Curriculum Guide for Go In Schools

by

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Mike Malveaux (Tacoma Go club) 6k; Dennis Wheeler (AGA) 13k; Mike LePore (AGA) 2d.

Purpose and Rationale

As I reviewed the teaching of Go literature, I failed to find any curriculum examples that satisfied several contemporary elements of curriculum development. First, there was no comprehensive approach to the development of Go curriculum and lesson plans. Second, there was no integration with the academic literature that was currently focused on standards-based reform. For 20 years in the United States, every state has developed standards that define academic learning goals for K-12 students. Go educators have a virtual gold mine from which to extract the lessons not only of curriculum development but also of Go teaching in light of these standards. Unless Go teachers can translate the standards approach into actual classroom practice in terms of what and how they teach and how they assess student mastery of the fundamentals of Go, they will have little or no effect on the formal development of not only novice, and amateur Go players, but also of professional Go players in the United States. In the field of education, research shows that "many schools lack understanding of the changes needed [to achieve standards-based reform] and lack the capacity to make them" (Elmore 1999). On the other hand, many Go teachers have used creative and effective strategies to increase student engagement and learning about Go. These Go teachers should record and share such practices with others who may have difficulty helping students achieve high levels of performance in Go.

Another objective of my constructing this curriculum guide was to introduce the concepts of curriculum mapping, and integration. Heidi Hayes Jacobs pioneered the concept of curriculum mapping both as a horizontal as well as a vertical articulation of the curriculum across all subject areas. When Sasha Orr discovered the political consequences of expanding his Go program in mathematics, he concluded:

> . . . I was reluctant to expand my teachings with an exclusive focus on the analytic, problem-solving and pattern-recognition aspects of the game, which the study of mathematics embraces. With only so many hours of contact time with elementary students for daily instruction in all subject area, I decided that I might run into a problem of justifying my go program if it continually inflated my math curriculum as it expanded in scope. This expansion would necessarily require cuts in other curriculum areas in order to accommodate increased time demands. I therefore decided to approach this task with caution. I certainly did not want to undermine my political success up to this point by drawing criticism for unjustified program cuts in mandated curriculum outside the field of mathematics. After a little thought, my solution to this quandary became obvious—in order for my go program to grow, it had to branch out into other content areas. (Orr 2004)

Orr's project introduced the idea that he needed to integrate Go across the academic areas of mathematics, language arts, social studies, and technology. This is consistent with Jacobs' articulation. However, in order for this concept to make practical sense, the Go teachers' lesson plans must reflect how they integrate the lesson into other curricula areas. Consequently, I have aligned my Go lesson plans with the indicated curricula areas as shown in the individual lesson plans.

The American Go Foundation has striven to help Go teachers build the capacity to strengthen Go instruction by assisting them with equipment and resources. It is particularly important for Go teachers to align their curriculum with their respective state's education standards to have a document that accurately describes all that they teach. A curriculum guide serves this purpose. It identifies the actual taught curriculum, and allows Go teachers to compare their curriculum with that of others who teach Go. For this reason, I became interested in this

project to establish congruence between what is taught in the Go lesson, and what is expected in state standards for student learning.

How is this curriculum guide different from lesson planning? Lesson plans describe in detail what and how a Go teacher intends to teach Go on a day-to-day basis—the sequence of activities, student grouping, and resources used. On the other hand, a curriculum guide records what content and skills are actually needed in the Go class during a longer period of time. The data provide an overview, rather than a daily Go class perspective, of what is actually happening over the course of the time period in which the Go teacher gives the classes.

Fenwick English (English 1980) pioneered curriculum development. He recorded the *what* of teaching (curricular topics, the content taught), and the *when* (actual time on task, scope and sequence of instruction, the amount of time spent teaching it). This view of curriculum evolved from the concepts that the quantity of instructional time affected student achievement. As I use this curriculum, I intend to meet with other Go teachers both to survey and to interview them to determine how much time they spent on topics to promote alignment with the curriculum. I have added another dimension to the improvement of Go instruction that I borrowed from the states of Alaska and Washington. This area is that of pedagogy (the art and science of teaching, especially instruction in teaching methods), particularly as it relates to cultural diversity and the teacher's sensitivity to the ethnic and cultural mixture of his/her students. Consequently, I have included in the appendices the standards from these states, and I have keyed the lesson plans to those standards. This process will reveal areas that we Go teachers must improve for students to achieve higher levels of expertise in Go. This information will be useful to me in identifying areas of strength within the curriculum, determining the instructional growth needs of the Go teachers, and developing and articulating revisions in the curriculum.

Yasutoshi Yasuda (Yasuda 2004) extended the definition for Go teaching to include the *how* of go teaching, because he strongly believed that the quality of a learning Go was as important as the quantity of time spent on it. Yasutoshi's approach was learner focused. In this respect, he paralleled in Go, what Jerome Bruner (Bruner 1959) described as the "spiral curriculum: how subject matter and mental operations can be 'continually deepened by using them in a progressively more complex form'" (Ornstein 1993). Consequently, the process I suggested was both vertical and a horizontal one that removes unnecessary repetitions, promoted alignment, emphasized cross-disciplinary connections, and encouraged a reinforcing and extending of essential skills with increasing complexity.

I constructed this curriculum guide for Go in schools to fulfill many of the design features of academic curricula guides. Consequently it contains discussions on the scope and sequence of a proposed Go curriculum, Go curriculum resources both electronic and print, American Go Association resources, and a discussion of the major trends and issues of Go education.

Another purpose I have for presenting this curriculum guide is to solicit suggestions from other teachers of Go. I appreciate that each Go teacher has his/her own approach to teaching the game. Upon initial inspection, the reader may claim that I have omitted the education standards for his/her particular state or locale. If those readers wish to see the guide reflect the educational standards of his/her state, country, or locale, please let me know. I will be happy to integrate those standards both into this curriculum guide and into the accompanying lesson plans. Consequently, I submit this curriculum guide in recognition that it is a work in progress that will greatly improve with the constructive suggestions of others.

About this curriculum guide

Increasingly educators have recognized the value of Go in education. It is popular in many school programs both as part of foreign language instruction as well as after-school activities. However, most schools in the United States do not offer a formal Go program. The reason for this was not that there was a lack of interest, time, or space. It was a paucity of qualified go teachers.

Most schools that have Go programs do not have professional go teachers. Individual teachers or people with an avid interest both in Go and in teaching Go run the schools' Go clubs. Given the increase in the popularity of Go in schools in the last couple of years individual volunteers have created new Go programs, not Go professionals.

I have planned *A curriculum guide for go in schools* for not only the unprofessional Go teacher, but also for those whose backgrounds were not in education. Contrary to some people's opinions, they found that teaching was not easy. While they knew something about go, they knew nothing about the art and science of teaching. I have met many Go teachers who were engineers or mathematicians. One of them told me that this publication would help them understand how to equip themselves with the educational tools to both help and to motivate others to learn how to play Go. If the teacher were at or above a basic skill level in Go, he/she could use this guide to help him/her to organize his/her own teaching program. If he/she knew very little about Go, I have discovered many fine books on how to play go even for adults. I have used Go software, for example the American Go Association's *Go starter CD*, and other beginner Go software programs, which gave the basic rules, and techniques of the game.

After the teacher has gained some knowledge of Go, I have designed this guide to help them in several areas:

1. to understand the concepts that new players must master,
2. a scope and sequence that could serve as a teaching schedule,
3. additional teaching resources

As this guide exposes you to the various topics of a basic Go curriculum, it will mention some additional teaching resources fro the teacher's use. Whenever relevant, the guide will demonstrate how to use components of Go teaching software programs both to advance the teacher's educational program but also to enhance the students'/players' enthusiasm. Consequently, the guide will contain many fine texts from publishers of Go books so that the teacher will have a wide variety of resources from which to choose as the teacher designs and builds his/her Go program. As the teacher investigates these resources, he/she should discover what many other Go teachers have found: when students play Go, they develop not only problem solving skills, but also a new respect for thinking in general. As other students discover the joys of playing Go, new enthusiasm for learning Go will likely result.

Lastly, I want to say a couple of things about the formatting conventions. For purposes of uniformity and consistency, I have used the style formats according the American Psychological Association's *Publications manual of the American Psychological Association 5th edition* throughout this project. Unlike many other published Go educators, I have avoided the gender confusion/bias that comes about when writers refer to Go players as "he/his/him" (Black), and "she/her" (White) (Kim). Consistent with contemporary efforts to put the genders on an equal footing, I use the convention of using the pronoun couplets "he/she," "his/her," and "him/her" to refer to each player whose gender is unspecified.

Introduction

It is difficult to choose an appropriate metaphor for the game of Go. Bruce Wilcox wrote that:

> Go takes on other meanings for its devotees: an analogy for life, an intense meditation, a mirror of one's personality, an exercise in abstract reasoning, a mental "workout" or an art form in which black and white dance across the board in delicate balance. (Wilcox 1990)

Roger B. White wrote that, "The game of Go is the essence of simplicity and the ultimate in complexity all at the same time. . . . Go is a game of skill involving no elements of chance" (Baker 2002). Whether one prefers to call it a "dance," "ultimate complexity," or an analog for "war," Go is an exciting game.

In the 15 step scope and sequence outline that I describe on page 38, I give what may appear to be discrete, unrelated parts. However, the teacher must approach Go in an integrated way. Heidi Hayes Jacobs' (Jacobs 1997) work in curriculum mapping was one of a series of efforts to assist educators to integrate subjects in a school's curriculum. Since my background is in education, I will call upon my experiences in the field to inform the present guide. I have reviewed many plans for teaching Go in schools. What my investigations have revealed is that this guide is a significant departure from the others, because it is firmly bassed in the pedagogy of education. The teacher does not ignore prior knowledge nor retire from an area he/she will cover later in any lesson. As the teacher helps the student build a strong base, a lot of cross-referencing should occur, and sometimes he/she will give a hint of things to come.

One of the major purposes of this guide is to provide a sequence of Go lessons. I acknowledge that there are many approaches to the teaching of Go, and I do not pretend to have the definitive answers for the "correct" approach. Even as I wrote this guide, I became aware of other important lessons: Bruce Wilcox' contact fighting was a good example. I would like to find a way to insert somewhere in the scope. There are those who would emphasize the study of joseki. While there is no question that this is good advice when teaching adults, I do not think they contemplated teaching a group of school children, some of whom might be as young as five or six years old, and may be developmentally incapable of understanding the concepts of aji and amashi. I know there are exceptions to this; I have seen some very talented young people, but they are not the norm. Young children want to start playing as soon as they can. Once they get the hang of the simple rules and the idea of capturing, they want information that will help them to understand how to make their stones work better together. Opening principles (fuseki), simple tactics (atari, tiger's mouth, and capturing) supply what they need and desire. Later, the finesses of yose moves in the ending will be more easily understood.

Since the 1960s, scientists (Gazzaniga 1978; Dennett 1991; Damasio 1994) have done extensive (though not exhaustive) studies on the brain. About 30 years later, educators, notably Robert Sylwester (Sylwester 1995), Patricia Wolfe (Wolfe 2001), and Barbara K. Given (Given 2002), have informed educators about the unique and complex needs of the brain of the learner/student. Simply stated, it is evident that the brain an amazing organ. The mind, which is like the messenger particle the photon, is what the brain does, and it seems clear that it is teleological, that is, purpose driven. The brain can only do what its "hard-wiring" is capable of doing at any given time, and it developed this way, through several evolutionary changes, to perceive reality. That does not mean that the brain consistently does this in a non-contradictory way. If we examine a "healthy" brain, we discover that there is no physiological reason for it not

to perceive reality in a consistent manner. Its major task is to make sense of the world. Contradictions and substitutions for reality cause the brain "pain" in its own way. If one persists in attempting to actualize substitutes for or to fake reality, one ultimately pays the price of temporary or permanent mental problems. In contrast, Go is arguably one of the most objective games. It starts on a very simple course, but the course very quickly branches out in an astonishingly large number of directions. As a go player's experience, and knowledge about the game increases, ideas combine and multiply, and feed new patterns for each other. It does not take the mind very long to develop a profound liking for the richness, the complexity, and the beauty of the game.

In this guide, I provide a framework for teaching Go to beginners, including school children. Anyone can use my ideas as a guide to help him/her collect his/her own teaching materials as he/she creates his/her own curriculum. If he/she does not wish to gather his/her materials from scratch, he/she can use the concepts I have presented along with the curriculum in this guide. The *Go Starter CD*, available from the American Go Association (P.O. Box 397, Old Chelsea Station, New York, NY, 10113-0397. Tel. 917-817-7080; http://www.usgo.org/index.asp), or on-line at http://playgo.to (the screen will come up in Japanese. Click on "English" in the upper right hand corner), gives you all of the tools you will need to teach the concepts I have outlined below—interactively, anywhere you, or your students are. Whichever path you choose to get the beginner (children or adults) playing, you can be sure of one thing: you will create an enthusiasm in your teaching environment that will help to make Go the "sport" of choice for many people.

Overview

In the United States, over the last 10-15 years most states' education departments engaged in systemic standards-based reform efforts, which define the academic learning goals for K-12 students. In this guide, I have included copies of the educational standards for two states: Alaska (Student Content Standards) and Washington (Educational Academic Learning Requirements (EALRs)). I have done this because I want to give the user the tools to understand how Go instruction can fit into this recent trend in education. The lesson plans I have constructed are aligned with these two states' standards. For those users who are unfamiliar with this trend, or just find the whole topic confusing, please let me know the state in which you intend to give your Go instruction, and I will be happy to align your state's standards with my lesson plans. In this regard, I hope to instill in the Go instructor the sense that he/she has a unique opportunity to become an active participant in improving Go teaching and learning. During my experience in education, I learned that unless a teach is able to actualize the standards into his/her pedagogical practice in terms of what and how he/she teaches, and how he/she assesses student mastery, the standards will have no effect on student learning. I hypothesize that the same thing is true of teaching Go. Research is clear that not only many schools, but also many teachers have a poor grasp of the fundamental changes needed to help students achieve the standards, and that they lack the capacity to make them. My experience with Go instructors informs me that they share the same deficiencies. That is why I engaged in this project. I want to give Go instructors creative and effective strategies to increase their Go students' engagement and learning. As Go instructors use this guide, I hope that they will record and share their practices with others who may be having difficulty helping all of their Go students achieve a high level of performance.

The process that I outline in this guide should enable the Go instructor to attain five goals: (1) align his/her Go curriculum, instruction, and assessment with state or national standards and assessments, (2) enrich go instructional practice, (3) increase understanding of results-oriented

Go teaching, (4) improve Go instructor communication and collaboration, and (5) increase students' Go achievement. I will paraphrase Hoyle, English, and Steffy (1994, p. 84) and offer three reasons for a Go instructor to approach Go instruction in a systematic way:

1. To ensure continuity of instruction within a Go class and among other Go instructors.
2. To ensure progressive skill development among Go instructors through continuity of instruction.
3. To maximize the use of student time, avoid unnecessary instructional overlaps, prevents gaps, and consequently minimizing boredom and ensure mastery of the lesson.

In the standards-based education reform climate, how well a Go instructor's lessons work depends, in large part, on how well he/she has aligned his/her Go curriculum with his/her state's standards. In concrete terms the Go instructor contributes to students' success in Go when he/she teaches what he/she expects the students to learn, and tests them on what he/she has taught. One way to assure this success is to build on a Go curriculum that is already in place. However, this ideal state does not exists in most Go instructional environments, and because what has been written as Go curriculum often is not what the Go instructor teaches in his/her lessons. This curriculum guide defines what *should* be taught, but I do not kid myself in thinking that it will affect what will actually happen in the Go lesson. I hope to change that, however. I hope that this guide will be more than just a well-intended fiction. My expectation is that this guide may encourage Go instructors to teach what they like to teach. Individual Go instructor decisions about what to emphasize, made in isolation and with good intentions, can actually contribute to a Go student's poor performance in play.

Building Go Instructor Capacity

In addition to the alignment activities that I described above, there are a number of scaffolding resources that I provide in this guide that will help the Go instructor identify the strengths and innovations in his/her curriculum and locate any areas that need improvement. One such resource is Bloom's cognitive taxonomy (see Appendix H).

Two other resources that will assist the Go instructor to extend effective and equitable instructional practices are Rankin-Hughes' *Dimensions of Thinking Model* (see Appendix I), and Howard Gardner's *Theory of Multiple Intelligences* (see Appendix J). Building on these theories, the Go instructor can use surveys and observations to determine his/her students' intelligences, and the appropriate dimensional strategy to use in his/her design of a variety of instructional activities to meet his/her students' diverse learning strengths. Because Go instructors also assess their own intelligences through this process, they are able to build on their individual strengths and promote teamwork between themselves and the regular classroom teacher, or, hopefully, an interdisciplinary team.

As Go instructors analyze their lessons and discuss the effectiveness of their teaching activities to improve student performance on the Go board, they will experience real professional growth. Go instructors learn from one another as they design lessons and assessments that are matched to standards.

Developing Relationships and Communicating with the Community

This guide and the accompanying lesson plans are useful visual tools for communicating with regular classroom teachers, school administrators, parents, and students about what happens in a Go lesson. When parents elect to have their child(ren) take Go lessons, they may want to learn more about the Go curriculum that the Go instructor offers. When regular classroom teachers, or teaching teams, share Go curriculum lessons with parents, they keep parents

informed about the expectations not only of their classrooms, but also those of the Go instructor. Seeing the Go curriculum for a period of time provides parents with an opportunity to ask questions of the classroom teacher, and the Go instructor. Some parents may even be able to offer resources or special expertise that can contribute to the Go topics their child(ren) is/are studying.

Students also benefit from seeing a Go curriculum guide. The guide helps them become better informed about what is expected of them in the go lesson. Students also learn to take mare responsibility for their work when they known in advance what the Go instructor expects. This Go curriculum guide can help to stimulate students' curiosity and to activate their prior knowledge as they begin to think about what they will learn over the next few weeks.

The school and district administrators of the schools in which Go instructors teach can use this guide for documentation and verification of standards-based instruction for their respective state departments of education. Some states have a policy requirement for school accreditation in the state.

Using Resources Effectively

While reviewing this guide and the accompanying lesson plans, Go instructors also should consider ways to upgrade their teaching strategies and materials. As go instructors analyze their lessons, and compare their instruction with student performance data, they may identify ways to use Go instructional strategies and resources more effectively. Sometimes this means that a resource or strategy that is successful for one Go instructor may be adopted or adapted by others who identify similar needs in their lessons.

Conclusion

This Go curriculum guide provides a process by which Go instructors can become active participants in improving Go teaching and learning. Because I built this guide on educators' strengths and creativity, and focuses on students' learning strengths, it is an educator –owned and student-centered process. When Go instructors record their student's actual learning experiences, go instructors "own" the curriculum, and therefore, have a greater investment in implementing and sustaining improvements.

This guide also encourages student creativity. Because the scope and sequence show students what they will learn, students are motivated to think about questions they may have about the topics or ideas for projects they may wish to pursue. Many Go instructors engage students in developing essential questions for each concept or unit. Also, go instructors frequently design a range of learning activities and assessments that provide choices for students and allow them to use their unique talents and interests.

This guide supports the primary activities that facilitate standards-based reform, and because it is a tool that builds on Go instructor and student strengths and creativity. This guide is a contribution to what may be the most effective process for not only improving education, but Go instruction as well. Many education reforms have come and gone over the decades without achieving their desired goals. Their failures have been due largely to lack of adoption or sustainability because they were "from on high." This guide begins with what Go teachers are already doing well; it is a grassroots process that I built on what is effective and innovative. The guide provides opportunities for critical review of the effectiveness of Go instruction by keeping the focus on student learning results.

In this age of accountability, this guide can help schools, go instructors, and students achieve their complementary goals. This situation comes about because the guide provides a

comprehensive professional development tool for using data in Go instructional decision-making, aligning Go with other academic areas, determining instruction, assessing with standards, and designing innovative and engaging classroom go instruction, it is a powerful tool that can help transform the beginning go player into a high performing Go player/ Also, because it is not a "silver bullet," like so many other educational reforms that have failed. Guide may well hold the future for real and sustainable go instruction.

Major Trends and Issues

Stages of Go Curriculum Development

I am sure that Go teachers would not necessarily agree on the specifics of each stage of developing their Go curriculum, and lessons. Most educators agree, however, that components of the process could be delineated into four stages: (1) planning and preparing for Go curriculum design, (2) reviewing a lot of the Go curriculum that Go instructors teach, (3) revising and aligning the taught Go curriculum with standards and assessments, and (4) validating alignment and planning for continuous Go curriculum improvement.

Planning and preparing for Go curriculum design

Before beginning Go curriculum design, a Go instructor (and the classroom teacher, if he/she is in a school) must make certain decisions regarding purpose, policies, and procedures, and clearly communicate them to everyone involved. A Go instructor and the classroom teacher should not begin creating a Go curriculum without thoughtful analysis and careful planning of the needs of the school and its students. This planning stage is the time to determine and to communicate the "whys" and benefits of Go curriculum design.

Go instructors should use data-based decision making at least six months prior to beginning Go curriculum development. They may review drop-out and graduation rates as well as student attendance and discipline records. Careful analysis of school, and classroom student achievement data can help the Go instructor identify specific areas of strength and weakness in student performance, problems with alignment between the Go lessons that he/she wants to teach, the state standards, and his/her professional development needs. These data also provide goals for school improvement that schools can incorporate into the strategic plans that they develop.

Reviewing Go curriculum

Because the purpose of this stage is to collect authentic data about what is taught in the course of a school year, it makes sense to begin Go curriculum alignment on the first day of school, if not before. However, it will be necessary to have some good data to begin with. Consequently, the Go instructor should conduct a review during the first year so that the data are rerecorded as Go teaching and learning actually occur. Most schools schedule several planning and professional development days ("LID" days in Washington State) prior to the beginning of the school year. Ideally, if the school/district has some summer curriculum development activities, that would be an excellent time for the Go instructor to become involved in curriculum planning.

Whatever steps a district takes to accomplish the introduction, curriculum leaders, including the Go instructor, should be sure to take the following steps:

1. Provide an overview of the Go curriculum process that explains the "why" and "hows."
2. Emphasize that the Go curriculum is a "strengths" model, not a "deficits" model. It capitalizes on what is sound, innovative, and creative in existing Go lesson practice.
3. Give a time frame for completing the Go curriculum (monthly or by grading period is recommended).
4. Show classroom teachers samples of the Go lessons (in the format that the district prefers).

5. Explain that it will be necessary for the Go instructor to complete the curriculum so that he/she can gather realistic data about the curriculum and build on the existing strengths in Go instructor and student performance.

Once the Go instructor has begun his/her classes, he/she should involve him/her self in weekly or bi-weekly team meetings during a common planning time. Team meetings are essential in smoothing the progress of the Go curriculum, and in promoting reflective, results-oriented teaching. In an elementary school, a team is generally all those teachers who teach a particular grade—or grade cluster in a multi-age setting. At the middle school level, interdisciplinary grade-level teams are more frequent. In high schools, a team may be interdisciplinary, departmental, or just whoever has planning during a certain block. In all settings, teachers of special education and exploratory or elective programs (e.g. art, music, physical education, Go) should share their curriculum and meet intermittently with teachers of core classes to coordinate student learning experiences.

Team meetings provide time for the teachers and the Go instructor to support and encourage the curriculum alignment process and to ease communication across the building. Many go instructors are concerned about what data they should keep about their lessons. They should record the topics, themes, or skills that they actually teach. After the first month or grading period, team meetings become a time to review and analyze the data collected. Using computer programs also makes communication, net-working, and data analysis possible.

Jacobs (1997) recommends that review and analysis take place after the completion of a year of lessons. However, if the go instructor uses the diary method (i.e. recording what happens in the classroom in real time), he/she should conduct more frequent reviews an analysis of the curriculum data. One practical reason is that so much is going on at the end of the school year that teachers are usually tired, which can lead to incomplete or inaccurate review and analysis. It is also important to begin instruction modification based on lesson and student achievement data as soon as possible, keeping in mind that the ultimate goal of the Go curriculum is to produce a coherent Go curriculum that is aligned with standards, builds on his/her creativity, and enables all students to be successful.

During the first year of Go curriculum use, team meetings should focus on establishing common goals for student learning; identifying consistencies, differences, and innovations in curriculum and instruction within grades or courses; finding opportunities to connect and to reinforce learning across the curriculum; noting unintended curricular gaps, and repetitions; and sharing resources and teaching strategies that promote student learning.

Research has shown that team meetings help enhance teaching practice and curricular coherence. Teachers become critical friends as they share effective and ineffective instructional practices with a focus on student engagement and learning. As teachers review their lessons to identify examples of instruction to share with others, the might consider the following six criteria for innovative and effective instructional activities:

1. They address the requirements and expectations of specific standards (note the use of verbs such as plan, investigate, create, describe, compose (these features would be considered to be among the “higher order thinking” skills that Bloom (Appendix H) lists in *Analysis, Synthesis,* and *Evaluation*)).
2. They encourage students to participate actively (for example, students teach lessons, create projects, design experiments).

3. They ensure that all students learn to their full potential by addressing multiple intelligences and learning styles.
4. They connect lessons to the real world through example, application, process, information, and so on.
5. They require students to use higher-order thinking skills (see Bloom's taxonomy in Appendix H).
6. They provide choices for students.

As the teacher(s) and the go instructor learn from one another, they become more creative in designing instructional activities and units. Furthermore, the teacher(s) and the Go instructor develop expertise in aligning knowledge and skills to the language of standards and in adapting or adjusting innovative practices as needed to meet standards. Through discussion, and collaboration, the teacher(s) and the Go instructor find effective ways to connect and reinforce learning across the curriculum. Finally, the teacher(s) and the Go instructor develop a greater sense of efficacy through a shared commitment to goals for student learning, and in this way team meetings usually evolve into professional learning communities (Senge 1990).

Another critical area of the Go curriculum process is professional development focused on specific needs that emerge from student achievement data or that the Go instructor identifies as he/she reviews Go lessons from other go instructors. Although team meetings promote continuous professional growth, often the teacher(s) and the Go instructor will need to be introduced to new research, for example Gordon Cawelti (Cawelti 1999), Kathleen Cotton (Cotton 2000), Jere Brophy (Brophy 1992), Herbert J. Walberg (Walberg 1990), and Larry Lezotte's *Effective schools research abstracts*. Although needs may vary from Go instructor to Go instructor, some common needs can be identified. For example, if reading scores are low, the teacher(s) and the go instructor may need additional strategies for improving literacy; if achievement data indicate that certain groups of students are performing consistently lower than others, teachers and go instructors may need more information on how to differentiate instruction. As teachers and go instructors review curricula within or among schools, they may identify particular content, skills, or standards that students have difficulty mastering or which they need alternative teaching strategies.

Benefits for the school and your students

Traditionally, teaching has been an isolated profession. From my observations of go instructors, I conclude that they, too, are isolated. Although teachers and go instructors may work together in the same building for a long time, they may have little knowledge of what others are teaching outside their own teaching environment. In this context, Go curriculum decisions are made in isolation. However, research (Sammons 1995; Cawelti 1997; Fitzpatrick 1998) suggests that in successful schools, and by implication, successful Go instruction classrooms, the curriculum is based on clear and shared learning goals, and the faculty conducts periodic review of the curriculum documents. There is clear documentation of the relationship of the goals to specific objectives, instructional activities, and student assessments.

Go curriculum development can help the go instructor, and the schools in which they teach, become successful. It promotes communication, and collaboration across and between grades. It can help Go instructors make curriculum instructions within a much larger context. Communication and collaboration lead to shared goals for student learning; a focus on student work; and connected, reinforced, and spiraled learning experiences in the go curriculum.

As Go educators undertake curriculum development, and review in their individual classes, however, they should remember the bigger picture—the school's and the district's

evolving academic curriculum. Go curriculum development allows a Go instructor to make a positive contribution to an institution's written curriculum that is aligned with the tested curriculum in that state.

Procedures for Go Curriculum Development, Integration, and Alignment

For the Go educator who wishes to professionalize his/her curriculum, lesson planning, and instruction, I will be happy to consult with you in your efforts. If such a project is not your Go stone, then, I recommend that you keep in mind the following phases:
Phase 1: Collecting the Data,
Phase 2: The First Read-Through,
Phase 3: Mixed Group review Session,
Phase 4: Large Group Review,
Phase 5: Determine Those Points That Can Be Revised Immediately,
Phase 6: Determine Those Points That will Require Long-Term Research and Development,
Phase 7: The Review Cycle Continues.

About the author

Gordon E. Castanza, Ed. D. is a retired educator from the state of Alaska, where he served 23 years as a high school teacher, a computer education specialist, principal, Federal Programs Director, and Superintendent of Schools. He holds a doctorate in educational leadership from the University of Nevada, Reno. He taught master in teaching students at City University (Tacoma, WA) curriculum and instruction, classroom management, fundamentals of teaching research, Mathematics concepts and methods, and supervised over 150 teacher interns. He is the author of one book, *Alaska's Charter Schools: Freedom and Accountability* . He has written a chapter, *Aleut Evacuation and Internment in World War II*, in Jerome Hagen's *War in the Pacific*, Vol. III (in press). He is currently working on his autobiography, *Went Into the Country: The Decline of Educational Leadership in Alaska and the United States*, in which he recounts his years of educational service in Alaska. He is the Chief Financial Officer for *Rittenberg Consulting Group*, a corporation that specializes in providing business and education consulting services to U.S. business people and educators wishing to do business in the People's Republic of China.

Go Curriculum Resources

The resources that I offer here are ones that people in the field have found useful. The list is not intended to be inclusive.

Electronic Resources

1. http://playgo.to/interactive/index.html. Interactive tutorial to learn to play; requires java.
2. http://senseis.xmp.net/. Senseis Library – collaborative, comprehensive study site and community.
3. http://www.gobase.org/. GoBase – pretty much a go encyclopedia.
4. news://rec.games.go. International Usenet newsgroup devoted to go; it can be tough filtering the nuggets from the sludge, but it's frequently worthwhile. It was ***the*** interactive "bulletin board" for go players until Senseis Library started. (Also accessible via Google Groups – http://groups-beta.google.com/group/rec.games.go).
5. http://kgs.kiseido.com/. Kiseido Go Server is probably the most user-friendly place to play go online, and has worthwhile study material (including an interactive "how to play" tutorial). Client must be downloaded and installed; requires java.
6. http://www.britgo.org/. British Go Association's site has lots of great info and links.
7. http://www.usgo.org/. American Go Association's site, almost as good; the Bob High Memorial Library is worthwhile.
8. http://www.xs4all.nl/~rongen17/. Jan van Rongen's "Friday Night Files" have games by pros like Cho Chikun and Yamashita Keigo, and much analysis of the games that appear in Hikaru No Go, as well as reports of trips to Korea and China.
9. http://waterfire.us/joseki.htm. Kogo's Joseki Dictionary has a zipped SGF file that shows most of the joseki that have been generally accepted, including some recent additions from Korea. Users will need a way to unzip the file (pkzip, winzip, or similar program), and a way to view SGF files (cgoban – the KGS client – works; so does jago). Includes links to SGF viewers.
10. http://www.goproblems.com/. Go problems to study, requires java.
11. http://www.msoworld.com/mindzine/news/orient/go/go.html. The Mind Sports Olympiad go site has not been updated since 2001, but it remains a great source of study material and information about Asian go culture and history.
12. http://www.dragongoserver.net. A turn-based server for all levels of players who wish to play others from around the world on-line.
13. http://www.littlegolem.net.
14. http://www.pandanet.co.jp/English/. This is the IGS go server that provides opportunities for players to play on-line.
15. http://www.nihonkiin.or.jp/lesson/index-e.htm. Has information about Go, Go lessons (a place to start), and exercises (improve by solving problems).
16. http://www.goproblems.com/. A web-based site for solving graded go problems for all levels.
17. http://gobase.org/. A pretty good site for a wealth of information about Go. Almost encyclopedic.
18. http://www.smart-games.com/manyfaces.html. David Fontland's *Many Faces of Go*: "**"The Many Faces of Go"** is the 2002 World Computer Go Champion, 1998 World Computer Go Champion, and ten time US Computer Go Champion. It is one of the strongest Computer Go opponents in the world, and has many other great features including an integrated IGS client

so you can play on the internet. A sophisticated set of go problems and a Joseki tutor help you improve your game."

19. http://www.go4go.net/english/. "Go4Go.net is a comprehensive web site promoting the ancient Oriental [Chinese] game of Go (or Weiqi, or Baduk) in North America. At the time the site was established, Chinese was selected as the primary language of the site because the targeted visitors are Chinese-speaking students and scholars living in the USA. However, as the popularity of the site grew there were many requests from English-speaking friends for an English version. Making an English version is not as simple as translating the text, and the translation itself can be quite difficult. What we decided to do first is to make the Game Collection section available in English, and then gradually add in new content."
20. http://www.pandanet.co.jp/English/. The **Internet Go Server**: "**PANDANET** is a network that uses the [Inter]Net to play Go. IGS PANDANET links Go fans in countries all around the world, so people everywhere can become friends through playing Go. IGS PANDANET never rests: you can play or view games throughout the whole year, whenever you feel like it. We have 40,000 members in about 100 countries around the world, and their level ranges from beginner to expert, so you can easily choose suitable opponents. The game-playing and viewing software PANDA-EGG is mouse-centered and is easy and simple to operate. Games you play or view are automatically stored; you can add comments or explanatory diagrams and print them out. The rating system has a ten-year record of performance and reliability. The computer will accurately compute your rating according to your results. We are the first network to provide the option of Pair Go. Four people in different countries can team up in two pairs and play each other." On the IGS "Home" page, click on "An Intr4oduction to the Game of Go," to get a concise set of rules for Go, or use this following link: http://www.pandanet.co.jp/English/learning_go/learning_go_1.html .
21. http://nwgo.braindog.org/. The Northwest Go Server. Has the "look-and-feel" of the Dragon Go Server.
22. http://oregongo.org/. "This is a site dedicated to providing a resource for Go players (or just those interested in the game) in the Oregon area. For a list of meeting times and locations, check out the **clubs** page."
23. http://www.seattlegocenter.org/. The official web page for the Seattle Go Center, one of only two Go centers in the United States (the other is in New York City). The SGC publishes a monthly journal, **Yomi**, and readers can read it at: http://www.seattlegocenter.org/yomi.php.
24. http://www.pipeline.com/~newyorkgocenter/home.htm. The official web page for the New York Go Center, the second of two Go centers in the United States.

Print Resources

1. See http://www.gobooks.info/ for even more.
2. Go in a nutshell – one of these 3 (they're all good):
3. Go: A Complete Introduction to the Game (Cho Chikun)
4. The Magic of Go (Cho Chikun)
5. An Introduction to Go (Davies & Bozulich).
6. Learn to Play Go (Janice Kim) – a 5-part series; the first one is a good introduction to the game and includes a cardboard go set; the rest get progressively more advanced.
7. The Book of Go (William Cobb) – uses the "first capture" game to introduce the rules; includes a cardboard go set.
8. Graded Go Problems for Beginners (Kano Yoshinori) – a 4-part series; the first one is great for beginners, the rest get progressively harder.

9. The Second Book of Go (Richard Bozulich) – not for absolute beginners, but very helpful once one has played a few dozen games.
10. Life and Death (James Davies).
11. Tesuji (James Davies) – finding the "super" move, generally in a tactical situation; how to read the board in fights.
12. Whole Board Thinking in Joseki (Yang & Strauss).
13. Lessons in the Fundamentals of Go (Kageyama Toshiro) – Not so useful for beginners, but excellent for those around 15k and stronger. This review was written by Christopher Gronbeck (4k): "Toshiro Kageyama's 'Lessons in the Fundamentals of Go," first published in 1978, is not your typical go book, in that its format diverges from the conventional strict focus on diagrams, analysis and problems. It covers critical fundamental go concepts, to be sure—common tesuji, the fundamentals of shape, liberties, endgame strategy, cutting and connecting, etc.—but it's written almost as a conversation with Kageyama, drawing unabashedly from his personal experience. He is concerned with process as much as content: not just what's being learned, but how you learn. And he's not afraid to go off on tangents about television, baseball, or traffic safety posters.
    "The book succeds by being interesting and alive. I could almost hear Kageyama's voice when he concludes: 'Joseki are not to be learned, but to be created.' The material in this almost 300-page volume is appropriate for an unusually wide audience, since the style and exposition is so intriguing; certainly anyone from 15 kyu to low dan would find it interesting, useful, and definitely entertaining."
14. Go World magazine.
15. Hikaru no Go. The Japanese magna and anime series that has been translated into English. It recounts the encounter of a dis-affected junior high school boy in Japan with the spirit of Go, Sai, that he finds emerges from a Go set his grandfather had stored away in a trunk. Younger children seem to like it, but there are some Go bad-manners in the book.
16. Go Players Almanac 2001 (Richard Bozulich) – If you get only one go book your whole life, make it this one.
17. Appreciating Famous Games (Ohira Shuzo) – has games by famous Japanese players from the 19th century and earlier. Ten games are analyzed in significant depth, with snippets of commentary on the historical context; another nine game records are included with almost no analysis. (These are not the ***most*** famous games of the classical era; "Ear Reddening" and "Blood Vomiting" are not included).
18. EZ-GO: Oriental Strategy in a Nutshell (Bruce and Sue Wilcox) – Refreshingly different from most go books; the chapters on sector lines and piecemeal vs. wholesale, as well as Wilcox's general approach to the game, should be helpful for anyone stronger than about 25k.
19. The Way of Go – Barker. Available from: http:// www.usgo.org/usa/waytogo/index.asp.
20. The Master of Go – Kawabata.
21. Basic Techniques of Go – Haruyama/Nagahara
22. Attack and Defense – Ishida/Davies
23. Opening Theory Made Easy: Twenty Strategic Principles to Improve your Opening Game (Otake 2002). Bob Barber, 1k provided this review from the E-Journal 7/6/04: "I love this book. It's the one I carry when flying on a plane. Here are the very basic fundamentals we all need to start a game correctly: 3rd line vs. 4th line; extend in front of your shimari; don't permit hane at head of two (or three) stones; don't push from behind, etc. Each of the 20

principles is well illustrated, and the reader is asked to find the proper next move. There is a section on shape; empty triangle bad, ponnuki good. Don't atari automatically. Don't connect weak stones. Make moves with more than one meaning. Play away from strength. And don't try to save every last one of your precious stones.
"Most of us have heard these admonitions countless times. For those who haven't, this book will be a real eye-opener. And for those who have, this book offers valuable reinforcement with very clear diagrams. . . . few stones on the board, and stick to the basics. Having a good opening will not ensure that you win the game. But if you come out of the opening with a better position, it's your opponent who will be chewing [his] her nails, and not you."

24. The Game of Go: The National Game of Japan – Arthur Smith.
25. The 1971 Honinbo Tournament – Iwamato.
26. The Magic of Go – Daily Yomimuri
27. Qijing Shisanpian (The Classic of Weiqi in 13 chapters).
28. Go for Kinds – Milton N. Bradley. Yutopian Press. "This is a Go primer [that] represents what I've learned from 50 years of teaching beginners, especially the eight yeatrs in the 1990's during which I taught over 700 primarily third graders thru fifth grade children in my after school Go program . . . ."
29. Handicap Go (Vol. 7 of the elementary Go Series) – Yoshiaki Nagahara and Richard Bozulich.
30. Get Strong at the Opening – Richard Bozulich. Kiseido Publishing Co. A beginning book about the important concepts of the opening presented in a problem format.
31. http://www.ishigames.com. "Ishi Press International has been bringing you the finest in Asian gaming equipment and books since 1986. We offer a wide range of products, but if you don't see what you're looking for, please ask.
32. http://www.kurokigoishi.co.jp/english/. A source of clam-shell Go stones. "We strive to maintain not only the glow and the beauty of the clam shell itself but also the usefulness, the attractive shape, and the feel of the Clam Go Stones."
33. http://www.slateandshell.com/. A source for all sorts of Go equipment from books to sets. "Slate & Shell is a publisher of Go books and seller of Go software and equipment. Slate & Shell was created by three active go players in the Fall of 2000 to promote go, primarily by publishing high quality go books in English. We produce books for every level of player, from beginner to advanced. Slate & Shell is also the distributor of MasterGo, software which is a dramatic breakthrough for studying joseki and fuseki."
34. http://www.samarkand.net/. Founded by Janice Kim, author of the *Learn To Play Go* series. "Samarkand is the professional source for Go books, equipment and software. We offer a range of fine products for Go enthusiasts of every caliber and taste. Every item we carry is reviewed by a group of dedicated Go players, and we don't carry it unless it passes the key "hey, can I get one of these?" test. We hope you enjoy exploring our catalog and growing collection of Go resources."
35. http://www.yutopian.com/. Although it is, in general, a "Chinese Culture Homepage," it offers a smorgasbord of items for the Go player, including a comprehensive listing of Go software.
36. Kageyama, *Lessons in the Fundamentals of Go*. No Go book can do it all, but this one comes close. You will enjoy reading over and over as a kyu player and as a dan player.
37. Bozulich, *The go Player's Almanac*. A great general resource on the game, rules, people, history, equipment, etc.

38. Bruce Wilcox, *EZ Go*. Very strange, large book, with lots of great principles. "Buy wholesale, sell retail" is my favorite lesson, and the "Great Wall" opening is fun to try.
39. Yang Yilun, *Whole Board Thinking in Joseki*, Vols. I and II. Fantastically put together books on choosing joseki according to the situation. Stones clear across the board become relevant after reading Yang's volumes. I always feel stronger after reading these books.
40. *Go World*. Quarterly English journal on the state of professional Go. Games, life and death problems, personal notes.
41. *Nagahara,* Strategic Concepts of Go. An old book but there is a lot of insight into timing of moves; needs to be read more than once.
42. *Hong, First Kyu.* Great, if not well written. A story about a young Korean's quest to become a professional Go player.
43. *Kajiwara,* Direction of Play. A great book on how games can be won at the opening. The author is fun to read, too.
44. Wu and Yu, *The Art of Connecting Stones,* and *The Art of Capturing Stones.* A neat set of problems illustrating non-standard ways to link up stones or kill stones.
45. *All About Joseki*, by MingJiu Jiang 7p, and Guo Juan 5p. "This is the second book in English by MingJiu Jiang, well known professional player and respected teacher. His co-author, Guo Juan, [is] one of the most popular teachers of go in Europe and the US today. *All About Joseki* uses a series of amateur games to illustrate issues about joseki, established corner play sequences. In the first part, mistakes in joseki sequences are analyzed and corrected, while in the second part the problem of choosing the correct joseki for the board situation is the focus. The aim is to help players understand what joseki are all about: why particular joseki work better in particular situations than others do. The key is to grasp the principles that guide the development and choice of joseki. These experienced teachers know how to help you do that" (from a *Slate & Shell* review).

The Curriculum

Beginning Curriculum

Phase 1: Pre-Go Skills

If the Go instructor is interacting with very young children, or those with a dearth of basic skills and concepts, he/she may have to spend some time on the fundamentals of Go. Although he/she may be surprised that he/she would need to cover these ideas, if his/her students do not understand a few simple concepts, they will never get beyond the first few lessons. I call these "pre-Go skills."

It all starts with the simple idea of the straight line:

1. The Go board is a large square (well, for the Japanese style board it is not exactly a square), joined by four right angles. Inside the large "square" there are 324 smaller squares that are formed by drawing 19 vertical lines and 19 horizontal lines that create 361 intersections or points.
2. The Go board is a pretty straight forward Cartesian grid. This makes it easy to "name" each intersection with a letter and a number. (I will explain more about this later).
3. The "pieces" are called "stones," which are placed on one of the intersections. Once one places them on an intersection you can not move them (except in capturing, which I will explain later).
4. The three straight lines in Go are vertical, horizontal, and diagonal.

Consequently, the first part of any Go curriculum should be an understanding of straight lines, right angles, squares, rows of squares making up the ranks (horizontal dimension), files (vertical dimension), diagonals, and the naming of the intersections on the Go board. Not only is this the most logical way to proceed, it is also essential for future communication between the Go instructor and the student(s), as well as communication between players.

Depending on the age of the students and the size of the class, this phase can take anywhere from one-half a lesson to several lessons. For a class of a couple of dozen Kindergarten students meeting once a week, the Go instructor may need to reinforce these ideas in every lesson for many weeks as he/she progresses through the next phases. Some Kindergartners come to school knowing the alphabet, how to count, and prepared with a lot of other skills that may speed up the learning. Other students may not even know there is an alphabet. Obviously, those students who are unable to recognize letters or understand the sequence of the numbering system will encounter difficulties, especially in the area of naming intersections in an alpha-numeric grid. Generally speaking, older students should grasp these ideas more quickly.

Once the go instructor is confident that his/her students have mastered the pre-Go skills, he/she is ready to explain the rules of the game itself. I've separated this section into several units (Phases II – IV). Depending on the social maturity and life experiences of your students, these lessons may go quickly or slowly.

The American Go Association's basic tutorial CD, *Go Starter CD* covers many of the lessons the Go instructor needs to teach in this next part of the curriculum guide. With lessons focusing on all of the fundamental concepts, special moves, plus many interactive puzzles for kyu level players, and counting the endgame, the Go instructor's students will have ample opportunity to learn and to practice all the basics (and an adult new to Go will always be able to stay a step ahead of his/her student(s).

Phase 2: Basic Moves and Rules

In this phase, the instructor teaches the student how stones are placed on the board, followed by how stones capture an opposing stone or group of stones. As in Phase 1, the maturation level and the number of students are determinants of the amount of time it takes for them to learn this material.. If your students are meeting only once a week, some homework based on the lesson is very important. It is important that the instructor provide some reinforcement during the interval between lessons. (Since it is likely the students will view solving Go problems more as a game than homework, this is where the interactive tutorials in the *Go Starter CD* come in handy. Copy the problems onto over-head transparency film, or give them to the students as handouts.

Phase 3: Special Moves

Since the stones do not move on the board, this phase addresses the special tactics of subsequent stone place. The *hane*, one-point extension, two-point extension, knight moves, and large knight move are examples of "special moves." Once again the interactive teaching tools on the *Go Starter CD* are invaluable in this respect.

Phase 4: The Value of Tactics

In this phase of learning Go, the student learns the relative merits of different tactics. The choice between a ladder and a net are two examples of such a choice. Other examples are deciding to cut or to connect, good/bad shape, and proper and improper moves. Two or three lessons in this area, along with supervised exercises, should be sufficient for the students to get the point.

Phase 5: Beginning Tactics

Next, the students should learn some fundamental tactics such as the first moves of the game, the 3-4 point, the 3-3 point, the 4-4 point, the 3-5 point, the 4-5 point, extending along the side, squeeze plays, invasions, extending into the center, and pushing and crawling. At this time, the go instructor need not concern him/her self with *creating* the positions that give rise to these tactics, but simply in helping his/her students *recognize* what they are and how to take advantage of them when they appear. In other words, the Go instructor should be aiming for a very elementary understanding of basic tactics at this time. Two to three lessons (with home-work) of twenty to twenty-five minutes before letting his/her students play a game should be enough to get these ideas across. If the instructor uses the *Go Starter CD*, the first part is devoted to these beginning tactics. Along with *Go Problems for Beginners*, the *Go Starter CD* has many puzzles that cover all of the basic tactical ideas so that students get ample practice with every concept whether they do the puzzles on the screen or on handouts that the instructor creates.

Phase 6: Opening Principles

The sixth section should be an in-depth look at Opening Principles. Without an understand of what should be accomplished in the opening, the beginning Go player will make all sorts of random and irrelevant (wasteful) moves. This is when the student begins to get into ideas that are more difficult to take in because there are so many irrelevant possibilities on the board; most of the possible beginning moves are not very good. It takes a lot of practice and a lot of coaching for students to begin to make good moves with understanding. At this point, students will be playing a lot, and there will be many opportunities to give a group lesson, and to follow it up with an assessment to see how individual students are retaining the information. Allow five or

more lessons to introduce and to reinforce an elementary understanding of the opening principles. *In the beginning: The opening principles in the game of Go* (Ishigure 1995), is a handy resource for players during this phase of teaching. (Remember that the Go instructor is still in an early phase here. He/she is covering principles rather than an in-depth study of specific openings (joseki). Those will come later).

By the time the Go instructor has completed Phase 6, his/her students should be playing recognizable and reasonable games of Go. The students will, of course, make moves that would make a *dan* player cringe. Never the less, the players should show some real Go thought and Go understanding. However, the Go instructor would make a mistake to expect a lot at this phase. Players will usually perform glaring over sights for several years to come.

Advanced Curriculum

As students play more games, they should become comfortable with the basic rules, special moves and tactics of the game. They should be able to play through complete games (although with frequent questionable moves). They should have all the basic tools they need to make the transition from Go *players* to Go *thinkers*, in which they learn to plan ahead and to create their own opportunities.

Teaching at this level may require someone with more than a basic knowledge of the game. Sometimes the go instructor may choose to bring in professional Go players, other go teachers, or higher level players to give lessons on these advanced topics. Please be aware, though, that good Go playing does not always translate into good Go teaching.

If the Go instructor does not have access to these resources, he/she should not give up. If the Go instructor is just a beginning player him/her self, he/she can go through the suggested materials first, and stay one step ahead of his/her students as he/she teaches them what he/she has just learned.

Phase 7: Strategic Thinking—Getting Beyond the Basics

In this phase, the Go instructor can introduce students to come complete games. I like to use games of Jie Li, 2003 and 2004 U.S. Open Champion. These games serve as an excellent springboard to dive into deeper waters of tactics, timing, territory, influence, eye space, and live groups. At this point, most players are not ready for a lot about joseki, but simple notions about ponnuki, iron pillar, and bamboo joint, but you can touch upon them especially as they relate to good shape and connecting stones. Jie's games are also extremely helpful for exploring some very important opening strategies such as extensions and fuseki (frameworks). Jie's games beautifully blend the opening to the middle game (there aren't a lot of end-game struggles in a Jie game, because he usually wins way before the true endgame is reached). A few Jie Li games (one week before the students play each other) should give a lot of room for discussing many new Go ideas, such as Jie Li's favorite "low Chinese" opening and its practical implications. Unfortunately Jie Li has not published a book on his approach to Go.

Phase 8: Creating Opportunities

In the eighth phase, more on tactics and shapes is essential. Now with a few of Jie's games under their belts, and many games they have played, it is time to start looking for ways to create "tiger eyes," "dog's neck," "horse's neck," avoiding the "ladder," and creating "ladder breakers," and other opportunities to foil one's opponent that occur in every game. At this time, the go instructor may want to have his/her students work through one and two move tactical

puzzles. Some excellent sources for puzzles like this would be Kano Yoshinori's *Graded Go problems for beginners, Volume One Introductory Problems* (Yoshinori 1985).

Phase 9: More Patterns

The ninth phase should be an extended journey into capturing patterns. Assuming the students have been doing some capture in one problems in every lesson, or have gone through Section 1 of the Yoshinori volume, it is now time to delve deeply into capturing races, ko, and two and three move capturing problems. Six or seven fifteen minute lessons with these before the students play their own games will go a long way to developing their skills. The Sensei Library web page, http://senseis.xmp.net/?BeginnerExercises, the GoBase web page, http://gobase.org/studying/problems/, and the Go Problem web page, http://www.goproblems.com/ are three excellent sources for capturing illustrations and puzzles.

Phase 10: Endgame Strategies

Toward the end of this curriculum plan is the study of the endgame. Beginning with the notion of "life and death," the student should learn about sente, the monkey jump, counting, crane's nest tesuji, the snapback, "under-the-stones," and gote. Available at http://senseis.xmp.net/?TheEndgame, Tomoko Ogawa and James Davies' book *The endgame* (Ogawa 1976)is an excellent source for teaching about the endgame.

Phase 11: Specific Openings

In the final part of the curriculum, the Go instructor should work on some specific opening patterns. You can examine such stalwarts as the niren-sei, the sanren-sei, the Chinese opening, and the Shusaku opening. Richard Bozulich's *Get strong at the opening* (Bozulich 1996), and Otake Hideo's *Opening theory made easy* (Hideo 2002), are two excellent resources for teaching opening strategies.

A good way to teach an opening is to pick a great game with the particular opening, and, using that game as a touchstone, show other ideas that could have been played in the first 12 to 15 moves. Always follow through with the rest of the game, so the students will understand that the opening does not exist in isolation, but is aiming toward a middle game plan, and that, in turn, often is a set up for a superior position in the endgame.

Time Requirements

I do not hazard a guess at the approximate amount of time it would take to teach the different steps in this curriculum. I leave that up to the Go instructor to determine based on his/her appraisal of the strengths/weaknesses of his/her students.

Basic Equipment & Teaching Materials

Besides the obvious Go boards and stones, which can be obtained from the American Go Association, several other items will be useful—some essential, others optional.

You should make Go teaching materials in the form of software, and books readily available to students. The American Go Association provides several kinds of equipment for teaching programs: demonstration boards in 9 x 9 or 19 x 19 size are available at special prices to active programs. AGA may also provide some playing sets for students for free. The latter include 9 x 9 sets with punch-out stones, as well as reversible 9 x 9/13 x 13 sets that are more durable. Full-size 19 x 19 sets from the Ing Foundation, www.usgo.org/ingfoundation, are also usually available for teaching programs. To obtain this equipment, send a message to the Chapter Services Coordinator, chapterservices@usgo.org, describing your program and identifying your needs.

There are also some grant funds available. A good source of grant funds is the American Go Association's Youth Outreach Mini-grant Program, www.usgo.org/teach/youth_outreach.asp. If you are interested in applying for a grant, contact Willard Haynes, Chair, AGA Youth Grant Committee, at: youth.grant@usgo.org, or Ray Laird at: roylaird@nyc.rr.com. For mail inquires, write to

Mary Laird
c/o AGF
211 West 106th St. #3C
New York, NY 10025

Some Go teachers think that Go software tends to be more appealing to children learning how to play Go than books. The animated, interactive graphics of software, which allows students clearly to visualize how the stones move, make it easier for children to learn Go basics. Many children—especially kindergarten through 6th grade—find reading Go books a bit overwhelming (although my daughter gobbled up the Hiraku No Go books(Hotta 1998)) because of the need to interpret Go notation, and to visualize how one static Go diagram evolves into the next.

There are a number of fine Go software programs available for players of all ages and skill levels. I provide a list of those above on pages 17 and 18. Some focus on beginners, and others on advanced concepts of Go. Many are somewhat sophisticated game-playing programs that let players develop their skills by playing against the computer. Good as they are, however, developers designed this software to aid individual players already motivated to learn the game rather than as a tool for a school program.

Whether you leave the learning up to the individual player, or decide to use a more structured teaching system, it is well-established that *the more Go kids do at home, the more successful your club program will be at school*. Specific incentives (like bonus points and awards for outside reading) should be built into your Go program to encourage students to pick up educational materials both at home and at school. If possible, you might choose to allow players to add the results of games they have played between each other outside of the Go classes to the club standings.

You should consider several other basic items for your Go classes/club. Recording forms (see Appendix N on page 231) to record game positions or moves will be helpful to students. If you are experienced, an easel mounted magnetic demonstration board (available from Ishi Press International, 800-859-2086, www.ishigames.com) can be a helpful tool.

As you Go club matures, you may wish to consider acquiring other items. Go clocks, for example, while optional, are useful if club members are likely to participate in tournaments.

T-shirts for Go team members, as for traditional school sports teams, will help excite and motivate students. Clubs which participate in tournaments will enjoy the distinction and recognition that comes from custom-designed tee shirts.

SPECIAL NOTE: Students want to play Go during club meetings. Try to keep administrative matters to a minimum or students will quickly lose interest. Each Go instructor will need to decide for him/her self how much time to devote to formal teaching. The critical goal if to encourage all students to play Go—rather than just to focus on developing the best players.

Nice Things to Have

Go Club Manager

I have not yet seen the equivalent of the United States Chess Federation's *Chess Club Manager* for Go. However, some enterprising programmer of Go programs might seriously consider designing such a software tool to make schools' Go programs even more successful and easier to run. It should have several features designed to help manage, motivate, and educate students, such as:

1. **MANAGE your club by:**
    a. Maintaining club rosters and mailing lists
    b. Recording outcomes of every game played by students, in a simple point and click fashion
    c. Instantly calculating score changes for players after every game played
    d. Maintaining club rankings based on an AGA-approved progressive scoring system
    e. Stratifying your club into subgroups based on Grades or unique Divisions
    f. Printing out a variety of commonly needed forms (e.g. game recording sheets) for club use and tournament activity to save hours of paperwork time.
2. **MOTIVATE students by**:
    a. Encouraging students to seek ever greater challenges in their play by letting them see their progress
    b. Automatically searching your database to generate and print different types of standard Awards, and certificates suitable for framing
    c. Defining any number of Unique Award categories to print certificates for any number of players
    d. Awarding bonus points to individuals or groups for any Go-related activity you determine
    e. Tracking "Workout Points" from an inter-active puzzle program
    f. Maintaining statistics to identify players deserving of special recognition or attention
3. **EDUCATE students by**:
    a. Providing them with a window to a world of affordable, interactive Go educational; software modules, to link their school Go club activities with more learning at home.

b. Automatically printing out handouts or transparencies, creating beautiful Go puzzles so that even students with limited access to computers can benefit from the software.

Organizing a School Go Club

Introduction

You have been thinking about organizing a School go club? Although I spoke above about the need for collaboration in designing your Go program, in this part of the guide I provide you with the nuts and bolts and the critical steps that you should take to establish and to sustain a successful club.

This section is not meant to be comprehensive, but I want to highlight many of the elements that you should consider as part of the process of starting a club. Not all of my recommendations are absolutely necessary. However, if you carefully go through certain basic functions to create a sound club structure from the beginning, you will increase your chances for long-term success. Without a doubt, each club will adapt these recommendations to create a program that will meet the needs of the students and the school. Each club will define success based on the context of the goals it sets for itself.

You may have another source of "How To" information in the form of other clubs in the school, or on neighboring schools or districts that already have organized Go clubs.

Why Start a School Go Club?

Parents and educators would probably agree that, as a major goal of the educational process, students should be able to analyze a situation, decide on their best response to that situation, and to be able to accept and to deal with the consequences of their actions. These are exactly the lessons that Go teaches; it is why Go is such a valuable educational tool.

Children benefit academically, socially, and in other areas critical for success in life as a result of playing Go; and they have fun in the process. Go-playing has been shown to have a high correlation with improved academic performance in student through its emphasis on critical or strategic thinking skills, improved concentration, and perseverance. Serious Go-playing also results in greater self-esteem for the child. There is a study under way in Olympia, WA to study the effects of Go on academic performance. You might also want to include some of this information in your informational letter to parents, or in your efforts to persuade administrators of the appropriateness of introducing Go to his/her school.

There do not seem to be any statistics on the number of school Go clubs/programs in the United States. As of this writing there were listed only 35 Go teacher names on the GoTeach roster page (http://mail.usgo.org/mailman/listinfo/goteach). I am sure that this is not a representative number for all Go instructors. Never the less, informal surveys suggest that scholastic Go is on the rise in the United States. In 2004, the American Go Foundation instituted a grant program designed to increase the number of younger Go players by providing funds to those who wish to start a scholastic Go club/program. This is testament to the fact that there is a need to address the desires of fledgling scholastic Go organizations. In addition, several regional Go groups are conducting tournaments especially for younger Go players. For example, the Oregon Go (http://oregongo.org/) organization is hosting its first ever tournament for middle-school students.

There are tremendous advantages to introducing Go to children through an organized school club or program. While many young people learn to play Go on their own—taught by a parent, sibling or friend, or by reading Go books—a structured setting provides unique opportunities (Given 2002) to develop and to reinforce Go-playing skills. Young people love to socialize, and they generally enjoy competition as in a school sports program. A formal Go club

provides opportunities for both socializing and competition, motivating children not only to learn the fundamentals of Go, but also to continue to improve their performance. The more their peers are involved in Go, the more "legitimate" it becomes in their eyes—as opposed their perception that it is a game just for the "brains"—and the more students will take Go seriously.

As you begin to organize and to publicize your school Go club, the goal of promotional materials should be to help students view Go as a mainstream activity, and to show them that strategic *thinking* is as legitimate and enjoyable an activity as any sport.

How to Get Started

Almost anyone involved with a school, parents, teachers, principal, PTA/PTO, or students, can begin the process of forming a Go club. Because you will need to get their approval to use school facilities, to determine space and time availability, and supervisory needs, etc., school administrators must be involved early on.

In many countries outside of the United States, especially Japan and Korea, people have introduced Go as part of the regular curriculum. In the majority of schools, however, organizers have introduced Go as an extracurricular activity—as a before or after-school activity, or an evening or weekend club. In some schools, Go is a lunch-time program.

Once one school in a district starts a school Go club, the idea tends to be contagious. Students from district schools not yet having Go clubs may ask established clubs to invite them to participate. Frequently, Go is then introduced into those district schools not yet having clubs. Peer-to-peer contact and active publicity can spread the word that Go is actually a lot of fun to play and a great challenge. In fact, you may been a bigger room than predicted to accommodate your Go club members. If desired, you could establish an interscholastic tournament structure within a district to promote the concept of "Go as sport." Or, just have tournaments within your own club.

A preliminary step to forming a school Go club is to recruit to groups of players: coach/mentors (usually teachers, parents, community volunteers, or older teenagers), and students/players.

How to Recruit Instructors

You can recruit instructors through a variety of sources including school newsletters, PTA/PTO meetings, a letter sent to parents and teachers, contacting senior citizen centers or volunteer pools, or an ad in community newspapers. In light of changes in the regulations for school volunteers, workers, and teachers that state legislatures, or school districts, have enacted in the past few years, volunteers may need to have their finger-prints taken.

Co-instructors would make it easier for clubs to meet regularly. If one coach is sick or unable to attend a meeting, the other can take over. There's always the consideration that large clubs may need access to more than one coach to be as efficient and effective as possible.

It is preferable that at least one of the instructors in a club be well enough versed in the game to teach it to others, but this is not always feasible, nor, in fact, is it absolutely necessary. Many clubs operate with parent supervisors whose Go skills are limited or non-existent.

An adult volunteer who is inexperienced in Go (or a mature teenager for clubs composed of younger players) could oversee a basic, unstructured school Go club where the major focus is simply on playing games. On the other hand, an inexperienced coach can establish a more structured club using tools such as the accompanying lesson plans, or a Go teaching program as given in the list of Go print and electronic resources on page 17. If you focus on student

rankings, awards and friendly competitive play, a traditionally quiet Go club can become a school-wide sport.

You can supplement your teaching, if desired, in cases in which the coach is not a Go player. While this is not necessary for the long term, obtaining the services of a seasoned player to get the club going during its first few meetings may be a helpful boost.

You may be able to recruit guest instructors with a higher level of skill through neighboring school districts, or local go clubs, to work with new students on a limited basis. You can also contact the American Go Association (http://www.usgo.org/index.asp; P.O. Box 397, Old Chelsea Station, New York, NY 10113-0397, phone: 917-817-7080), to put you in touch with its local affiliate, which may be able to provide you with a list of potential guest instructors. High-level Dan players or Go professionals may be included on this list, but they will probably charge for their services, and some have difficulty teaching a very young group of beginners.

You may wish to contact your local high school or college where you might likely find experienced Go players. While these individuals may want to be paid to commit to a long-term coaching commitment, they will probably not charge as much as a high-level Dan player or other Go professional. A small sum in the form of dues or membership fees from parents, in addition to a contribution form the school or PTA/PTO, should be more than adequate to cover short-term salaries if these become necessary.

A good source of potential guest instructors may be the local senior center. Such centers frequently will have someone who plays Go, and a population of individuals with a lifetime of experience in the game who would love to work with children.

IMPORTANT NOTE: Coach enthusiasm and willingness to encourage players are critical factors in the overall cusses of a scholastic Go club. Instructors with limited knowledge of or experience playing go can motivate students to high levels of mastery by helping to provide them with good resources to improve their skills and by offering them a great deal of encouragement and enthusiasm. On the other hand, even an experienced Go player will have a difficult time getting students excited about chess if he/she is not enthusiastic about the game.

How to Recruit Student Players

You can use some of the same mechanism for recruiting Go club instructors to recruit players. School newsletters, PTA/PTO meetings or a letter sent home to parents are particularly useful for younger players. You can invite middle and high school aged players to help organize or participate in a Go club through daily activity announcements in home rooms, activity board lists, or posters around the school, on the school's public address system, or from the student newspaper. Word of mouth is one of the best ways to recruit players. You should encourage students who join to help recruit their friends. You can contact teachers to suggest names of students they think may enjoy participating.

Once the Go club gets going, well-placed publicity about its activities—particularly if this involves tournaments and such—will help to draw in new players. You can use school newsletters, school and community newspaper stories, photographs of students at Go tournaments, PTA/PTO and school board meeting presentations to increase interest in the club.

One of the little uphill battles you may have in recruiting new players is the ability to defuse the image of Go players as "eggheads." One way you can address this issue is the promote actively the idea and image of Go as a **sport for the mind**. You need to emphasize the social and competitive aspects of Go-playing to encourage students to join the Go club. Point out that Go is not just for intellectuals.

The best time to get young people started playing Go is when they are young and less likely to have a bias against Go. You need to nurture and encourage students all along to sustain their interest and motivation to continue in the go club over the long term. Middle and high school students, more than the very young, will be concerned about the club's image among their peers. Consequently you will have to make an extra effort to portray Go as a legitimate school sport.

Logistics of Organizing a School Go Club: Where, When, and How Often?

Facility and coach availability are the critical factors which determine where a Go club will meet, when, and how often. The school principal or administrator will determine room availability. The coach or instructors can then determine their commitment to meet with students. They can check with the school administrator to make sure the room will be available at the time or times they wish to hold meetings. Preferably, the same room will be available for each meeting so that students have a sense of continuity, of having a place of their own, and of knowing where Go equipment and materials are stored for use when Go club is not meeting formally.

While some clubs can only meet for an hour to an hour and a half or so once a week, others meet two or more times a week for an hour or more. The more times the club meets (without become burdensome to either students or instructors), the better for the development and the reinforcement of Go skills. Students are more likely to become motivated to do better if the meetings are held more often. For purposes of continuity, it is probably better to meet twice a week for a minimum of one hour each time, than to meet once a week for two or three hours.

Scholastic Go clubs meet before or after school, during lunch time or evenings, or some combination. If their school is open, some even meet on weekends. Some clubs alternate their schedules to accommodate players with varying schedules after school, evenings or weekends. For example, they meet on a Monday evening Week 1, Tuesday evening Week 2, Wednesday evening Week 3, etc. The advantage of doing this is that more players are accommodated. The disadvantage is that it may be confusing for instructors and players to keep their club meeting schedule straight. As with any other school-based program, a well publicized calendar is very helpful.

Schools which offer daycare programs before and after school may be particularly interested in providing an activity like Go for their daycare charges.

You can supplement formal Go club meetings at lunch time, study hall (assuming it is allowed) or other times during which students just get together to play Go. Go boards and stones should be stored in the same place each week so that students have access to them even when the club is not meeting formally. If your club uses a competitive rating system, you may wish to allow students to enter games played outside of club meetings into your scoring system.

It is hard to overemphasize the importance of expanding Go playing throughout the entire school and not just in the setting of the club meetings themselves. After all, the goal is to make Go every bit as legitimate to students as other sports.

Basic Equipment and Teaching Materials

See page 26.

Club Management

Traditionally, one of the most labor intensive, and least fun aspects of scholastic Go, particularly for instructors, has been dealing with the managerial and administrative details, that

is, keeping track of players and their game performance statistics, creating club divisions for the purpose of intra-club competition, creating tournament registration forms and the like.

With the development of a Go Club Manager computer program, these tasks will be simplified tremendously, but students can now handle many of the routine administrative functions of the Go club themselves. Not only does this spare instructors form the bureaucratic tasks many dislike, but students actually like doing the data entry themselves and their technology skills are, thereby, reinforced. Most importantly, the computer calculation of club rankings for each player as new game statistics are added to the data base, motives students to take Go more seriously. Instructors are given the option, through various security features built into the program, to limit access to certain data for students.

Beyond the purely administrative tasks associated with maintaining a Go club, you may want to consider electing Club Officers, particularly in clubs made up of older students. This can become a basis for delegating certain managerial functions and responsibilities. (For purposes of consistency in score entry, etc. it may, however, be better to give only a small number of students access to the computer rather than give each player a turn. Each coach will have to make that decision for him/her self.

One important consideration for electing club officers beyond needing their help with administrative responsibilities is to create peer leaders who can help the coach increase levels of player commitment and motivation. Most school sports teams have team captains and/or manager. You may wish to adopt a similar organizational structure for your Go club for the reasons stated above and to parallel other school organizations.

Advantage of a Club Rating System: Motivation

One may take the position that in order to keep students motivated to improve their skills, and to project an image of go as a sport just like any other school sport, a club rating system in which players' wins and losses and club rankings are tracked, is important. Students are more likely to want to improve in a structured situation, even if the coach ultimately decides not to formally rank students and only to distribute data to each student on how his/her own skills have improved.

Other sports in the school keep track of team and/or player statistics to some extent. Students expect this, and go should be no different. When students learn early to cooperate appropriately—to remain calm in a pressured situation, to win with humility, and to accept defeat gracefully—Go playing students experience some important early lessons.

Another reason to get students used to a system to scores and ranking is that AGA sponsored tournaments, should your club decide to participate in these events, collect and disseminate individual student and team rankings for participants.

You should consider some concern before adopting a formal rating system for your club. You do not wish to alienate prospective Go players who want to learn how to play Go in a low key environment. Secondly, as your club evolves, you do not want to lose players whoa re less than outstanding at the game. Students quit sports programs all the time because they do not feel good enough to compete against other players, and a good program would want to make provisions for this situation before it happens.

You can emphasize the cooperative aspects of working together as a team, with the understanding that each individual brings something positive to the club. You should encourage students to work together collaboratively to develop their skills and understanding of Go. Those who progress more rapidly can work to help their peers having difficulty learning the game.

While Go instructors exercise sensitivity for the needs of all students, many options are available to those who want to emphasize the competitive aspects of Go playing. You can recognize players based on factors other than games won. If you use a point system to track student performance, and perhaps to present awards, you can create additional categories such as attendance, leadership, and tournament participation to motivate students to stay active in the go club. Students can earn bonus points when they complete various homework assignments, such as solving Go puzzles or progressing through go materials that you assign. If you use these alternate bases for measuring accomplishment, the best Go players are not the only ones who gain recognition for their efforts.

Activity Level of Go Club: Participate in Tournaments or Not?

Scholastic Go clubs run the gamut from extremely active clubs which participate in local, state, and even national tournaments to low-key clubs whose members play just to have fun.

The advantages of encouraging your students to participate in tournaments are essentially the same as those described in the section above. Students are more likely to be motivated to improve their Go-playing skills, and, therefore, to take the game more seriously. Secondly, tournament participation is likely to reinforce the image of Go as being a legitimate competitive activity, just like any school sport. Third, the competitive aspects of Go helps to prepare students for their roles in later life.

Their tournament participation seems to excite students. These events can truly become important for focusing students' attention on the need to consistently grow as Go players. Even though members are not required to participate, tournaments always provide special new challenges for club members. Even if your students are interested in tournament participation, your club would not have to participate in all of the area scholastic tournaments offered each year. The club may pick and choose those which seem interesting or accessible. As the club evolves, students may become more serious about participating in regional or state tournaments.

Whatever the activity level and focus of your Go club, the benefits of learning how to play Go are so great that the establishment of a program in your school(s) is extremely worthwhile.

Advantages of American Go Association (AGA) Membership

Scholastic Go club affiliation with AGA presents many advantages which you should seriously consider when organizing a club. AGA is a wonderful source of information and materials for students and their instructors. In addition, if your club wishes to participate in official tournaments, students will have to be members of AGA. Scholastic members receive the weekly e-Journal, and the AGA Annual. Each issue provides tournament information for sites around the country, and offers news, puzzles, games, lessons, and other forms of Go instruction.

You may also want to consider membership in your state affiliate, for example the Seattle Go Center. Fees are usually nominal, and the state organization can keep you up to date on the Go scene around your region or state. The AGA web site (http://www.usgo.org) provides additional information, including other Go-related web sites.

How to Finance Your Club

A variety of ways may be available to help pay for the Go equipment, supplies, and possibly salaries. You should consider individual dues, PTA/PTO funds, or school district funds. You can form a Parent Booster Club. You can contact local business or community groups for

contributions. You can also hold bake sales, car washes, spaghetti dinners, etc. from time to time to augment funds or to pay for something special (e.g. club participation in a regional or state tournament where the club may have to cover airfare, housing, food, tournament fees, etc.). You can consider some combination of all of the above sources of revenue to organize and to sustain a scholastic Go club.

Contacting Other Go Instructors

Besides being in touch with other go instructors in your school district or through you AGA state affiliate or at tournaments, you may want to use the Internet to reach a broader group. When you sign up as a subscriber to GoTeach, http://mail.usgo.org/mailman/listinfo/goteach, you can reach other Go instructors, and visit its archives. This is a general scholastic Go site which may be helpful to you in organizing your school's program. For example, I broadcast a request for information about game recording sheets, and I received three responses that helped me with game recording sheets for 9 x 9, 13 x 13, and 19 X 19 games.

Some Closing Thoughts: Key Ingredients for a Successful Club

When you introduce Go in your school, you will open up a whole new realm of activity: challenge and competition for students. The key ingredients to making your club a success are:

1. Promote Go as a "Sport for the Mind" to legitimize Go club participaction in the eyes of students and their peers.
2. Provide students with appropriate educational and motivational tools that will allow them to grow as Go players.
3. Create an organized structure so that the club has some specific focus and you fdo not become bogged down in administrative and managerial details.
4. Provide students with a great deal of enthusiasm and encouragement to take the game seriously, but also to have fun.

Since you will provide significant and meaningful new opportunities for students, your efforts will yield a great deal of satisfaction for you. While few students will make their living as athletes, despite their interest and involvement with scholastic sports programs, many will apply the critical thinking skills and other attributes they develop as Go players to their adult careers.

Think Like a Stone: Go Club Manager

Although this software does not exist, yet, I offer some suggestions here for software programmers to help make school Go programs both successful and easier to run. If the program has features designed to help manage, motivate, and educate students, it may well prove to be the most valuable too in your Scholastic Go Program.

It should allow your school to build a program of Go as a Sport, and teach your students that strategic thinking can be as much fun and as legitimate as any athletic activity. With the tools that the Go Club Manager would provide, students will view Go as a "sport for the mind."

The Go Club Manager should:

MANAGE students by:

- Maintaining club rosters and mailing lists
- Recording outcomes of every game students play, in a simple point and click fashion
- Instantly calculating score changes for players after every game they play
- Maintaining club rankings based on AGA-approved scoring system
- Stratifying your club into subgroups based upon Grades or unique Divisions
- Printing out varieties of commonly needed forms for club use and tournament activity to save hours of paperwork time.

MOTIVATE students by:

- Encouraging students to seek ever greater challenges in their play by letting them see their progress
- Automatically searching your database to generate and to print several different types of awards certificates suitable for framing.
- Defining any number of unique awards categories to print certificates for any number of players
- Awarding bonus point to individuals or groups for any Go related activity you define
- Tracking "Work out Points" from problem books or interactive software (e.g. Bruce Wilcox' "Contact Fights," and "Sector Fights")
- Maintaining statistics to identify players deserving of special recognition or attention

EDUCATE students by:

- Providing them with a "window" to a world of affordable, interactive Go software modules linking their school Go club activities with more learning at home.
  When you combine interactive software and problem tutorials with a core curriculum to teach and to solidify Go skills, you help your students improve their go playing.
- Automatically printing out handouts from your "library" creating Go puzzles so that even students with limited access to computers can benefit from your archives.

Your First Lessons in Go

The American Go Association's *Go Starter CD* is not just another computer Go game. In fact, you don't play Go against it at all. However, what a beginning player can do is *learn* how to play Go, step-by-step in a hands on way. Here's what the *Go Starter CD* does:

- Becomes an introductory Go book that you "read" on your home computer.
- Combines the best elements of both media: the in-depth descriptions of a book that gives you simultaneous, and interactive computer graphics.
- Eliminates the most difficult element of Go books: the constant back-and-forth struggle between text and static diagrams, trying to imagine how one figure changes to the next.
- Students watch stones played as lessons unfold, or place them themselves for various puzzles and challenges.
- Fills a void in existing Go software programs, which rarely adequately address the basic first lessons.
- Covers the equivalent of an introductory series of Go lessons as it takes the beginning player through:
    - The basic placement of stones and rules
    - Development and opening strategy
    - Basic tactics like atari, the ladder, eyes, snapback, cutting, one-point jump, and handicapping
    - Common end game scenarios
- Includes dozens of interactive, challenging exercises to reinforce lessons and to help students quickly to escalate their skills.
- Includes dozens of introductory level Go puzzles to solve interactively.
- Designed for reading-aged children (Grade 3 and up) or even adults trying to keep up with their children.
- Very young children can do the lessons with an older child or adult, and they'll love doing the interactive puzzles by themselves.

Curriculum Scope & Sequence for Teaching Go In Schools

	SEQUENCE							
	Two Dimensions							
	Essentials	**Units & Liberties**	**Capture**	**Eyes**	**Seki**	**No Repetition**	**Territory**	**Influence**
SCOPE	9 x 9 Board (G, p. 1)	Unit (G, p. 19)	Basic rule (G, p. 30), (S), (W, p. 7), (Y2, p. 5)	Eye making (G, p. 47)	Form 1 (G, p. 67)	Full-board position (G, p. 77)	Extensions (G, p. 85)	Thickness (G, p. 99), (S)
	Stones (G, p. 2)	Liberty (G, p. 20) (S)	Atari (G, p. 31)	3-point eye space (G, p. 51), (W, p. 18)	Form 2 (G, p. 70)	Ko (G, p. 76)	Base (G, p. 91)	Joseki (G, p. 99)
	Intersection (G, p. 2)	Empty triangle (G, p. 20)	Suicide/Illegal move (G, p. 33), (W, p. 9)	4-point eye space (G, p. 51), (W, p. 18, 19))	Form 3 (G, p. 71)		Secure territory (G, p. 96)	
	A move (G, p. 3)	Counting liberties (G, p. 26-29), (S)		5-point eye space (G, p. 53-56), (W, p. 19)	Seki (W, p. 20)		Estimating territory (G, p. 97), (S)	
	Parts of a game (G, p. 5)			6-point eye space (G, 57-59), (W, p. 20)				
	Territory (G, p. 11), (S)			False eyes (G, p. 63)				
	Objective (G, p. 11)							
	Shape (G, p. 14), (S)							

	SEQUENCE							
	Two Dimensions							
	Scoring	**Extensions, Connections, Cuts**	**Basic Opening Strategy**	**Endgame**	**Planning**	**Fighting**	**Connecting to the Go world**	
SCOPE	Pass (G, p. 107)	1 pt. jump (G, p. 122), (W, p. 25)	Corner (G, p. 164), (S)	Life-and-death (G, p. 180), (S), (W. p. 10)	Planning (G, p. 193)	Stable unit (G, p. 209)	AGA, KGS, IGS, Yahoo (W, p. 12)	
	Dame (G, p. 110), (W, p. 11)	2 pt. jump (W, 25)	Ponnuki (G, p. 165)	Sente (G, p. 181), (W, p. 24)	Go problems (W, p. 13)	Unstable unit (G, p. 211)	Tournament, (W, p. 27)	
	Procedure (G, p. 113), (W, p. 11)	3 pt. jump (W, 25)	Corner enclosure (G, p. 165), (W, p. 23)	Monkey jump (G, p. 190)		Sacrifice to reduce liberty count (G, p. p.215)		
	Komi (G, p. 114)	Large knight's move (W, p. 26)	Side extensions from shimari (G, p. 167)	Gote (W, p. 24)		Big eye space and virtual liberty count (G, p. 218)		
		Virtual/Indirect extension (G, p. 123), (W, p. 14)	Joseki (G, p. 171)					
		Diagonal extension (G, p. 123), (W, p. 14, 25) Double Diagonal/"Field" (W, p. 26)	Fuseki (W, p. 23)					
		Bamboo joint (G, p. 125-127), (W, p. 15)	Shimari (W, p. 23)					
		Tiger's mouth (G, p. 128), (W, p. 14)	Kakari (I, p. 11)					
		The Ladder (G, p. 133), (W. p. 16)						
		Ladder breaker (W, p. 16)						
		Geta (G, p. 141)						
		Crane's nest (G, p. 144)						

	SEQUENCE							
	Two Dimensions							
	Scoring	**Extensions, Connections, Cuts**	**Basic Opening Strategy**	**Endgame**	**Planning**	**Fighting**	**Connecting to the Go world**	
		Loose ladder (G, p. 146)						
		Knight's move (G, p. 148), (W, p. 15)						
		Dog's neck extension (G, p. 151)						
		Horse's neck extension (G, p. 152)						
		Snapback (G, p. 153), (W, p. 17)						
		Robber's Attack (G, p. 157)						
		Connecting and cutting (W, p. 14)						
		Iron Pillar (W, p. 14, 25)						
		Peep (W, p. 14)						
		Crossing under (W, p. 15)						

Key: G = Go for Kids (Bradley 2001); I= Ikuro Ishigure, *In The Beginning* (Ishigure 1995); K1= Learn to Play Go vol.1 (Kim 1997; Weir 2004); S = the *Sensei Library* (http://senseis.xmp.net/); W = Susan Weir, *School Go Teaching Program Lessons* (Weir 2004); Y2 = Yasutoshi Yasuda, *Let's play go: A simple introduction to the game of Go*;

Magic Formulæ

	Number	Description						
MAGIC FORMULÆ	1	The correct order of play in the opening is corners first, sides next, center last (G, p. 6)						
	2	Any group containing two (or more) separate and distinct real eyes is forever safe from capture! (G, p. 47)						
	3	In symmetrical positions, the key point is at the middle (G, p. 48)						
	4	The opponent's key point is my key point (G, p. 49)						
	5	A unit enclosing 3-point eye-space lives if the defender plays first, and dies if the attacker plays first (G, p. 50)						
	6	Units enclosing eye-space of four points in a row live no matter which side moves first (G, p. 52)						
	7	Units enclosing eye-space of four points in a square die no matter which side moves first (G, p. 53)						
	8	If both sides play correctly, complete eye-spaces of 7 pts. or more are <u>always</u> safe, except in ko (G, p. 60)						
	9	The third line is the line of territory (G, p. 86)						
	10	From a wall of (n) stones based on the THIRD line a "safe" extension skips exactly (n+1) spaces (G, p. 89)						
	11	Don't play near thickness (either your own or the opponent's) (G, p. 103)						
	Basic Opening Strategies							
	12	The best opening moves in a corner are usually in some combination of the third and/or fourth lines (G, p. 161)						
	13	Distribute your stones across the board (G, p. 162)						
	14	Don't put your stones too close to either friends or opponents, but make sure they work together (G, p. 162)						
	15	The influence of a shimari is projected: 1. at right angles to the base formed by its two stones 2. in direct proportion to the spacing between those stones (g, p. 167)						
	16	When extending along the side from a shimari, the best direction is the one in which its influence is stronger (G, p. 169)						
	17	The optimal distance from the shimari for the extension is in the middle of the side (G, p. 169)						
	18	The best location for the extension is usually on the third line, but sometimes the fourth line is better (G, p. 169)						
	19	Each joseki structures only a single corner, so it must be integrated with the other corners, the sides, and the center (G, p. 171)						
	20	To attack, play away. To defend, play close (G, p. 173)						
	21	Life-or-death plays before territorial plays (G, p. 180)						
	22	Play to retain sente is possible! (G, p. 180)						
	23	Every move must be part of a flexible plan which is revised as needed after each move by the opponent (G, p. 193)						
	24	Fill the opponent's unshared liberties first! Fill any shared liberties last! (G, p. 205)						
	25	A unit is stable when either: it can make two eyes, or it has at least five liberties and is <u>not</u> enclosed (G, p. 209)						
	26	Fighting should stop as soon as both sides are stable (G, p. 212)						
	27	An eye is worth many liberties (G, p. 216)						
	28	Number of captives	1	2	3	4	5	6
		Virtual liberty count	1	2	3	5	8	12

Trends In Go Instruction

From American Go E-Journal 10/04/04

GO REVIEW: Bruce Wilcox's Sector Fights Instructional CD
reviewed by John Stephenson

Sector Fights is brilliant both in its lucid and compelling content as well as its modern technical presentation. It's no exaggeration to say that with only this one resource, a new player could apply himself and become a high amateur dan-level player, provided he (or she) carefully absorbed the its guidelines and techniques. Bruce's writing style is both humorous and hard-hitting and his material is densely packed with useful concepts instantly applicable to one's own games.

The content is organized in four parts. The first targets the 20-kyu level, Part Two the 10-kyu level, Part Three the single-digit Kyu level, and Part Four dan-level. But it is misleading to neatly define the content that way, because the fundamentals covered in each part plugs gaps even in advanced players' techniques, who would be well-advised to return to basic material they think they know. Newer players will learn it right the first time. Bruce's work is impressive in its high utility to all levels of players.

The CD Rom is interactive with many click-style quizzes such that the reader can self-check how he has absorbed the material. Thus it's innovative compared with a book. Unless you're a professional player or a gambler, the purpose of studying go is to increase enjoyment, and taking Bruce's self-paced Sector Fights course should give you a clear road map to what's really happening move by move, thus providing rich opportunities to apply new levels of strategy and direction, the stuff that makes go so much fun. Well worth the $35.

More details can be found at Wilcox's website:
http://members.cox.net/wilcoxeureka/Sector.htm

GO REVIEW: Five Hundred and One Opening Problems
By Richard Bozulich in collaboration with Rob van Zeijst
Reviewed by Mark Lentczner, 10k

Unlike most problem books, this one is more like a personal tutor than a drill sergeant. It uses the problem format as a way to teach opening strategies, rather than to simply hammer right and wrong into you.

Each page presents four whole-board opening problems, with hints of suggested strategies. Then, on the back of the page, the answers are given with brief, but clear explanations of how the strategies are applied, including follow up moves. These explanations are why the book shines: Each is a well-written, concise little lesson on the opening.

I also appreciated the layout of the book. Because the answers are on the back of each problem page, there is none of the flipping back and forth like most problem books. I only wish they had printed the hints all at the bottom of the page so that you could easily cover them while you first try to solve the four problems without the hints, as the book suggests.

The problems seem to be aimed squarely at kyu level. At 10kyu, I seem to get about 50% right. This is a book I'm sure I'll return to again and again. I recommend it for any kyu player's library.

Approved November 2001

Appendix A

Model Lesson Plan

PREPARATION

OBJECTIVE/EALR(s)

1. What Essential Academic Learning Requirement(s) will be addressed?
2. How does your objective relate to your current (unit) goals?

STUDENTS

3. What student characteristics will you consider when planning? (Grade level, special needs)
4. How will this lesson relate to students' prior learning and experiences?

CLASSROOM MANAGEMENT

5. What technology, materials, equipment will you need for this lesson, and how will you organize the room?
6. What routines, transitions, and behavioral expectations are appropriate for this lesson?
7. How do you plan to involve parents, colleagues, or community members to support student learning?

INTRODUCTION

SET

8. How will you get students' attention, focus them on the objective, and motivate them to learn?

COMMUNICATION OF PURPOSE

9. What will you say to students to explain the purpose of the lesson? (Why should they learn this? Of what value will this be for them personally?)

BODY OF THE LESSON

PRESENTATION

10. What information will be communicated to the students and how?
    (Direct instruction, modeling, inquiry, laboratory experience, etc.)

PROCESSING

11. How will students be actively engaged in processing the information?
    (Technology/guided practice/independent practice)
    (Gardner's Theory of Multiple Intelligences)
12. How will students develop understanding, thinking and problem solving skills?

MONITORING

13. What specific learnings (content and skills) will you be looking for?
    (Relate to your objective.)
14. How will you check for understanding and accommodate for disabilities?
15. What special needs (Spec. Ed. / ESL / cultural diversity) modifications will
    you make?

CLOSING

CLOSURE

16. How will you actively involve students at the end of the lesson or class to reflect on and reinforce the main learnings from the lesson?

ASSESSMENT

17. How will you assess students' learning (content and skills)?
    (Relate to your objective.)

FOLLOW-UP

18. How will students apply and extend the learning, and deal with real world problems?

REFLECTION (after the lesson)

19. What did you do that helped students learn and meet the objective?
20. What would you do differently if you taught this lesson again to make it more successful for students?

Appendix B

State of Washington Essential Academic Learning Requirements

(Washington Commission on Student Learning 2003)

The Arts

Introduction to the Arts

The Arts for Today and Tomorrow

"The Arts are an essential part of public education. From dance and music to theatre and the visual arts, the arts give children a unique means of expression, capturing their passions and emotion, and allowing them to explore new ideas, subject matter, and cultures. They bring us joy in every aspect of our lives.

Arts education not only enhances students' understanding of the world around them but it also braches their perspective on traditional academics. The arts give us the creativity to express ourselves, while challenging our intellect. The arts integrate life and learning for all students and are integral in the development of the whole person.

The Arts communicate and speak to us in ways that teach literacy and enhance our lives. We must continue to find a place for arts programs and partnerships not only for what it teaches students about art, but for what it teaches us all about the world we live in."

Dr. Terry Bergeson
State Superintendent of Public Instruction
November 2001

What are the Arts?

The Arts Defined – The arts are creative expressions using sound, image, action and movement. They are a means to satisfy the human need to communicate thoughts, feelings, and beliefs.

Purpose – The arts engage those capacities most characteristically human – imagination, creativity, the ability to conceptualize and solve complex problems – by stimulating skills, which are essential to learning. The arts are catalysts for change. They are vital in this rapidly changing multi-media age. They facilitate and encourage the exchange of views, reflecting and shaping cultures. As technology changes, so do the tools and materials of the arts. Students are prepared through visual arts, music, drama, and dance to interact effectively in a dynamic world, with joy, confidence, and a sense of fulfillment.

The Arts and Education – Whether our civilization can remain dynamic, nurturing, and successful will ultimately depend on how well and how fully we develop the capacities of our children, not only to earn a living, but also to live a life rich in meaning.

Intellectual Development – the arts represent one of the primary modes of thought used to do essential work in a world at large. Through the study and practices of the arts, students

employ sound, image, action, and movement to learn to solve problems, make decisions, think creatively, and use imagination.

Social Development – The arts represent a legacy of common achievement, a heritage of civilization that teaches us about ourselves and others. Arts education is essential to enable students to make sense of both historical and contemporary cultures. It also provides students with knowledge of past cultures, recognition of their place in contemporary culture, and insight on roles and responsibilities regarding cultural change.

Personal Development – Study of the arts also produces personal benefits, including motivation, self-discipline, and perseverance, willingness to take risks, cooperation, collaboration, productivity, craftsmanship, and thus, self-esteem.

Aesthetic Development - The arts provide benefits not available through any other means. Through arts education, students learn how to express themselves through the arts, interpret works of arts with deeper understanding, and more fully appreciate the natural designed world. Study of the arts provides unique opportunities to work with student's individual differences in learning styles, personalities, and ability levels while challenging those students in a process of continuous refinement and growth with the goal of achieving the highest possible standard of their work. This process not only leads to understanding of one's own work and that of others in the arts, but also develops skills, which are highly sought after in the world of work.

Essential Academic Learning Requirements —The Arts

1. **The student understands and applies arts knowledge and skills**.
   To meet this standard the student will:
   1.1. Understand arts concepts and vocabulary
   1.2. Develop arts skills and techniques
   1.3. Understand and apply arts styles from various artists, cultures, and times.
   1.4. Apply audience skills in a variety of arts settings and performances.
2. **The student demonstrates thinking skills using artistic processes**.
   To meet this standard the student will:
   2.1. Apply a creative process in the arts:
      2.1.1. **Conceptualize** the context or purpose
      2.1.2. **Gather** information from diverse sources
      2.1.3. **Develop** ideas and techniques
      2.1.4. **Organize** arts elements, forms, and/or principles into a creative work.
      2.1.5. **Reflect** for the purpose of elaboration and self-evaluation
      2.1.6. **Refine** work based on feedback
      2.1.7. **Present** work to others.
   2.2. Apply a performance process in the arts:
      2.2.1. **Identify** audience and purpose.
      2.2.2. **Select** artistic work (repertoire) to perform.
      2.2.3. **Analyze** structure and background of work.
      2.2.4. **Interpret** by developing a personal interpretation of the work.
      2.2.5. **Rehearse, adjust, and refine** through evaluation and problem solving.
      2.2.6. **Present** work for others.
      2.2.7. **Reflect** and **evaluate**,
   2.3. Apply a responding process to an arts presentation
      2.3.1. **Engage** actively and purposefully.
      2.3.2. **Describe** what is seen and/or heard.
      2.3.3. **Analyze** how the elements are arranged and organized.
      2.3.4. **Interpret** based on descriptive properties.
      2.3.5. **Evaluate** using supportive evidence and criteria.
3. **The student communicates through the arts**.
   To meet this standard the student will:
   3.1. Use the arts to express and to present ideas and feelings.
   3.2. Use the arts to communicate for a specific purpose.
   3.3. Develop personal æsthetic criteria to communicate artistic choices.
4. **The student makes connections within and across the arts to other disciplines, life, cultures, and work.**
   To meet this standard the student will:
   4.1. Demonstrate and analyze the connections among the arts disciplines.
   4.2. Demonstrate and analyze the connections among the arts and other content areas.
   4.3. Understand how the arts impact life long choices.
   4.4. Understand that the arts shape and reflect culture and history.
   4.5. Demonstrate the knowledge of arts careers and the knowledge of arts skills in the world of work.

1. The student understands and applies arts knowledge and skills.

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—HIGH SCHOOL
1.1. Understand arts concepts and vocabulary.		
Identify and use visual art, dance, theatre, and music vocabulary and concepts.	Explain and apply the concepts of visual art, dance, theatre, and music using arts vocabulary.	Analyze and interpret works of visual art, dance, theatre, and music using arts concepts and vocabulary.
1.2. Develop arts skills and techniques.		
Identify and use basic arts skills and techniques.	Develop arts skills and techniques.	Refine and extend arts skills and techniques.
1.3. Understand and apply arts styles from various artists, cultures, and times.		
Identify specific attributes of art works of various artists, cultures, and times using arts vocabulary.	Apply techniques from various artists, cultures, and/or times.	Transfer understandings from one artistic style to a larger group of artworks.
1.4. Apply audience skills in a variety of arts settings and performances.		
Demonstrate audience conventions in a variety of arts settings and performances.	Understand and demonstrate the relationship and interactive responsibilities of the artist/performer and audience.	Articulate how audience conventions and responsibilities differ according to style and culture.

2. The student demonstrates thinking skills using artistic processes.

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—HIGH SCHOOL
2.1. Apply a creative process in the arts: conceptualize the context or purpose, gather information from diverse sources, develop ideas and techniques, organize arts elements, forms, and/or principles into a creative work, reflect for the purpose of elaboration and self evaluation, refine work based on feedback, present work to others.		
Develop work using a creative process with instructor direction.	Develop work using a creative process with instructor assistance.	Develop work using a creative process independently.
2.2. Apply a performance process in the arts: identify audience and purpose, select artistic work (repertoire) to perform, analyze structure and background of work, interpret by developing a personal interpretation of the work, rehearse, adjust, and refine through evaluation and problem solving, present work for others, reflect and evaluate.		
Develop work using a performance process with instructor direction.	Develop work using a performance process with instructor assistance.	Develop work using a performance process independently.
2.3. Apply a responding process to an arts presentation: engage actively and purposefully, describe what is seen and/or heard, analyze how the elements are arranged and organized, interpret based on descriptive properties, evaluate using supportive evidence and criteria.		
Apply a responding process to an arts presentation with instructor direction.	Apply a responding process to an arts presentation with instructor assistance.	Apply a responding process to an arts presentation independently.

3. The student communicates through the arts.

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—HIGH SCHOOL
3.1. Use the arts to express and present ideas and feelings.		
Express personal ideas and feelings through the arts.	Express ideas and feelings using artistic symbols in a variety of styles.	Express ideas and feelings through the arts in a variety of forms and styles.
3.2. Use the arts to communicate for a specific purpose.		
Create and/or perform an artwork to communicate for a given purpose with instructor direction.	Create and/or perform an artwork to communicate for a selected purpose with instructor assistance.	Analyze how the deliberate use of artistic elements communicates for a specific purpose.
3.3. Develop personal aesthetic criteria to communicate artistic choices.		
Explain how personal aesthetic criteria is reflected in artwork.	Explain how aesthetic choices are influenced by culture and history.	Analyze how cultural and historical perspectives influence personal aesthetic criteria.

4. The student makes connections within and across the arts, to other disciplines, life, cultures, and work.

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—HIGH SCHOOL
4.1. Demonstrate and analyze the connection among the arts disciplines.		
Describe skills, concepts, and vocabulary common among arts disciplines.	Compare and contrast attributes of personal artwork with other arts disciplines.	Analyze an arts presentation that integrates two or more arts disciplines.
4.2. Demonstrate and analyze the connection between the arts and other content areas.		
Identify skills, concepts, and vocabulary common to the arts and other content area.	Explain relationships between the arts and other content areas.	Integrate and adapt skills within the arts and other content areas.
4.3. Understand how the arts impact lifelong choices.		
Analyze how the arts impact personal and community choices.	Analyze how the arts impact choices in natural and constructed environments.	Analyze how the arts impact economic choices.
4.4. Understand that the arts shape and reflect culture and history.		
Identify specific attributes of artworks that reflect culture.	Compare and contrast specific attributes of artworks that reflect culture and history.	Identify specific attributes of artworks that shape culture and history.
4.5. Demonstrate knowledge of arts careers and the role of the arts skills in the world of work.		
Describe career roles in the arts, demonstrates arts skills used in the world of work.	Describe work habits and skills needed for careers in the arts, explains how art skills and knowledge are used in the world of work.	Assume roles of arts careers and practices appropriate work habits and skills, analyzes and interprets how arts skills and knowledge influence the world of work.

Communication

Introduction to Communication

Communication for Today and Tomorrow

The information age and the increasing contact between people of different cultures make communication more important than ever before. These global realities heighten the need for clarity and an understanding of the ethical responsibilities and consequences of communication. As education researcher Ernest Boyer noted, "It should be remembered that we speak more than we write. Throughout our lives we judge others and we ourselves are judged by what we say and how we speak. The information age raises to new levels of urgency the need for all students to be proficient in the use of the spoken as well as the written word." (1983)

What Is Communication?

Communication is defined as a process by which we assign and convey meaning in an attempt to create shared understanding. This process requires a vast repertoire of skills in intra-personal and interpersonal processing, listening, observing, speaking, questioning, analyzing, and evaluating. Use of these processes is developmental and transfers to all areas of life, home, school, community, work, and beyond. It is through communication that collaboration and cooperation occur.

Fundamental Beliefs About Curriculum and Assessment

If there is one unifying theme that crosses all disciplines it is communication. Communication is our window to basic literacy and academic excellence. Reaching levels of excellence and accuracy of expression mandate mastery of formal English. These are the capabilities that cultivate the potential in each student and the possibilities for our future.

Essential Academic Learning Requirements—Communication

1. The student uses listening and observation skills to gain understanding.

To meet this standard, the student will:

1.1 Focus attention.
1.2 Listen and observe to gain and interpret information.
1.3 Check for understanding by asking questions and paraphrasing.

2. The student communicates ideas clearly and effectively.

To meet this standard, the student will:

2.1. Communicate clearly to a range of audiences for different purposes.
2.2. Develop content and ideas. Develop a topic or theme; organize thoughts around a clear beginning, middle, and end; use transitional sentences and phrases to connect related ideas; and speak coherently and compellingly.
2.3. Use effective delivery. Adjust speaking strategies for a variety of audiences and purposes by varying tone, pitch, and pace of speech to create effect and aid communication.
2.4. Use effective language and style. Use language that is grammatically correct, precise, engaging and well suited to topic, audience, and purpose.

2.5. Effectively use action, sound, and/or images to support presentations.

3. The student uses communication strategies and skills to work effectively with others.
To meet this standard, the student will:
3.1. Use language to interact effectively and responsibly with others.
3.2. Work cooperatively as a member of a group.
3.3. Seek agreement and solutions through discussion.

4. The student analyzes and evaluates the effectiveness of formal and informal communication.
To meet this standard, the student will:
4.1. Assess strengths and need for improvement. Assess own and others' communication strengths and needs and set goals for improvement.
4.2. Seek and offer feedback. Seek and use feedback to improve communication; offer suggestions and comments to others.
4.3. Analyze mass communication.
4.4. Analyze how communication is used in career settings.

1. The student uses listening and observation skills to gain understanding.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
1.1 Focus attention.		
Pay attention while others are talking.	Give evidence of paying attention, *such as nodding, maintaining eye contact, taking notes, and asking relevant questions*.	Use attention level appropriate for particular circumstances and contexts.
Pay attention to oral stories, instructions, reports, assemblies, and daily announcements.	Pay attention and respond appropriately in particular contexts, such as social interactions and receiving information.	Analyze and reflect on ideas while paying attention and listening in a variety of situations.
1.2 Listen and observe to gain and interpret information.		
Recognize nonverbal communication.	Identify the relationship between verbal and nonverbal communication**.**	Interpret and draw inferences from verbal and nonverbal communication**.**
Identify visual information, *such as from a science experiment*.	Identify visual information and/or people's behaviors, *such as in a math activity or an ethnographic study.*	Draw inferences based on visual information and/or people's behaviors.
Interpret visual texts, *such as illustrations, comics, and videos*.	Interpret and discuss relationships among ideas, information, and events in visual texts, *such as illustrations, art, dance, graphs, and diagrams.*	Explore different perspectives on complex issues through viewing a range of visual texts.
Listen for, identify, and explain: / Main ideas / Details / Fact vs. opinion / Meaning	Listen for, identify and explain: / Important as well as extraneous details. / Relationships in stories, poems, etc. / Pitch, intensity, and intonation.	Listen for, identify, and explain: / Information vs. persuasion / Inferences / Emotive rhetoric vs. reasoned arguments.
Demonstrate listening strategies for following instructions.	Demonstrate listening strategies for gaining information.	Use a variety of effective listening strategies.
1.3 Check for understanding by asking questions and paraphrasing.		
Ask questions to clarify content and meaning, including who, what, why, when, where, and how.	Ask questions to clarify content and meaning in a variety of contexts and situations.	Ask questions to interpret and evaluate oral and visual contexts based on information from a variety of sources.
Paraphrase information.	Paraphrase conversations and information.	Paraphrase to expand and refine understanding.
	Ask questions to verify judgments and inferences.	Make judgments and inferences.
Select information and give opinions.	Construct hypotheses.	Ask questions to refine and verify hypotheses.

2. The student communicates ideas clearly and effectively.

The student communicates ideas clearly and effectively.To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
2.1. Communicate clearly to a range of audiences for different purposes.		
Communicate to teacher, small group, and class, *for example, by tutoring or giving reports.*	Communicate with an expanding range of audiences, *such as community members and voice-mail.*	Communicate effectively with different audiences.
Show beginning awareness of the needs of an audience.	Determine needs of an audience and make limited adjustments in content and technique.	Make well chosen and varied connections between own purposes and audience interests and need.
Use narrative and descriptive forms of speech	Communicate for a range of purposes, *for example to inform, explain, persuade, or entertain.*	Communicate for a broad range of purposes, *for example, to reflect, make inferences, interview, and influence.*
	Communicate using different forms of oral presentation, *such as reports or drama.*	Identify and use different forms of oral presentation.
2.2. Develop content and ideas.		
Choose content, which relates to topic.	Choose content appropriate to own purposes and interests and needs of an audience.	Use a variety of content to convey messages to a chosen audience.
Select material from readily available sources.	Select and document relevant material from a variety of sources.	Access and use a variety of primary and secondary sources.
Organize information in a sequential pattern (beginning, middle, end) using simple transitions.	Organize information with a clear sequencing of ideas and transitions.	Create a comprehensive and organized presentation with a clear sequencing of ideas and transitions.
Describe ideas in concrete terms.	Develop a rational argument.	Make a well-reasoned, insightful presentation supported by related details.
2.3. Use effective delivery.		
Speak at a volume and rate that enables others to follow.	Speak at a volume and pace appropriate to the situation.	Vary tone, pitch, and pace of speech to create effect and aid communication.
Project voice well.	〃 Project voice well.	〃 Project voice well.
Speak fluently and expressively to the class.	Appeal to the interests of the audience.	Use logic, arguments, or appeals to persuade others.
Use good posture and eye contact.	〃 Use good posture and eye contact.	〃 Use good posture and eye contact.
Begin to use facial expression and body language to convey a message or enhance an oral presentation.	Use facial expression and body language to heighten and emphasize message.	Skillfully use facial expression, body movement, and gestures to convey tone and mood appropriate to the audience and message.

The student communicates ideas clearly and effectively. (Continued).

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
2.4. Use effective language and style**.**		
Speak using standard grammar.	Speak using standard grammar.	Speak using standard grammar.
Use complete sentences.	Use complex sentences.	Use a variety of sentence structures.
Use age-appropriate vocabulary.	Use a range of vocabulary related to a particular topic.	Use language that is interesting and well suited to the topic and audience.
Use words and illustrations such as pictures or charts to create an effective presentation.	Use language well suited to the chosen audience.	Develop effective voice for the audience and purpose.
2.5. Effectively use action, sound, and/or images to support presentations.		
Experiment with a variety of media and resources to convey a message or enhance an oral presentation.	Use a variety of media to illustrate and support ideas.	Communicate messages through oral, artistic, graphic, and/or multimedia presentations.
	Use available technology as a presentation tool.	Demonstrate sophisticated use of available technology to present ideas and concepts.

3. The student uses communication strategies and skills to work effectively with others.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
3.1. Use language to interact effectively and responsibly with others.		
Demonstrate conversation skills, *for example, entering in, taking turns, responding to others' remarks, and closing a conversation.*	Use language to interact with others, *for example, to greet people, compliment, give encouragement, or express feelings*.	Use language to influence others, *for example, to persuade, convince, correct, or disagree.*
Distinguish between types of speech such as a chat, a warning, or a joke.	Respond to different types of speech and audiences.	Use appropriate humor, slang, idioms, and conversational styles with both peers and adults.
Use language that is respectful of others feelings and rights.	Use language that is free from stereotyping, bias, libel, slander, or harassment.	Use language that is accurate and equitable.
Show awareness of possible difficulties when communicating cross-culturally.	Identify cultural assumptions and perspectives.	Show awareness of cultural premises, assumptions, and world views in order to effectively communicate cross-culturally.
3.2. Work cooperatively as a member of a group.		
Assume a variety of assigned roles within a group to perform a task.	Assume roles or tasks within a group to perform a task.	Participate in a group to write, work toward consensus, propose solutions, or achieve results.
Contribute to group with ideas and effort.	Contribute to group with suggestions, research, and effort.	Make individual contribution to the group and extend the contribution of others.
Respect others' feelings and right to participate in a group.	Demonstrate respect for others' opinions by allowing time for responses.	Encourage group members to offer ideas and points of view.
3.3. Seek agreement and solutions through discussion.		
Identify and share ideas and points of view.	Acknowledge others' ideas and points of view; identify similarities and differences.	Respect that a solution may require honoring other points of view.
	Check for understanding in group interactions.	Analyze group interaction to anticipate consequences.
Accept responsibility for personal actions.	Contribute responsibly to group efforts.	Accept accountability for group results.
Formulate ideas and identify possible alternatives.	Choose a position and develop a plan of action.	Advocate, implement, and evaluate a plan.
Suggest solutions and initiate action.	Define challenges and encourage others to action.	Influence by encouraging and supporting others to act independently.

4. The student analyzes and evaluates the effectiveness of formal and informal communication.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
4.1. Assess strengths and need for improvement.		
Use established criteria to evaluate and improve one's own and others' presentations.	Establish and apply criteria for evaluating one's own and others' presentations.	Defend choices to deviate from established criteria.
	Know the qualities that make a presentation effective.	Use one's own and established criteria to improve presentations.
	Evaluate excellent presentations to improve own work.	Assess own strengths and weaknesses as a presenter.
4.2. Seek and offer feedback.		
Offer feedback on others' presentations	With guidance, offer feedback on others' presentations with regard to content and organization.	Independently offer specific feedback on others' presentations with regard to content, design, delivery skills, word choice, and conventions.
Accept and apply feedback on own presentation when appropriate.	Accept feedback when appropriate and revise own presentation.	Seek, evaluate, accept, and apply feedback.
4.3. Analyze mass communication.		
Identify various forms of mass communication, *such as magazines, television, newspapers, and the internet; identify messages in simple advertisements.*	Identify and evaluate techniques used in mass communication such as name calling, celebrity appeal, and identification with the audience.	Identify and evaluate complex techniques used in mass communications, *such as generalization, appeal to popularity, and appeal to emotion.*
Identify fact, opinion, and assumptions in mass communication.	Identify and explain the uses and impact of fact, opinion, bias, etc. in mass communication.	Analyze and explain the effectiveness of methods used in mass communication.
Understand that all media is produced from a point of view and with a set of assumptions.	Identify the accuracy, point of view, and assumptions of media.	Analyze and interpret the influence of media sources.
4.4. Analyze how communication is used in career settings.		
Identify different ways people communicate in the workplace, *for example, telephone, e-mail, or formal presentations.*	Identify different communication techniques used in a variety of career settings, *such as to persuade, inform, or instruct.*	Determine effective communication techniques for an occupational/career field of interest.

Health and Fitness

Introduction to Health and Fitness

Health and Fitness for Today and Tomorrow

An understanding of good health and fitness concepts and practices is essential for students. Businesses have already begun to realize the extent to which poor health can undermine an employee's effectiveness and ability to succeed. The same is true of students. Teaching our student's good health and safety principles can lead to a life of healthy practices, resulting in more productive, active, and successful lives. The Essential Academic Learning Requirements in health and fitness establish the concepts and skills necessary for safe and healthy living, and in turn, for successful learning.

Essential Academic Learning Requirements—Health and Fitness

1. The student acquires the knowledge and skills necessary to maintain an active life: movement, physical fitness, and nutrition.

To meet this standard, the student will:

1.1. Develop fundamental and complex movement skills as developmentally appropriate.
1.2. Safely participate in a variety of developmentally appropriate physical activities.
1.3. Understand the concepts of health-related physical fitness and develop and monitor progress on personal fitness goals.
1.4. Understand the relationship of nutrition and food nutrients to physical performance and body composition.

2. The student acquires the knowledge and skills necessary to maintain a healthy life: recognize patterns of growth and development, reduce health risks, and live safely.

To meet this standard, the student will:

2.1. Recognize patterns of growth and development.
2.2. Understand the concept of control and prevention of disease.
2.3. Acquire skills to live safely and reduce health risks.

3. The student analyzes and evaluates the impact of real-life influences on health.

To meet this standard, the student will:

3.1. Understand how environmental factors affect one's health (air, water, noise, chemicals).
3.2. Gather and analyze health information.
3.3. Use social skills to promote health and safety in a variety of situations.
3.4. Understand how emotions influence decision-making.

4. The student effectively analyzes health and safety information to develop health and fitness plans based on life goals.

To meet this standard, the student will:

4.1. Analyze health and safety information.
4.2 Develop a health and fitness plan and a monitoring system.

1. The student acquires the knowledge and skills necessary to maintain an active life: movement, physical fitness, and nutrition.

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—HIGH SCHOOL
1.1. Develop fundamental and complex movement skills, as developmentally appropriate.		
Demonstrate physical skills (loco-motor, non-loco-motor, and manipulative) that contribute to movement proficiency.	Perform fundamental movement combinations (run/catch; catch/throw; dribble pass).	Apply movement principles and skills to complex activities that enhance a physically active life.
1.2. Safely participates in a variety of developmentally appropriate physical activities.		
Follows rules and safety procedures while participating in a variety of physical activities.	Demonstrates knowledge of rules and safety procedures while participating cooperatively in individual, dual/team, and leisure activities.	Incorporates safety procedures into activities and individual fitness plans for leisure and employment.
1.3. Understand the concepts of health-related physical fitness and develop and monitor progress on personal fitness goals.		
Develop a fitness vocabulary and awareness of fitness concepts while participating regularly in a variety of physical activities for fitness and play.	Measure physical fitness, set fitness and activity goals, and explore a variety of activities to maintain healthy levels of cardio respiratory fitness, muscular strength-endurance-flexibility-and body composition.	Develop and monitor progress on individualized fitness goals based on fitness profiles and national guidelines in relation to work, activities, and leisure.
1.4. Understand the relationship of nutrition and food nutrients to physical performance and body composition.		
Identify the nutrients provided by a variety of foods and describe how bodily function and physical performance are affected by food consumption.	Design nutrition goals based on national dietary guidelines and individual activity needs.	Develop and monitor progress on personal nutrition goals based on national dietary guidelines and individual needs.
Recognize the physical benefits of movement, fitness, and nutrition.	Analyze the effects of movement, fitness, and nutrition practices.	Compare and contrast the application of movement, fitness, and nutrition concepts to safe work practices and leisure activities.

2. The student acquires the knowledge and skills necessary to maintain a healthy life: recognize patterns of growth and development, reduce health risks, and live safely.

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—HIGH SCHOOL
2.1. Recognize patterns of growth and development.		
Describe the structure and function of human body systems.	Describe the physical, emotional, intellectual, and social changes that occur during puberty.	Identify and plan for coping with situations related to the physical, social, and emotional transition from adolescence to adulthood as related to the reproductive health.
Identify hereditary factors that affect growth and development.	Identify hereditary factors that affect growth, development, and health.	Develop strategies to manage hereditary factors that affect growth development and health.
Describe the influence on nutrition on health and development.	Describe how nutrition, exercise, and rest influence physical growth and lifelong health.	Describe how nutrition, rest, exercise, disease, and substance abuse influence health throughout the life span.
2.2. Understand the concept of control and prevention of disease.		
Identify and demonstrate skills that help in the prevention of non-communicable diseases.	Describe health care practices that result in early detection, treatment, and monitoring non-communicable diseases.	Evaluate the effect and validity of personal health practices, public policies, research and medical advances on the prevention and control of non-communicable diseases.
Identify and demonstrate skills that prevent and reduce the risk of contracting and transmitting communicable diseases.	Describe personal and health care practices that result in prevention, detecting, and treatment of communicable diseases.	Evaluate the effect and validity of personal health practices, public policies, research, and medical advances on the prevention and control of communicable diseases.
2.3. Acquire skills to live safely and reduce health risks.		
Explain one's right to personal and physical safety.	Explain the adverse physical, emotional, and economic consequences of being sexually active.	Describe the responsibilities associated with abstinence, sexual activity, and the avoidance of pregnancy and sexually transmitted diseases (STDs).
Identify abusive and risky situations and demonstrate safe behaviors to prevent injury to self and others at home, school, and in the community.	Anticipate abuse and risky situations and demonstrate safe behavior to minimize risk and prevent injury to self and others at home, school, and in the community.	Develop strategies for self and others to promote non-abusive and safe environments and to demonstrate safe and respectful behaviors at home, school, and in the community
Identify sources to ask for help in an emergency or crisis.	Recognize emergency situations and respond appropriately and safely.	Maintain emergency first-aid skills to assist self and others, when necessary.
Identify the differences between harmful and helpful stress: recognize signals of too much stress and when to ask an adult for help.	Demonstrate skills that help self and others in emergency or crisis.	Develop strategies to manage stress and know how to modify these strategies throughout life.
Identify physical, emotional, and legal consequences of using nicotine, alcohol, and other drugs, and apply sills to resist any harmful use of substances.	Identify ways to use stress positively and develop short-term strategies to reduce harmful stress.	Analyze the implications of decisions regarding the use of nicotine, alcohol, and other drugs, based on laws, and the steps leading to dependence or addiction.
	Anticipate situations that involve pressure to abuse legal or use illegal drugs and plan how to reduce drug risks.	

3. The student analyzes and evaluates the impact of real-life influences on health.

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—HIGH SCHOOL
3.1. Understand how environmental factors that affect one's health (air, water, noise, chemicals),		
Identify environmental factors that affect health.	Describe the influence of environmental factors that positively and negatively affect health.	Assess how the environment impacts choosing healthy places to live, work, and recreate.
3.2. Gather and analyze health information.		
Determine reliable sources of health information.	Distinguish between safe and unsafe use of health-care products.	Evaluate the accuracy and usefulness of health information for selection of products and services.
Identify messages about safe and unsafe behaviors *such as those found in tobacco or alcohol advertising.*	Identify ways people encourage health and unhealthy decisions, plan how to resist unhealthy messages, and create healthy messages.	Analyze the effect of media and technology on personal and community health policy and health promotion.
Demonstrate the ability to practice health-enhancing behaviors and reduce risks.	Analyze health-care needs and identify sources of health care.	Solve a health and fitness problem or issue: *List alternative courses of action. *Choose the course that most fully addresses the needs and requirements of the situation. *Back up the choice with evidence. *Evaluate the outcome.
3.3. Use social skills to promote health and safety in a variety of situations.		
Express emotions constructively and forms safe and respectful relationships.	Express opinions and resolve conflicts constructively while maintaining safe and respectful relationships.	Negotiate conflict situations constructively while maintaining safe and respectful relationships.
Recognize social skills to keep out of trouble and resist pressure from others.	Identify effective social skills to avoid risky situations.	Anticipate emotional situations and develop strategies to act in ways that are safe to self and others.
3.4. Understand how emotions influence decision-making.		
Recognize a variety of emotions and how they affect self and others. Develop strategies about how to act in emotional situations.	Describe how emotions may influence decision making and strategies about how to act in emotional situations.	Anticipate emotional situations and develop strategies to act in ways that are safe to self and others.

4. The student effectively analyzes health and safety information to develop health and fitness plans based on life goals.
To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—HIGH SCHOOL
4.1. Analyze health and safety information.		
Identify how fitness and healthy living are requires for careers and occupations.	Identify workplace health and safety issues associated with occupational/career fields of interest.	Investigate the health and fitness requirements for occupational/career areas of interest.
4.2. Develop a health and fitness plan and a monitoring system.		
Set daily goals for improving health and fitness practices.	Develop a support system and record-keeping system to achieve health and fitness goals.	Develop, implement, and monitor a personal health and fitness plan, based on life goals for leisure and employment.

Mathematics

Introduction to Mathematics

Mathematics for Today and Tomorrow

Mathematics continues to grow at a rapid rate, spreading into new fields and creating new applications in its open-ended search for patterns. Several factors—growth of technology, increased applications, impact of computers, and expansion of mathematics itself—have combined in the past century to extend greatly both the scope and the application of the mathematical sciences. The changes must be reflected in the schools if our students are to be well prepared for tomorrow's world.

What is Mathematics?

Mathematics is a language and science of patterns. As a language of patterns, mathematics is a means for describing the world in which we live. In its symbols and vocabulary, the language of mathematics is a universal means of communication about relationships and patterns.

As a science of patterns, mathematics is a mode of inquiry that reveals fundamental understandings about order in our world. This mode of inquiry relies on logic and employs observation, simulation, and experimentation as means of challenging and extending our current understanding.

Toward a Deeper Study of Important Mathematics

More than at any other time in history, society is placing demands on citizens to interpret and use mathematics to make sense of information and complex situations. Computers and other technologies have increased our capacities for dealing with numbers for collecting, organizing, representing, and analyzing data. Tables, lists of numbers, graphs of data, and statistics summarizing information occur in every form of the media.

To be well informed as adults and to have access to desirable jobs, students today require an education in mathematics that goes far beyond what was needed by students in the past. All students must develop and sharpen their skills; deepen their understanding of mathematical concepts and processes; and hone their problem-solving, reasoning, and communication abilities while using mathematics to make sense of and to solve compelling problems. All students need a deep understanding of mathematics; for this to occur, rigorous mathematical content must be reorganized, taught, and assessed in a problem-solving environment. For students to develop this deeper level of understanding, their knowledge must be connected to a variety of ideas and skills across topic areas and grade levels in mathematics to other subjects taught in school as well as to situations outside the classroom.

Essential Academic Learning Requirements—Mathematics

1. The student understands and applies the concepts and procedures of mathematics.

To meet this standard, the student will:

1.1. Understand and apply concepts and procedures from number sense—number and numeration, computation, and estimation.

1.2. Understand and apply concepts and procedures from measurement—attributes and dimensions, approximation and precision, and systems and tools.

1.3. Understand and apply concepts and procedures from geometric sense—properties and relationships and locations and transformations.

1.4. Understand and apply concepts and procedures from probability and statistics—probability, statistics, and prediction and inference.

1.5. Understand and apply concepts and procedures from algebraic sense—patterns, representations, and operations.

2. The student uses mathematics to define and solve problems.

To meet this standard, the student will:

2.1. Investigate situations by searching for patterns and using a variety of approaches.

2.2. Formulate questions and define the problem.

2.3. Construct solutions by organizing the necessary information and using appropriate mathematical tools.

3. The student uses mathematical reasoning.

To meet this standard, the student will:

3.1. Analyze information from a variety of sources; use models, known facts, patterns and relationships to validate thinking.

3.2. Predict results and make conjectures based on analysis of problem situations.

3.3. Draw conclusions and verify results—support mathematical arguments, justify results, and check for reasonableness of solutions.

4. The student communicates knowledge and understanding in both everyday and mathematical language.

To meet this standard, the student will:

4.1. Gather information—read, listen, and observe to access and extract mathematical information.

4.2. Organize and interpret information.

4.3. Represent and share information—express and explain mathematical ideas using language and notation in ways appropriate for audience and purposes.

5. The student understands how mathematical ideas connect within mathematics, other subject areas, and real-life situations.

To meet this standard, the student will:

5.1. Relate concepts and procedures within mathematics—use conceptual and procedural understandings among content strands and use equivalent models and representations.

5.2. Relate mathematical concepts and procedures to other disciplines—identify and use mathematical patterns, thinking, and modeling in other subject areas.

5.3. Relate mathematical concepts and procedures to real-life situations—understand the connections between mathematics and problem-solving skills used every day at work and at home.

1. The student understands and applies the concepts and procedures of mathematics.
To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2— GRADE 7	BENCHMARK 3—GRADE 10
1.1. Understand and apply concepts and procedures from number sense.		
Number and Numeration		
Demonstrate understanding of whole and fractional numbers and place value in whole numbers using objects, pictures, or symbols.	Demonstrate understanding of integers, fractions, decimals, percents, place value of decimals, and properties of the rational number system using pictures and symbols.	Understand and use properties and symbolic representations of rational numbers, powers, and roots.
Identify, compare, and order whole numbers and simple fractions.	Compare and order integers, fractions, and decimals.	Compare and order rational numbers, powers, and roots.
Demonstrate an understanding of the properties of whole numbers.	Understand the concepts of prime and composite numbers, factors and multiples, and divisibility rules.	Understand concepts of and use processes involving prime and composite numbers, factors and multiples, and divisibility.
	Understand and apply the concepts of ratio and direct proportion.	Understand and apply the concepts of ratio and both direct and inverse proportion.
Computation		
Show understanding of whole number operations (+, -, ×, ÷) using blocks, sticks, beans, pictures, symbols, etc.	Understand operations on nonnegative rational numbers.	Understand operations on rational numbers, powers, and roots.
Add, subtract, multiply, and divide whole numbers.	Add, subtract, multiply, and divide nonnegative fractions and decimals using rules for order of operation.	Compute with rational numbers, powers, and roots.
Use mental arithmetic, pencil and paper, or calculator as appropriate to the task involving whole numbers.	Use mental arithmetic, pencil and paper, calculator, or computer as appropriate to the task involving nonnegative rational numbers.	Use mental arithmetic, pencil and paper, calculator, or computer as appropriate to the task involving real numbers.
Estimation		
Identify situations involving whole numbers in which estimation is useful.	Identify situations involving nonnegative rational numbers in which estimation is sufficient and computation is not required.	Identify situations involving rational numbers, powers, and roots in which estimation is sufficient and computation is not required.
Use estimation to predict computation results and to determine the reasonableness of answers, *for example, estimating a grocery bill.*	Use estimation to predict computation results and to determine the reasonableness of answers involving nonnegative rational numbers, *for example, estimating a tip*.	Use estimation to predict computation results and to determine the reasonableness of answers involving real numbers, *for example, estimating.*

1. The student understands and applies the concepts and procedures of mathematics (continued).
   To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
1.2. Understand and apply concepts and procedures from measurement.		
Attributes and Dimensions		
Understand concepts of perimeter, area, and volume.	Understand the concepts of and the relationships among perimeter, area, and volume and how changes in one dimension affect perimeter, area, and/or volume.	Understand how changes in dimension affect perimeter, area, and volume.
Use directly measurable attributes *such as length, perimeter, area, volume/capacity, angle, weight/mass, time, money, and temperature to describe and compare objects.*	Measure objects and events directly or using indirect methods *such as calculating and applying procedures for determining perimeter, area, and volume.*	Measure objects and events directly or use indirect methods such as finding the volume of a cone given its height and diameter.
	Understand the concept of rate and how to calculate rates and determine units.	Calculate rate and other derived and indirect measurements.
Approximation and Precision		
Understand that measurement is approximate.	Understand that precision is related to the unit of measurement used and the calibration of the measurement tool.	Understand precision and accuracy of measurement are affected by measurement tools and calculating procedures.
Know when to estimate and use estimation to determine when measurements are reasonable or to obtain approximations, for example, estimating the length of the playground by pacing it off.	Know when to estimate and use estimation to obtain reasonable approximations, *for example, estimating the length and width of the playground to approximate its area.*	Know when to estimate and use estimation to obtain reasonable approximations, *for example, estimating how much paint is needed to paint the walls of a classroom.*
Systems and Tools		
Understand the benefits of using standard units of measurement for measuring length, area, and volume.	Understand the appropriate uses of standard units of measurement for both direct and indirect measurement.	Understand the benefits of standard units of measurement and the advantages of the metric system.
Understand appropriate units of measure for time, money, length, area, volume/capacity, weight/mass, and temperature.	Understand the relationship among units within both the U.S. and metric systems.	Compare, contrast, and use both the U.S. system and metric system.
Select and use appropriate tools for measuring time, money, length, area, volume, mass, and temperature.	Select and use tools that will provide an appropriate degree of precision, *for example, using meters vs. kilometer*.	Select and use tools that will provide an appropriate degree of precision and accuracy for the situation, *for example, using kilometers vs. light years.*

1. The student understands and applies the concepts and procedures of mathematics (continued).
To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
1.3. Understand and apply concepts and procedures from geometric sense.		
Properties and Relationships.		
Use attributes of geometric shapes and properties of parallel and perpendicular to identify, name, compare, and sort geometric shapes and figures.	Use the properties and relationships of plane geometry to describe shapes and figures, *including angles, degrees in a circle, triangles, isosceles, equilateral, or quadrilateral*.	Use geometric properties and relationships to compare, contrast, describe, and classify 2- and 3-dimensional geometric figures.
Recognize geometric shapes in the surrounding environment, *for example, identify rectangles within windows*.	Identify, describe, or draw objects in the surrounding environment in geometric terms, *for example, producing a simple scale drawing of a classroom.*	Construct geometric models and scale drawings using tools as appropriate, *for example, building a model of a bridge*.
Understand concepts of symmetry, congruence, and similarity.	Understand symmetry, congruence, and similarity.	Understand and use properties of symmetry, congruence, and similarity.
Draw and build simple shapes and figures using appropriate tools, *such as a straightedge, ruler, protractor, or nets.*	Perform geometric constructions using a variety of tools and technologies *such as paper folding, computer software, straightedge, compass.*	Perform complex geometric constructions using a variety of tools and technologies *such as paper folding, computer software, straightedge, compass.*
Locations and transformations.		
Locate and describe the location of objects on a number line, map, or a coordinate grid in the first quadrant.	Identify and describe location of objects on coordinate grids in any of the four quadrants.	Understand and use coordinate grids.
Understand and draw simple geometric transformations using translations (slides), reflections (flips), or rotations (turns).	Understand and apply simple geometric transformations using combinations of translations (slides), or reflections (flips), or rotations (turns).	Understand and apply multiple geometric transformations using combinations of translations, reflections, and/or rotations.

1. The student understands and applies the concepts and procedures of mathematics (continued).

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
1.4. Understand and apply concepts and procedures from probability and statistics.		
Probability		
Understand the difference between a certain and uncertain event.	Know how to calculate numerical measures of chance for simple events.	Understand the properties of dependent and independent events.
Know how to list all possible outcomes of simple experiments.	Understand procedures for counting outcomes to determine probabilities.	Understand and use appropriate counting procedures to determine probabilities.
Understand and use experiments to investigate the probabilities of uncertain events.	Know how to conduct experiments and simulations and to compare results with mathematical expectations.	Use both experimental and theoretical methods to determine probabilities.
Statistics		
Collect data in an organized way.	Collect a random sample of data that represents a described population.	Collect data using appropriate methods and technology.
Organize and display data in numerical and graphical forms *such as tables, charts, pictographs, and bar graphs.*	Organize and display data in appropriate forms *such as frequency tables, circle graphs, and stem-and-leaf plots.*	Organize and display data in appropriate forms *such as tables, graphs, scatter plots, and box and whisker plots.*
Understand measures of central tendency, *such as mean, median, and mode in describing data*.	Calculate and appropriately use range and measures of central tendency to describe data.	Calculate and use the different measures of central tendency, variability, and range as appropriate to describe data.
Identify how data can be used to support a point of view.	Identify how statistics can be used to support different points of view.	Use statistics to support different points of view, *for example, in a debate or a position paper.*
Prediction and Inference		
Predict outcomes of simple activities and compare predictions to experimental results.	Predict outcomes of experiments and simulations and compare the predictions to experimental results.	Predict outcomes and design and conduct experiments to verify or disprove predictions.
Understand and make inferences based on experimental results using coins, number cubes, spinners, etc.	Understand and make inferences based on analysis of experimental results, statistical data, and simple graphical representations.	Understand and make inferences based on the analysis of experimental results, statistical data, and graphical representations.

1. The student understands and applies the concepts and procedures of mathematics (continued).
To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
1.5. Understand and apply concepts and procedures from algebraic sense.		
Patterns		
Recognize, extend, and create patterns of numbers, shapes, or objects *such as beans, toothpicks, pattern blocks, cubes, and colored tiles.*	Recognize, extend, and create patterns and sequences.	Recognize, extend, and create complex patterns and sequences.
Write a rule for a pattern based on a single arithmetic operation between terms such as a function machine.	Represent and describe patterns with tables, graphs, and rule.	Generalize and express rules describing patterns and sequences.
Representations		
Understand equality and inequality and use =, >, and < in number sentences.	Represent equalities and inequalities symbolically using =, >, <, ≤, ≥.	Translate among tabular, symbolic, and graphical representations of relations using =, ≠, >, <, ≥, ≤.
Identify and use appropriate symbols and notations in reading and writing open sentences; for example, $3 \times \square = 18$.	Use variables to write simple expressions, equations, and inequalities, for example, $3x > 18$.	Use variables to write expressions, equations, and inequalities.
Operations		
Evaluate simple expressions using blocks, sticks, beans, pictures, etc.	Evaluate expressions and formulas.	Simplify and evaluate expressions and formulas.
Solve simple equations using blocks, sticks, beans, pictures, etc.	Solve single-variable equations.	Solve equations and inequalities.

2. The student uses mathematics to define and solve problems.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
2.1. Investigate situations		
Search for patterns in simple situations.	Search systematically for patterns in simple situations.	Search systematically for patterns in complex situations.
Use a variety of strategies and approaches.	Develop and use a variety of strategies and approaches.	Use multiple strategies.
Recognize when information is missing or extraneous.	Identify missing or extraneous information.	Identify what information is missing or extraneous and compensate for it.
Recognize when an approach is unproductive and try a new approach.	Recognize the need to modify or abandon an unproductive approach.	Analyze an unproductive approach and attempt to modify it or try a new approach.
2.2. Formulate questions and define the problem		
Identify questions to be answered in familiar situations.	Identify questions to be answered in new situations.	Identify questions to be answered in complex situations.
Define problems in familiar situations.	Define problems in new situations.	Define problems in complex situations.
Identify what is known and unknown in familiar situations.	Identify the known and unknown in new situations.	Identify the information that is known and unknown in complex situations.
2.3. Construct solutions		
Organize relevant information.	Organize relevant information from multiple sources.	Organize and synthesize information from multiple sources.
Select and use appropriate mathematical tools.	Select and use appropriate mathematical tools.	Select and use appropriate mathematical tools.
Apply viable strategies and appropriate concepts and procedures to construct a solution.	Apply viable strategies and appropriate concepts and procedures to construct a solution.	Apply viable strategies and appropriate concepts and procedures to construct a solution.

3. The student uses mathematical reasoning.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
3.1. Analyze information.		
Compare and interpret information in familiar situations.	Compare, contrast, and interpret information from a variety of sources.	Compare, contrast, interpret and integrate information from multiple sources.
Validate thinking using models, known facts, patterns, and relationships.	Validate thinking and mathematical ideas using models, known facts, patterns, relationships, and counter-examples.	Validate thinking and mathematical ideas using models, known facts, patterns, relationships, counter-examples, and proportional reasoning.
3.2 Predict results.		
Make conjectures based on analysis of familiar problem situations.	Make conjectures based on analysis of new problem situations.	Make and explain conjectures based on analysis of problem situations.
3.3. Draw conclusions and verify results.		
Test conjectures by finding examples to support or contradict them.	Test conjectures and explain why they are true or false.	Test conjectures by formulating a proof or by constructing a counterexample.
Support arguments and justify results.	Support arguments and justify results using evidence.	Support arguments and justify results using inductive and deductive reasoning.
Check for reasonableness of results.	Check for reasonableness of results.	Check for reasonableness of results.
Reflect on and evaluate procedures and results in familiar situations.	Reflect on and evaluate procedures and results in new problem situations.	Reflect on and evaluate procedures and results and make necessary revisions.

4. The student communicates knowledge and understanding in both everyday and mathematical language.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
4.1. Gather information		
Develop and follow a simple plan for collecting information.	Develop and follow a plan for collecting information.	Develop or select and follow an efficient system for collecting information.
Use reading, listening, and observation to access and extract mathematical information from a variety of sources *such as pictures, diagrams, physical models, classmates, oral narratives, and symbolic representations.*	Use reading, listening, and observation to access and extract mathematical information from multiple sources *such as pictures, diagrams, physical models, oral narratives, and symbolic representations.*	Use reading, listening, and observation to access and extract mathematical information from multiple, self-selected sources *such as pictures, diagrams, physical models, oral narratives, and symbolic representations.*
Use available technology to browse and retrieve mathematical information from a variety of sources.	Choose appropriate available technology to browse, select, and retrieve relevant mathematical information from a variety of sources.	Integrate the use of a variety of available technologies to browse, select, and retrieve mathematical information from multiple sources.
4.2. Organize and interpret information		
Organize and clarify mathematical information in at least one way—reflecting, verbalizing, discussing, or writing.	Organize and clarify mathematical information by reflecting, verbalizing, discussing, or writing.	Organize, clarify, and refine mathematical information in multiple ways—reflecting, verbalizing, discussing, or writing.
4.3. Represent and share information		
Express ideas using mathematical language and notation *such as physical or pictorial models, tables, charts, graphs, or symbols.*	Clearly and effectively express or present ideas and situations using both everyday and mathematical language *such as models, tables, charts, graphs, written reflection, or algebraic notation*.	Express complex ideas and situations using mathematical language and notation in appropriate and efficient forms.
Explain or represent mathematical ideas and information to familiar people for a given purpose.	Explain or represent mathematical ideas and information in ways appropriate for audience and purpose.	Explain or represent complex mathematical ideas and information in ways appropriate for audience and purpose.

5. The student understands how mathematical ideas connect within mathematics, other subject areas, and real-life situations.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
5.1. Relate concepts and procedures within mathematics.		
Relate conceptual and procedural understandings among familiar mathematical content strands.	Relate and use conceptual and procedural understandings among a variety of mathematical content areas.	Relate and use conceptual and procedural understandings among multiple mathematical content strands.
Recognize equivalent mathematical models and representations in familiar situations.	Relate and use different mathematical models and representations of the same situation.	Relate and use multiple equivalent mathematical models and representations.
5.2. Relate mathematical concepts and procedures to other disciplines.		
Recognize mathematical patterns and ideas in familiar situations in other disciplines.	Identify mathematical patterns and ideas in other disciplines.	Extend mathematical patterns and ideas to other disciplines.
Use mathematical thinking and modeling in familiar situations in other disciplines.	Use mathematical thinking and modeling in other disciplines.	Apply mathematical thinking and modeling in other disciplines.
Describe examples of contributions to the development of mathematics *such as the contributions of women, men, and different culture.*	Describe examples of contributions to the development of mathematics *such as the contributions of women, men, and different cultures.*	Describe examples of contributions to the development of mathematics *such as the contributions of women, men, and different cultures.*
Relate mathematical concepts and procedures to real-life situations.		
Give examples of how mathematics is used in everyday life.	Recognize the widespread use of mathematics in daily life and the extensive use of mathematics outside the classroom, *for example, in banking or sports statistic*.	Identify situations in which mathematics can be used to solve problems with local, national, or international implications *such as calculating resources necessary for interstate highway maintenance*.
Identify how mathematics is used in career settings.	Investigate the use of mathematics within several occupations/careers of interest.	Investigate the mathematical knowledge and training requirements for occupational/career areas of interest.

Reading

1: The student understands and uses different skills and strategies to read.

1.1 Use word recognition skills and strategies to read and comprehend text.
1.2 Use vocabulary (word meaning) strategies to comprehend text.
1.3 Build vocabulary through wide reading.
1.4 Apply word recognition skills and strategies to read fluently.

2: The student understands the meaning of what is read.

2.1 Demonstrate evidence of reading comprehension.
2.2 Understand and apply knowledge of text components to comprehend text.
2.3 Expand comprehension by analyzing, interpreting, and synthesizing information and ideas in literary and informational text.
2.4 Think critically and analyze author's use of language, style, purpose, and perspective in informational and literary text.

3: The student reads different materials for a variety of purposes.

3.1 Read to learn new information.
3.2 Read to perform a task.
3.3 Read for career application.
3.4 Read for literary/narrative experience in a variety of genres.

4: The student sets goals and evaluates progress to improve reading.

4.1 Asses reading strengths and need for improvement.
4.2 Develop interests and share reading experiences.

Science

Introduction to Science

"The important thing is not to stop questioning."
Albert Einstein

Learning in science depends on actively doing science. Active engagement in hands-on, minds-on science learning experiences enables students to make personal sense of the physical world and to solve problems. Toward these ends, the Essential Academic Learning Requirements for science were developed based on the following set of guiding principles.

1. All students should be expected to attain satisfactory achievement and performance on all Essential Academic Learning Requirements.

2. All students should have access to a carefully articulated science program **each year** in kindergarten through 10th grade with opportunities for continued study in grades 11 and 12.

3. All students should receive quality feedback about their performance and achievement in science on a continuous basis.

4. All students, regardless of gender, cultural or ethnic background, physical or learning disabilities, aspirations, or interest and motivation in science, should have the opportunity to attain scientific literacy.

5. All students should have access to effective and appropriate teaching from well-trained teachers who are supported with high quality instructional resources.

If all students attain mastery of the Essential Academic Learning Requirements for science, Washington State will be much closer to attaining the national goal of being the first in the world in science achievement and performance.

.Essential Academic Learning Requirements—Science

1. The student understands and uses scientific concepts and principles.

To meet this standard, the student will:

1.1. Use properties to identify, describe, and categorize substances, materials, and objects, and use characteristics to categorize living things.

1.2. Recognize the components, structure, and organization of systems and the interconnections within and among them.

1.3. Understand how interactions within and among systems cause changes in matter and energy.

2. The student knows and applies the skills and processes of science and technology.

To meet this standard, the student will:

2.1. Develop abilities necessary to do scientific inquiry.

2.2. Apply science knowledge and skills to solve problems or meet challenges.

3. The student understands the nature and contexts of science and technology.

To meet this standard, the student will:

3.1. Understand the nature of scientific inquiry.

3.2. Know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace.

1. The student understands and uses scientific concepts and principles.

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK—GRADE 10
1.1. Use properties to identify, describe, and categorize substances, materials, and objects, and use characteristics to categorize living things.		
PHYSICAL SCIENCE		
Properties of Substances		
Use properties to sort natural and manufactured materials and objects, *for example, size, weight, shape, color, texture, and hardness.*	Use physical and chemical properties to sort and identify substances, *for example, density, boiling point, and solubility*.	Examine the basis for the structure and use of the periodic table.
Motion of Objects		
Describe the relative position and motion of objects.	Describe the positions, relative speeds, and changes in speed of objects.	Describe the average speed, direction of motion, and average acceleration of objects, *for example, increasing, decreasing, or constant acceleration.*
Wave Behavior		
Describe experiences with sound, for example vibrations, echoes, and pitch; describe experiences with light in terms of bouncing off, passing through, and changes in path direction.	Describe sound, water waves, and light, using wave properties *such as wavelength, reflection, refraction, transmission, absorption, scattering, and interference*.	Describe water waves and sound, relating the ideas of frequency, wavelength, and speed, and by relating energy to amplitude.
EARTH/SPACE SCIENCE		
Nature and Properties of Earth Materials		
Observe and examine physical properties of earth materials, such as rocks and soil, water (as liquid, solid, and vapor) and the gases of the atmosphere.	Classify rocks and soils into groups based on their chemical and physical properties; describe the processes by which rocks and soils are formed.	Correlate the chemical composition of earth materials *such as rocks, soils, water, gases of the atmosphere, with properties that determine their use to humans.*
LIFE SCIENCE		
Basis of Biological Diversity		
Distinguish living organisms from nonliving objects, and use characteristics to sort common organisms into plant and animal groups.	Categorize plants and animals into groups according to how they accomplish life processes and by similarities and differences in external and internal structures.	Classify organisms into distinct groups according to structural, cellular, biochemical, and genetic characteristics.

1. The student understands and uses scientific concepts and principles (continued).

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—GRADE 10
1.2. Recognize the components, structure, and organization of systems and the interconnections within and among them.		
Systems		
Identify the parts of a system, how the parts go together, and how they depend on each other.	Describe how the parts of a system interact and influence each other.	Analyze systems, including the inputs and outputs of a system and its subsystems.
PHYSICAL SCIENCE		
Energy Sources and Kinds		
Understand that energy keeps things running and comes in many forms.	Understand that energy is a property of substances and systems and comes in many forms, including stored energy, energy of motion, and heat energy *such as heat, light, electrical, mechanical, sound, nuclear, and chemical.*	Understand many forms of energy as they are found in common situations on earth and in the universe.
Energy Transfer and Transformation		
Know that energy can be transferred between various forms.	Determine factors that affect rate and amount of energy transfer; associate a decrease in one form of energy with an increase in another.	Understand that total energy is conserved; analyze decreases and increases in energy during transfers, in terms of total energy conservation.
Structure of Matter		
Know that matter is made of small particles.	Understand that all matter is made up of atoms, which may be combined in various kinds, ways, and numbers.	Relate the structural characteristics of atoms to the principles of atomic bonding.
Physical/Chemical Changes		
Know that matter can undergo changes of state, such as evaporation, condensation, or freezing and thawing.	Understand physical and chemical changes at the particle level, and know that matter is conserved.	Analyze and explain the factors that affect physical and chemical changes and how matter and energy are conserved in a closed system.
EARTH/SPACE SCIENCE		
Components and Patterns of the Earth System.		
Recognize that the earth is a spherical planet with a mainly solid interior and a surface composed of landforms, bodies of water, and an atmosphere.	Describe the components and relationships of the earth system, including the solid earth (crust, hot confecting mantle and dense metallic core), the hydrosphere (oceans, seas, lakes, rivers, and streams), and the atmosphere (a mixture of gases).	Explain how patterns and arrangements of landforms, oceans, and the atmosphere are determined by natural forces and how the theory of plate tectonics accounts for movement over time.
Components of the Solar System and Beyond (universe)		
Know that the earth is one of several planets that orbits the sun, and the moon orbits the earth.	Describe the relationships of the earth to the sun, the moon, the other planets and their moons, and smaller objects such as asteroids and comets.	Understand that the solar system is in a galaxy in an expanding universe composed of immense numbers of stars and celestial bodies.

1. The student understands and uses scientific concepts and principles (continued).

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—GRADE 10
LIFE SCIENCE		
Structure and Organization of Living Systems.		
Know that living things are composed of parts made of cells.	Know that specialized cells within multi-cellular organisms form different kinds of tissues, organs, and organ systems to carry out life functions.	Understand that specific genes regulate the functions performed by structures within the cells of multi-cellular organisms.
Molecular Basis of Heredity.		
Describe the life cycles of plants and animals, and recognize the differences between inherited and acquired characteristics.	Understand that all living things reproduce and pass on genetic information and that an organism's characteristics are determined by both genetic and environmental influences.	Describe how genetic information (DNA) in the cell is controlled at the molecular level and provides genetic continuity between generations.
Human Biology.		
Understand the organization and function of human body structures and internal organs and how they work together.	Identify and describe human life functions, and the interconnecting organ systems necessary to maintain human life, such as digestion, respiration, reproduction, circulation, excretion, movement, disease prevention, control, and coordination.	Compare and contrast the specialized structural and functional systems that regulate human growth and development, and maintain health.

1. The student understands and uses scientific concepts and principles (continued).
To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—GRADE 10
1.3. Understand how interactions within and among systems cause changes in matter and energy.		
PHYSICAL SCIENCE		
Nature of Forces		
Describe forces in terms of strength and direction.	Know the factors that determine the strength of the various forces.	Identify various forces and their relative magnitudes, and explain everyday situations in terms of force.
Forces to Explain Motion		
Investigate and recognize factors, which determine the effects of a push or pull on the motion of objects.	Understand the effects of balanced and unbalanced forces on the motion of objects along a straight line.	Explain the effects of unbalanced forces in changing the direction of motion of objects.
EARTH/SPACE SCIENCE		
Processes and Interactions in the Earth System		
Identify processes that slowly change the surface of the earth *such as erosion and weathering, and those that rapidly change the surface of the earth, such as landslides, volcanic eruptions, and earthquakes.*	Describe the processes of constructive and destructive forces and how they continually change landforms on earth.	Understand that patterns of movement in the plates that comprise the earth's surface are the result of outward transfer of the earth's internal heat and that historical patterns of movement can be identified from clues in rock formations; describe how volcanoes and earthquakes in Washington State occur because of this interaction.
History and Evolution of the Earth		
Recognize that fossils provide evidence of plants, animals, and environments that existed long ago.	Know the importance of fossils in documenting life and environmental changes over time.	Understand that fossils and radioactive elements can be used to correlate and determine the sequence of geologic events.
Hydrosphere/Atmosphere		
Observe and measure weather indicators *such as temperature, wind direction and speed, and precipitation, noting changes and patterns of change from day-to-day and over the seasons*.	Relate global atmospheric movement and the formation of ocean currents to weather and climate.	Correlate global climate to energy transfer by the sun, cloud cover, the earth's rotation, and positions of mountain ranges and ocean.
Interactions in the Solar System and Beyond		
Observe and describe the patterns of movement of the sun and moon relative to each other and the earth, and relate them to the earth's rotation.	Describe how the regular and predictable motions of most objects in the solar system account for such phenomena as the day, year, phases of the moon, eclipses, seasons, and ocean tides.	Understand that the earth, planets, sun, and the rest of the celestial bodies in the universe are continuing to evolve because of interactions between matter and forces of nature.

1. The student understands and uses scientific concepts and principles (continued).

To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—GRADE 10
LIFE SCIENCE		
Life Processes and the Flow of Matter and Energy		
Recognize that living things need constant energy supplied from food or light and that in ecosystems substances such as air, water, nutrients, and the chemicals in food are continually recycled.	Understand that individual organisms use matter and energy for life processes, and the mechanisms accomplishing these processes are complex, integrated, and regulated.	Explain how organisms can sustain life by obtaining, transporting, transforming, releasing, and eliminating matter and energy.
Biological Evolution		
Know that fossil records show patterns of structural change in organisms over time.	Describe how biological evolution accounts for species diversity, adaptation, natural selection, extinction, and change in organisms over time.	Investigate and examine the scientific evidence used to develop theories for evolution, speciation, adaptation, and biological diversity.
Interdependence of Life		
Describe how an organism's behavior and ability to survive is influenced by environment, other life forms, and the availability of food and/or other resources.	Explain how organisms interact with their environment and with other organisms to acquire energy, cycle matter, influence behavior, and establish competitive or mutually beneficial relationships.	Compare and contrast the complex factors (biotic and abiotic) that affect living organisms' interactions in biomes, ecosystems, communities, and populations.
Environmental and Resource Issues		
Know humans and other living things depend on the natural environment and can cause changes in their environment that affect their ability to survive.	Explain how human societies' use of natural resources affects quality of life and the health of ecosystems.	Analyze the effects of natural events and human activities on the earth's capacity to sustain biological diversity.

2. The student knows and applies the skills and processes of science and technology.
To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—GRADE 10
2.1. Develop abilities necessary to do scientific inquiry.		
Questioning		
Ask questions about objects, organisms, and events in the environment.	Generate questions that can be answered through scientific investigations.	Study and analyze questions and related concepts that guide scientific investigations.
Designing and Conducting Investigations.		
Plan and conduct simple investigations, using appropriate tools, measures, and safety rules.	Design, conduct, and evaluate scientific investigations, using appropriate equipment, mathematics, and safety procedures.	Design, conduct, and evaluate systematic and complex scientific investigations, using appropriate technology, multiple measures, and safe approaches.
Explanation		
Use data to construct reasonable explanations.	Use evidence from scientific investigations to think critically and logically to develop descriptions, explanations, and predictions.	Formulate and revise scientific explanations and models using logic and evidence; recognize and analyze alternative explanations and predictions.
Modeling		
Model objects, events, or processes by representing them with concrete objects, metaphors, analogies, or other conceptual or physical constructs.	Correlate models of the behavior of objects, events, or processes to the behavior of the actual things; test models by predicting and observing actual behaviors or processes.	Use mathematics, computers and/or related technology to model the behavior of objects, events, or processes.
Communication		
Record and report observations, explanations, and conclusions using oral, written, and mathematical expression.	Communicate scientific procedures, investigations, and explanations orally, in writing, with computer-based technology, and in the language of mathematics.	Research, interpret, and defend scientific investigations, conclusions, or arguments; use data, logic, and analytical thinking as investigative tools; express ideas through oral, written, and mathematical expression.

2. The student knows and applies the skills and processes of science and technology (continued).
To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—GRADE 10
2.2. Apply science knowledge and skills to solve problems or meet challenges.		
Identifying Problems		
Identify problems found in familiar contexts in which science/technology can be or has been used to design solutions.	Identify and examine common, everyday challenges or problems in which science/technology can be or has been used to design solutions.	Study and analyze challenges or problems from local, regional, national, or global contexts in which science/technology can be or has been used to design a solution.
Designing and Testing Solutions		
Propose, design, and test a solution to a problem.	Identify, design, and test alternative solutions to a challenge or problem.	Research, model, simulate, and test alternative solutions to a problem.
Evaluating Potential Solutions		
Evaluate how well a design or a product solves a problem.	Compare and contrast multiple solutions to a problem or challenge.	Propose, revise, and evaluate the possible constraints, applications, and consequences of solutions to a problem or challenge.

3. The student understands the nature and contexts of science and technology.
To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—GRADE 10
3.1. Understand the nature of scientific inquiry.		
Intellectual Honesty.		
Understand that all scientific observations should be reported accurately even when they contradict expectations.	Understand the operational and ethical traditions of science and technology *such as skepticism, cooperation, intellectual honesty, and proprietary discovery*.	Analyze and explain why curiosity, honesty, openness, and skepticism are integral to scientific inquiry.
Limitations of Science and Technology.		
Distinguish between questions that can be answered with science and technology and those that cannot.	Understand that scientific investigation is limited to the natural world.	Identify and analyze factors that limit the extent of scientific investigation.
Dealing with Inconsistencies.		
Explain why similar investigations may not produce similar results.	Provide more than one explanation for events or phenomena; defend or refute the explanations using evidence.	Compare, contrast, and critique divergent results from scientific investigations based on scientific arguments and explanations.
Evaluating Methods of Investigation.		
Recognize that results of scientific investigations can come from expected and unexpected sources.	Describe how methods of investigation relate to the validity of scientific, experiments, observations, theoretical models, and explanation.	Analyze and evaluate the quality and standards of investigative design, processes, and procedures.
Evolution of Scientific Ideas.		
Know that ideas in science change as new scientific thinking, theories, and evidence arise.	Explain how scientific theory, hypothesis generation, experimentation, and observation are interrelated and may lead to changing ideas.	Know that science involves testing, revising, and occasionally discarding theories; understand that scientific inquiry and investigation lead to a better understanding of the natural world and not to absolute truth.

3. The student understands the nature and contexts of science and technology (continued).
To meet this standard, the student will:

BENCHMARK 1—GRADE 5	BENCHMARK 2—GRADE 8	BENCHMARK 3—GRADE 10
3.2. Know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace.		
All Peoples Contribute to Science and Technology.		
Know that science and technology have been practiced by all peoples throughout history.	Know that science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history.	Analyze how scientific knowledge and technological advances discovered and developed by individuals and communities in all cultures of the world contribute to changes in societies.
Relationship of Science and Technology.		
Recognize that people have invented tools for everyday life and for scientific investigations.	Compare and contrast scientific inquiry and technological design in terms of activities, results, and influence on individuals and society; know that science enables technology and vice versa.	Analyze how the scientific enterprise and technological advances influence and are influenced by human activity, *for example, societal, environmental, economical, political, or ethical considerations.*
Careers and Occupations Using Science, Mathematics, and Technology.		
Identify the knowledge and skills of science, mathematics, and technology used in common occupations.	Investigate the use of science, mathematics, and technology within occupational/career areas of interest.	Investigate the scientific, mathematical, and technological knowledge, training, and experience needed for occupational/career areas of interest.

Social Studies

Civics

1. The student understands and can explain the core values and democratic principles of the United States as set forth in foundational documents, including the Declaration of Independence and the Constitution.

To meet this standard, the student will:

1.1 Understand and interpret the major ideas set forth in the Declaration of Independence, the Constitution, and other foundational documents

1.2 Examine key ideals of United States democracy such as individual human dignity, liberty, justice, equality, and the rule of law

1.3 Examine representative government and citizen participation

2. The student analyzes the purposes and organization of government and laws.

To meet this standard, the student will:

2.1 Understand and explain the organization of government at the federal, state, and local level including the executive, legislative, and judicial branches.

2.2 Understand the function and effect of law

2.3 Compare and contrast democracies with other forms of government

3. The student understands the purposes and organization of international relationships and how United States foreign policy is made.

To meet this standard, the student will:

3.1 Understand how the world is organized politically and how nations interact

3.2 Recognize factors and roles that affect the development of foreign policy by the United States, other nations, and multinational organizations

4. The student understands the rights and responsibilities of citizenship and the principles of democratic civic involvement.

To meet this standard, the student will:

4.1 Understand individual rights and their accompanying responsibilities including problem-solving and decision-making at the local, state, national, and international level

4.2 Identify and demonstrate rights of United States citizenship related to school, local, state, national, and international issues

4.3 Explain how various stakeholders influence public policy

1. The student understands and can explain the core values and democratic principles of the United States as set forth in foundational documents, including the Declaration of Independence and the Constitution.

To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
1.1 Understand and interpret the major ideas set forth in the Declaration of Independence, the Constitution, and other foundational documents		
1.1.1a Identify and describe the essential characteristics of the Declaration of Independence	1.1.2a Describe the origins and creation of foundational documents such as the Declaration of Independence and the Constitution	1.1.3a Explain key concepts found within foundational documents and evaluate their impact on the contemporary U.S. political system
1.1.1b Identify and describe the essential characteristics of the Constitution	1.1.2b Explain specific rights guaranteed by the Constitution and how these rights are related to responsibilities	1.1.3b Analyze how specific rights guaranteed by the Constitution can be modified as the Constitution remains open to change and interpretation
1.2 Examine key ideals of United States democracy		
1.2.1a Identify key democratic ideals of U.S. government	1.2.2a Explain key democratic ideals of the U.S. government and discuss their application in specific situations	1.2.3a Examine the origins and continuing influence of key democratic ideals of the U.S. government
1.2.1b Identify the traits of responsible citizenship and explain how they contribute to the democratic ideal	1.2.2b Describe efforts to reduce differences between democratic ideals and realities	1.2.3b Analyze why democratic ideals demand that people work together to reduce the disparity between those ideals and realities
1.3 Examine representative government and citizen participation		
1.3.1a Identify examples of rights and responsibilities of citizenship	1.3.2a Explain how U.S. citizens govern through representative government and empower representatives to make, interpret, and enforce laws to carry out public policy	1.3.3a Examine and evaluate how citizens use and influence governmental institutions and processes to solve problems
	1.3.2b Explain how the U.S. government includes concepts of both a democracy and a republic	1.3.3b Analyze the differences between democracy and a republic in relation to the U.S. form of government

2. The student analyzes the purposes and organization of governments and laws.
To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
2.1 Understand and explain the organization of federal, state, and local government including the executive, legislative, and judicial branches at, and among, the three levels of government.		
2.1.1a Identify the people and entities who make, apply, and enforce rules and laws	2.1.2a Describe how the state and federal government derives its power from the consent of the governed through voting, constituent meetings	2.1.3a Examine and explain the constitutional principles that establish and limit government
2.1.1b Distinguish among local, state, and national public servants	2.1.2b Describe the structure of state and federal government including the legislative, executive, and judicial branches; federal, state, and local levels; and political parties	2.1.3b Analyze problems and solutions related to the distribution of power between the legislative, executive, and judicial branches of government
2.2 Understand the function and effect of law		
2.2.1 Explain the purpose of rules and laws	2.2.2 Distinguish among making, enforcing, and interpreting laws	2.2.3 Explain how the Constitution is maintained as the supreme law of the land and how it is changed or amended
2.3 Compare and contrast democracies with other forms of government		
2.3.1a Explain what government is and what governments do	2.3.2a Describe the purposes of government and how its powers are acquired, used, and justified	2.3.3a Explain the purposes of government and analyze how its powers are acquired, used, justified, and balanced
2.3.1b Understand that different societies have different forms of government	2.3.2b Describe a variety of forms of government	2.3.3b Compare and contrast U.S. democracy and other forms of government
	2.3.2c Explain how various forms of government have different effects on the lives of people	2.3.3c Analyze and explain how citizens can influence governments through voting, lobbying, protesting, revolution

Economics

1. Students understand the impact of scarcity on their personal lives and on the households, businesses, governments, and societies in which they are participants.

To meet this standard, the student will:

1.1 Understand that the condition of scarcity requires people to choose among alternatives and bear the consequences of that choice.

1.2 Understand that the availability and use of resources influences the production of goods and services in the economy.

2. Students understand the essential characteristics of past and present economic systems.

To meet this standard, the student will:

2.1 Recognize that both buyers and sellers participate in voluntary trade because both expect to gain.

2.2 Explain how different economic systems produce, distribute, and exchange goods and services.

2.3 Understand that prices in competitive markets create incentives that influence the choices of buyers and sellers.

2.4 Understand that investment in people, tools, and technology affects employment levels and standards of living.

3. Students understand the role of government and institutions in past and present economic systems.

To meet this standard, the student will:

3.1 Analyze the role of government as participant in an economy through taxation, spending, and policy setting.

3.2 Understand the role of money, banking, and financial institutions and how individuals and businesses use them.

1. Students understand the impact of scarcity on their personal lives and on the households, businesses, governments, and societies in which they are participants.

To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
1.1 Understand that the condition of scarcity requires people to choose among alternatives and bear the consequences of that choice.		
1.1.1a Recognize that wants exceeding available resources implies alternative uses of the resources and forces individuals into making choices. Every choice has an associated opportunity cost in both a personal and community context.	1.1.2a Provide examples of how groups and individuals face choices and consider price and personal values, etc., in making choices in present and in historical situations (opportunity cost)	1.1.3a Using the concepts of scarcity, choice, and incentives explain the use of a resource.
		1.1.3c Analyze how choices made by groups and individuals can impose costs on others.
1.2 Understand that the availability and use of resources influences the production of goods and services to the economy.		
1.2.1a Differentiate among resources (factors of production), goods, and services.	1.2.2a Give examples of how factors of production (labor, capital, resources, and entrepreneurship) work together to produce goods and services	1.2.3a Identify how the cost of resources impact production decisions.
		1.2.3b Explain how the difficulty of assessing the real costs of resources has consequences on present and future production and quality of life

2. Students understand the essential characteristics of past and present economic systems.
To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
2.1 Recognize that both buyers and sellers participate in voluntary trade because both expect to gain		
2.1a. Recognize that people trade or exchange goods and services only when they think they will gain.	2.1.2a Understand that when trade occurs, people benefit and have a broader range of choices.	2.1.3a Explain how comparative advantage within markets leads to production choices and specialization
2.1.1b Describe how markets are created by buyers and sellers exchanging goods and services.	2.1.2b Describe circular flow where households sell labor and buy goods and businesses sell goods and services and buy labor.	
2.2 Explain how different economic systems produce, distribute, and exchange goods and services.		
2.2.1a Recognize that economies distribute and exchange goods and services in different ways depending on laws, values, and customs.	2.2.2a Understand how differences in property rights, ownership, and non-economic values and beliefs result in different methods of production and distribution of goods and services	2.2.3a Evaluate how the nature of distribution may advantage or disadvantage particular groups of people
	2.2.2b Describe ways that labor organizations and employers negotiate	2.2.3b Predict how a change in a law or custom could affect production, distribution, or consumption of a good or service
		2.2.3c Evaluate how the characteristics of economic systems may advantage or disadvantage particular groups of people

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
2.3 Understand that prices in competitive markets create incentives that influence the choices of buyers and sellers.		
2.3.1a. Understand that competition is when there are buyers and sellers of similar products in the same market at the same time	2.3.2a Explain the two forces of supply and demand and the interaction between them	2.3.3a Explain how prices provide information and serve as incentives that assist producers and consumers in making decisions
2.3.1b Explain that consumer choices are influenced by advertising	2.3.2b Explain how prices, costs, substitutes, advertising, tastes, and values interact with supply and demand	2.3.3b Analyze how prices coordinate production and exchange in domestic and international markets
2.4 Understand that investment in people, tools, and technology affect employment levels and standard of living		
2.4.1a Explain how various forms of investment affect individuals and societies in neighborhoods, communities, and countries	2.4.2a Define productivity and describe how productivity improvements may result in a higher standard of living	2.4.3a Explain how investments in human capital can increase productivity but such investments entail opportunity costs and risks
	2.4.2b Explain how technological change has lowered the cost of products or provided new products that enhance the quality of life	

3. Students understand the role of government and institutions in past and present economic systems.
To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
3.1 Analyze the role of government as participant in an economy through taxation, spending, and policy setting		
3.1.1a Provide examples of the four aspects of the function of governments (Reallocation of resources, provision of public goods and services, a legal system, and redistribution of income between income groups)	3.1.2a Explain that taxation supports public goods and services	3.1.3a Analyze costs and benefits of the role of government in establishing and enforcing property rights or contractual agreements to protect the producer and consumer while attending to the public interest
	3.1.2b Explain the need to establish a legal framework to protect property and other rights	3.1.3b Analyze costs and benefits of how governments redistribute income through taxation and government expenditures
3.2 Understand the role of money, banking, and financial institutions and how individuals and businesses use them		
3.2.1a Explain how money makes trading easier by replacing barter with currency, coins, or checks	3.2.2a Describe how financial institutions transfer funds from savers to borrowers and investors	
	3.2.2b Understand that money, as a medium of exchange, serves as a temporary store of value, decreases transaction costs, and a measure of account	

Geography

1. The student uses maps, charts, and other geographic tools to understand the spatial arrangement of people, places, resources, and environments on Earth's surface.

To meet this standard the student will:

1.1 Use and construct maps, charts, and other resources to gather and interpret geographic information

1.2 Recognize spatial patterns on Earth's surface and understand the processes that create these patterns

2. The student understands the complex physical and human characteristics of places and regions.

To meet these standards, the student will:

2.1 Describe the natural characteristics of places and regions and explain the causes of their characteristics

2.2 Describe the patterns humans make on places and regions

2.3 Identify the characteristics that define the Pacific Northwest and the Pacific Rim as regions

3. The student observes and analyzes the interaction between people, the environment, and culture.

To meet this standard, the student will:

3.1 Identify and examine people's interaction with and impact on the environment

3.2 Analyze how the environment and environmental changes affect people

3.3 Examine cultural characteristics, transmission, diffusion and interaction

1. The student uses maps, charts, and other geographic tools to understand the spatial arrangement of people, places, resources, and environments on Earth's surface.

To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
1.1 Use and construct maps, charts, and other resources to gather and interpret geographic information		
1.1.1a Examine a variety of maps to describe basic mapping elements. (Location)	1.1.2a Use globes, a variety of map projections, satellite imagery, and Geographic Information System (GIS) data to interpret information from a spatial perspective (Location, Place)	
1.1.b Use basic mapping elements to construct a map that displays information about school grounds, a neighborhood, or a local community (Location, Place)	1.1.2b Use data and a variety of symbols and colors to create thematic maps, mental maps, and graphs depicting geographic information (Location, Place, Region)	1.1.3b Use maps, tables, and graphs to construct solutions to problems involving transportation networks within regions, literacy rates, voting patterns, or the variation in population density in relation to resources and land use (Five Themes)
1.2 Recognize spatial patterns on Earth's surface and understand the processes that create these patterns		
1.2.1a Locate places, major physical features, and human spatial patterns using maps, globes, and other sources (Location, Place, Region)	1.2.2a Locate physical and human features and events on maps and globes (Location, Place, Region)	1.2.3a Explain why different places of the world have particular physical and human characteristics (Five Themes)
	1.2.2b Analyze how human spatial patterns emerge from natural processes and human activities (Place, Human/Environment Interaction, Movement)	1.2.3b Evaluate how physical and human processes that change landscape can affect public policy (Five Themes)

Note: The Five Themes of Geography are placed in parentheses to assist in using the benchmarks. The themes of geography are:

- ***Place***
- ***Region***
- ***Human environment interaction***
- ***Location***
- ***Movement***

(see glossary for definitions)

2. The student understands the complex physical and human characteristics of places and regions.
To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
2.1 Describe the natural characteristics of places and regions and explain the causes of their characteristics		
2.1.1 Observe and describe the physical characteristics of the local area and Washington State (Location, Region, Place)	2.1.2 Use observation, maps, and other tools to identify, compare, and contrast the physical characteristics of places and regions (Location, Region, Place)	2.1.3 Describe and interpret the physical processes that shape places and regions (Location, Region, Place)
2.2 Describe the patterns humans make on places and regions		
2.2.1 Observe and describe the human characteristics of the local area and Washington State (Location, Region, Place, Human/Environment Interaction)	2.2.2 Use observation, maps, and other tools to identify and to compare and contrast the patterns humans make on places and regions (Location, Region, Place, Human/Environment Interaction)	2.2.3 Analyze how social, cultural, and economic influences shape the physical features of places and regions (Five Themes)
2.3 Identify the characteristics that define the Pacific Northwest and the Pacific Rim as regions		
2.3.1 Describe how distinct physical and human characteristics and their interactions define the Pacific Northwest as a region (Five Themes)	2.3.2 Examine the Pacific Northwest as part of the Pacific Rim region and describe similarities and differences among Pacific Rim countries with regard to oceans, landforms, trade, and culture (Five Themes)	2.3.3 Analyze how cultural and physical features define the Pacific Rim as a region (Five Themes)

3. The student observes and analyzes the interaction between people, the environment, and culture.
To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
3.1 Identify and examine people's interaction with and impact on the environment		
3.1.1a Identify choices individuals have in how they interact with the environment (Human/ Environment Interaction, Region)	3.1.2a Analyze the different ways people use the environment, identify the consequences of use, and consider possible alternatives (Human/Environment Interaction, Region)	3.1.3a Analyze and evaluate the positive benefits and negative consequences of people's different uses of the environment (Human/Environment Interaction, Region)
	3.1.2b Explain how the actions and interactions of human societies affect and are affected by the environment with regard to air, water, and land issues (Human/Environment Interaction, Region)	3.1.3b Analyze how environmental knowledge and responsible action can encourage species' survival in the midst of air, water, and land issues (Human/ Environment Interaction, Region)
3.2 Analyze how the environment and environmental changes affect people		
3.2.1a Describe how differing environments both provide varying opportunities and set limits for human activity (Human/Environment Interaction, Region, Place)	3.2.2a Explain how the physical environment impacts how and where people live and work. (Human/ Environment Interaction, Region, Place, Movement)	3.2.3a Detect and interpret how changes in the physical environment enhance or diminish its capacity to support human activity (Five Themes)
3.2.1b Describe how people adapt to their environment to meet basic human needs and concerns (Human/ Environment Interaction, Region)	3.2.2b Examine how technology can affect people's interaction with the environment (Human/ Environment Interaction, Region, Movement)	3.2.3b Analyze how technological innovation may both solve environmental problems and create new ones (Five Themes)
3.3 Examine cultural characteristics, transmission, diffusion, and interaction		
3.3.1a Know that people are born into societies that consist of different racial, ethnic, religious, and/or social groups (Location, Region, Place)	3.3.2a Identify the many groups and subcultures that exist within large societies and the ways they interact (Location, Region, Place, Movement)	3.3.3a Evaluate how the numerous subcultures that comprise a national culture interact and examine the consequences of their interaction (Five Themes)
3.3.1b Identify the ways cultural traditions are expressed through artistic creations and use of the environment (Five Themes)	3.3.2b Explain how some forms of cultural communication contribute to societal cohesion and/or division (Five Themes)	3.3.3b Analyze how peoples' responses to policy debates are shaped by cultural influences (Five Themes)
3.3.1c Recognize the positive and negative outcomes that can result when people of different cultural backgrounds interact and understand how an awareness of cultural traditions can help in cross-cultural communication (Five Themes)	3.3.2c Identify how people develop their understandings of culture through the exchange of ideas, art, music, natural resources, and goods and services (Five Themes)	3.3.3c Examine how communication technologies are bridging and impacting cultures (Five Themes)

History

1. The student examines and understands major ideas, eras, themes, developments, turning points, chronology, and cause-effect relationships in United States, world, and Washington State history.

To meet this standard, the student will:

1.1 Understand and analyze historical time and chronology

1.2 Understand events, trends, individuals, and movements shaping United States, world, and Washington State history

1.3 Examine the influence of culture on United States, world, and Washington State history

2. The student understands the origin and impact of ideas and technological developments on history.

To meet this standard, the student will:

2.1 Compare and contrast ideas in different places, time periods, and cultures, and examine the interrelationships between ideas, change, and conflict

2.2 Understand how ideas and technological developments influence people, culture, and environment

1. The student examines and understands major ideas, eras, themes, developments, turning points, chronology, and cause-effect relationships in United States, world, and Washington State history.

To meet this standard, the student will:

Benchmark 1 – Grade 5	Benchmark 2 – Grade 8	Benchmark 3 – Grade 10
1.1 Understand and analyze historical time and chronology		
1.1.1a Group personal, local, state, and national events in terms of past, present, and future, and place in proper sequence on a timeline.	1.1.2a Group events and individuals by broadly defined historical eras and develop related timelines; compare and contrast different cultural measurements of time.	1.1.3a Group events and individuals by broadly defined historical eras and use timelines to identify and explain patterns of historical continuity and change in a succession of related events; compare and contrast different cultural perceptions of time
1.1.1b Identify and analyze relationships between historical events	1.1.2b Using evidence for support, identify, analyze, and explain possible causal factors contributing to given historical events	1.1.3b Compare and evaluate competing historical narratives, analyze multiple perspectives, and challenge arguments of historical inevitability
1.2 Understand events, trends, individuals, and movements shaping United States, world, and Washington State history		
United States History		
US1.2.1 Describe and compare patterns of life over time in the following historical periods: · "Indian" cultures (prehistory to 1492) · Worlds Meet: Western Europe, West Africa, the Americas · Settlement and Colonization (1607-1776) · Revolution and Constitution (1754-1789) · U.S. Expansion (1776-1850	US1.2.2 Identify and analyze major issues, people, and events in U.S. history from the Revolution to 1900 including: · Revolution, Constitution, and New Nation (1763-1820) · Expansion and Reform (1801-1861) · Civil War and Reconstruction (1850-1877) · Industrialization, Immigration, Urbanization (1870-1900)	
World History		
WH1.2.1 Describe similarities and differences between families, communities, and cultures past and present; describe similarities and differences in the ways families, communities, and cultures address human needs over time; describe ways in which stories, folktales, and the arts serve as expressions of cultures	WH1.2.2 Compare and contrast elements of culture (e.g., society, government, economy, technology, arts, ideas, and beliefs) in the following contexts: · Ancient history (prehistory – 600): River civilizations, Greece, Rome, China · World History (600-1600): Medieval Europe/Renaissance, Islam, African Kingdoms, Meso-America, Japan	WH1.2.3 Identify and analyze major concepts, people, and events in world history from 1600 to the present including: · Global expansion and encounter (1450-1770) · Age of Revolutions (1750-1914) · Causes and consequences of WW1 and WWII

		(1870-1989) · Emergence and development of new nations (1945-present) · Challenges to democracy and human rights (1900-present)

Washington State History		
WA1.2.1 Describe and compare patterns of life over time in Washington State including: · Native cultures of Washington · Maritime and overland exploration and trade (1774-1849) · Immigration, settlement, and interaction of cultures (1830-statehood)	WA1.2.2 Identify and analyze the contributions of the following eras in the development of Washington State: · The emergence of Washington State (statehood-1930) including the study of the state constitution · The Great Depression and World War II (1930-1945) · Post World War II domestic political, social, and economic issues (1945-1980) · Contemporary Washington (1980-present)	The essential learnings for Washington State History are completed for most students at the second benchmark
1.3 Examine the influence of culture on United States, world, and Washington State history		
1.3.1 Describe the contributions of people from various cultural groups to the development of local, Washington State, and U.S. history	1.3.2 Examine the development of different cultures in Washington State, U.S., and world history	1.3.3 Examine and analyze how the contributions of various cultural groups influence society.

2. The student understands the origin and impact of ideas and technological developments on history.
To meet this standard, the student will:

BENCHMARK 1 – GRADE 5	BENCHMARK 2 – GRADE 8	BENCHMARK 3 – GRADE 10
2.1 Compare and contrast ideas in different places, time periods, and cultures, and examine the interrelationships between ideas, change, and conflict (cross reference with the themes and topics outlined under the United States, world, and Washington State history headings)		
2.1.1 Explain how an idea has affected the way people live	2.1.2 Explain the origin and historical context of major ideas and their impact on societies	2.1.3 Compare and analyze major ideas in different places, times, and cultures, and how those ideas have brought about continuity, change, or conflict
2.2. Understand how ideas and technological developments influence people, culture, and environment		
2.2.1 Describe instances in which new technology has led to changes in values, beliefs, and attitudes	2.2.2 Interpret how changing technologies have shaped ideas and attitudes, and analyze the impact of ideas and technological developments on society and culture	2.2.3 Analyze how technological developments have changed people's ideas about the natural world and evaluate their short and long-term consequences

Grade 11--U. S. History

1. The student examines and understands major ideas, eras, themes, developments, turning points, chronology, and cause-effect relationships in United States, world, and Washington State history.

To meet this standard, the student will:

1.1 Understand and analyze historical time and chronology

U.S. History:

1.1.3a Group events and individuals by broadly defined historical eras and use timelines to identify and explain patterns of historical continuity and change in a succession of related events; compare and contrast different cultural perceptions of time

1.1.3b Compare and evaluate competing historical narratives, analyze multiple perspectives, and challenge arguments of historical inevitability

1.2 Understand events, trends, individuals and movements shaping United States, world, and Washington State history

1.2.3 Identify and analyze major concepts, people, and events in 20th century U.S. history including:

- Emergence of America as a world power (1890-1918)
- Reform, prosperity, and depression
- World War II, the Cold War, and International Relations (1939-present)
- Post World War II domestic, political, social, and economic issues (1945-present)

World History:

1.2.3 Identify and analyze major concepts, people, and events in world history from 1600 to the present including:

- Global expansion and encounter (1450-1770)
- Age of Revolution (1750-1914)
- Causes and consequences of WWI and WWII (1870-1989)
- Emergence and development of new nations (1945-present)
- Challenges to democracy and human rights (1900-present)

1.3 Examine the influence of culture on United States, world, and Washington State history

1.3.3 Examine and analyze how the contributions of various cultural groups influence society in the United States

2. The student understands the origin and impact of ideas and technological developments on history.

To meet this standard, the student will:

2.1 Compare and contrast ideas in different places, time periods, and cultures and examine the inter-relationships between ideas, changes, and conflict

2.1.3 Compare and analyze major ideas in different places, times, and cultures, and how those ideas have brought about continuity, change, or conflict

2.2 Understand how ideas and technological developments influence people, culture, and environment

2.2.3 Analyze how technological developments have changed people's ideas about the natural world and evaluate their short and long-term consequences

Inquiry and Information Skills

The student will:

	Benchmark 1 – Grade 5	Benchmark 2 – Grade 8	Benchmark 3 – Grade 10
1.1a Define central question (Writing 3.1), (Math 2.2)	1.1.1a Select a social studies topic; ask questions to identify sub-topics	1.1.2a Formulate an essential question in the social studies	1.1.3a Formulate a thesis statement in the social studies that examines whys as well as hows
1.1b Search for relevant information (Communication 2.2) (Reading 1.5, 3.1) (Writing 3.2) (Math 4.1)	1.1.1b Identify key works; identify appropriate and varied sources; use basic search skills; use table of contents and indices as social studies reference materials	1.1.2b Identify key words, develop search strategies; locate appropriate and varied information sources; distinguish between primary and secondary sources	1.1.3b Identify key words; use advanced search strategies; independently locate appropriate and varied information sources; evaluate primary/secondary sources
1.1c Determine the source		1.1.2c Identify the time, place, audience, purpose, and form of a source	
1.1d Evaluate information (Reading 2.3) (Math 2.1)	1.1.1d Locate particular facts in social studies documents, identify the main idea	1.1.2d Recognize relevant facts and ideas in social studies documents; evaluate bias of sources/authors; classify information as fact/opinion	1.1.3d Evaluate reliability, credibility, and validity of information from a variety of social studies sources
1.1e Organize information (Writing 3.2) Math 4.1, 4.2)	1.1.1e Locate data into graphic organizers	1.1.2e Take notes, paraphrase, summarize, enter data	1.1.3e Produce and interpret outlines, charts, graphs, maps, tables, timelines, and decision-making grids that explain problems and/or construct solutions
1.1f Apply information (Writing 2.2, 2.3, 2.4.3.5) (Communication 2.1, 2.5) (Math 4.3)	1.1.1f Create a product that demonstrates understanding of information and responds to central questions; present product to a meaningful audience	1.1.2f Create a product that uses social studies content to support findings; present product in appropriate manner to a meaningful audience	1.1.3f Create a product that uses social studies content to support a thesis and present product in appropriate manner to a meaningful audience

Interpersonal and Group Process Skills

The student will:

	Benchmark 1 – Grade 5	Benchmark 2 – Grade 8	Benchmark 3 – Grade 10
2.1 Understand and use interpersonal and group process skills required by citizens in a democratic society			
2.1a Discussion skills (Communication 1.1, 1.2, 1.3, 3.3)	2.1.1a Communicate own feelings and beliefs; listen to viewpoints on social studies issues	2.1.2a Articulate a particular perspective/value orientation; demonstrate content knowledge; listen critically and build upon the ideas of others	2.1.3a Voice original ideas; demonstrate content knowledge; persuade audience; listen critically and build upon the ideas of others; ask clarifying questions and challenge statements of others; negotiate and compromise
2.1b Group interaction skills (Communication 3.1, 3.2, 3.3)	2.1.1b Identify roles of different members of a group, serve in different roles in a group	2.1.2b Participate in delegating duties, establishing rules, planning, making decisions, taking action in group settings	2.1.3b Participate in developing group process, persuade, compromise, debate, resolve conflicts, and negotiate differences
2.1c Interview skills (Communication 1.1, 1.3, 1.3, 2.4)	2.1.1c Identify appropriate people to gain needed information, ask relevant questions, record answers	2.1.2c Identify appropriate people to gain needed information, ask relevant questions, pose follow-up questions; paraphrase conversations	2.1.3c Select appropriate people to gain needed information, identify bias of subject, ask questions to refine and verify understanding

Critical Thinking Skills

The student will:

	Benchmark 1 – Grade 5	Benchmark 2 – Grade 8	Benchmark 3 – Grade 10
3.1 Understand and apply critical thinking and problem solving skills to make informed and reasoned decisions			
3.1.1a Define and clarify a problem (Reading 2.2) (Math 2.2, 3.2)	3.1.2a Identify central issue; formulate appropriate questions	3.1.3a Identify central issue; formulate appropriate questions; identify multiple perspectives; compare and contrast; validate date using multiple sources; determine relevant information; paraphrase problem	3.1.4a Identify central issue; formulate appropriate questions; identify multiple perspectives; compare and contrast; validate data using multiple sources; determine relevant information; paraphrase problem
3.1.1b Judge information related to the problem (Reading 2.3) (Communication 4.3) (Math 3.3)	3.1.2b Distinguish between fact and opinion; clarify point of view; identify main message and target audience	3.1.3b Distinguish between fact, opinion, and reasoned argument; clarify time, point of view and purpose; recognize stereotypes, clichés, bias, and propaganda techniques; identify message and target audience of narrative and documents to determine credibility and authenticity	3.1.4b Distinguish between fact, opinion, and reasoned argument; clarify point of view and context; identify assumptions and fallacies, recognize stereotypes, clichés, bias, and propaganda techniques; evaluate accuracy and timeliness of information; determine main message and identify target audience; analyze credibility and authenticity
3.1.1c Solve problems and draw conclusions (Math 3.3)	3.1.2c Compare advantages and disadvantages, suggest solutions, decide appropriate course of action	3.1.3c Compare advantages and disadvantages, suggest alternate solutions; predict probable consequences, provide evidence to justify best solution	3.1.4c Compare benefits and costs, suggest logical alternatives, predict probably consequences, provide evidence to justify best solution, select most effective manner of communicating solution
3.1.1d Analyze cause and effect relationships (Math 1.4)	3.1.2d Investigate cause and effect relationships and their impact on people, environments, and economic systems	3.1.3d Analyze and evaluate the impact of ideas, events, and/or people on groups, environments , economic systems, and/or subsequent events	3.1.4d Hypothesize possible outcomes from an initial event recognizing multiple causes and accidental factors
3.1.1.e Think chronologically	3.1.2e Group human and natural events into broadly defined eras and place in proper sequence on a timeline	3.1.3e Group human and natural events into broadly defined eras and construct related timelines	3.1.4e Group human and natural events into broadly defined eras and use timelines to explain patterns of continuity and change in the succession of events
3.1.1f Take perspective	3.1.2f Assume and portray others' points of view	3.1.3f Reconstruct and express others' points of view, highlighting an historic, geographic, civic, or economic perspective	3.1.4f Reconstruct and express multiple points of view and integrate an historic, geographic, civic, or economic perspective

Writing

Introduction to Writing

Writing for Today and Tomorrow

Writing is essential to a literate society. Writing can be an act of discovery, of communication, of joy. It connects us to work, culture, society, existing knowledge, and to the meanings of our lives

What Is Writing?

Writing is the learned process of shaping experiences into text, allowing the writer to discover, develop, clarify, and communicate thoughts and feelings. Writing requires and supports the development of thinking skills. Learning to write brings the learner into the literate community as an active participant in the conversation. Writing is our catalyst for creating the future.

Committed writers use writing for a wide spectrum of practical, economic, social, personal, and aesthetic purposes. Engaged writers use a language that is alive, flexible and adaptable to the highest expression of which the human being is capable.

Essential Academic Learning Requirements—Writing

1. The student writes clearly and effectively.

To meet this standard, the student will:

1.1. Develop concept and design. Develop a topic or theme; organize written thoughts with a clear beginning, middle, and end; use transitional sentences and phrases to connect related ideas; write coherently and effectively.

1.2. Use style appropriate to the audience and purpose. Use voice, word choice, and sentence fluency for intended style and audience.

1.3. Apply writing conventions. Know and apply correct spelling, grammar, sentence structure, punctuation, and capitalization.

2. The student writes in a variety of forms for different audiences and purposes.

To meet this standard, the student will:

2.1. Write for different audiences.

2.2. Write for different purposes, such as telling stories, presenting analytical responses to literature, persuading, conveying technical information, completing a team project, and explaining concepts and procedures.

2.3. Write in a variety of forms, including narratives, journals, poems, essays, stories, research reports, and technical writing.

2.4. Write for career applications.

3 The student understands and uses the steps of the writing process.

To meet this standard, the student will:

3.1. Pre-write—generate ideas and gather information.

3.2. Draft—elaborate on a topic and supporting ideas.

3.3. Revise—collect input and enhance text and style.

3.4. Edit—use resources to correct spelling, punctuation, grammar, and usage.

3.5. Publish—select a publishing form and produce a completed writing project to share with chosen audience.

4. The student analyzes and evaluates the effectiveness of written work.

To meet this standard, the student will:

4.1. Assess own strengths and needs for improvement. Analyze effectiveness of own writing and set goals for improvement.

4.2. Seek and offer feedback.

1. The student writes clearly and effectively.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
1.1. Develop concept and design.		
Represent one main idea or topic in text.	Demonstrate consistency in focus; construct a logical argument.	Maintain a sharp focus throughout the work; focus text clearly to hold a reader's attention, to make a point, to tell a story, and/or describe a process or phenomenon.
Choose own topic; write in more than one genre.	Write in a number of genres and forms.	Approach a topic in an individualized and purposeful way.
Include relevant details.	Discriminate between essential, intriguing, or useful information and trivia.	\ Discriminate between essential, intriguing, or useful information and trivia.
Elaborate on details to enhance or support main ideas.	Demonstrate elaboration through examples, details, facts, and/or reasons, etc.	Develop a topic, theme, or central metaphor with carefully chosen and focused detail and content.
Organize text with a clear beginning, middle, and end (spatial, sequential); use transitions to construct logical order.	Use effective organizational structures; construct sequenced paragraphs using effective transitions.	Control emphasis, sequencing, focus, and transitions in a variety of genres *such as poetry, technical, or narrative*.
Use paragraphs to organize text.	Write coherent paragraphs.	\ Write coherent paragraphs.
	Write analytically using basic and clear logic.	Develop analysis, synthesis, persuasion, and exposition logically; demonstrate advanced logic.
1.2. Use style appropriate to the audience and purpose.		
Communicate own perspective and ideas.	Choose voices appropriate to different genres and audiences.	Recognize voice; strengthen and modify own voice as appropriate.
Demonstrate awareness of the audience.	Choose language that is precise, engaging, and well suited to the topic and audience.	Choose words to convey intended message in a precise, interesting, and natural way.
Use patterns and vocabulary from literature and nonfiction.	Use accurate and precise language relevant to content area.	Use specialized vocabulary relevant to a specific content area.
Use figurative language and imagery.	Experiment with figurative language and sound patterns.	Use figurative language and sound patterns effectively.
Use words in more than one context.	Use words appropriate to the chosen purpose.	Consider connotation and denotation when choosing words.
Use a variety of sentence lengths and types.	Vary sentence length and structure.	Vary the complexity of sentence structure and cadence for effect.

1. The student writes clearly and effectively.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
1.3. Apply writing conventions.		
Write complete sentences.	Use compound and complex sentences.	Use standard writing conventions in final draft to enhance meaning and clarity:
Use correct subject-verb agreement.	Employ conventional grammar such as subject/verb agreement and verb tense agreement except for effect.	/ Grammar/usage / Capitalization
Use capitalization and punctuation accurately in the final draft.	Apply capitalization and punctuation rules correctly.	/ Punctuation / Spelling
Spell age-level words correctly in the final draft.	Spell correctly except for effect in final draft.	
Indicate paragraphs consistently.	Use paragraphing, stanza division, and other textual markers *such as table of contents, title and subtitle, and bullets.*	Use paragraphing and stanza division to reinforce text's organizational structure.
Use correct cursive letter formation and legible handwriting.	Write legibly.	\ Write legibly.

2. The student writes in a variety of forms for different audiences and purposes.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
2.1. Write for different audiences.		
Write for self, teacher, or other personally known audience.	Write for distant audiences such as pen pals and community members.	Identify, analyze, describe, and meet the needs of chosen audience.
Show some awareness of audience needs.	Determine and write for the needs of different audiences.	Show sense of how particular audience may interpret a text.
2.2. Write for different purposes.		
Write for different purposes including: / To respond to teacher's prompt. / To tell about something. / To name something. / To describe something. / To direct. / To imagine. / To learn.	Write for a range of purposes including: / To express him/herself. / To inform others. / To create. / To explain ideas or procedures. / To persuade others. / To entertain. / To debate. / To question.	Write for a broad range of purposes including: / To reflect upon own experiences. / To experiment with language. / To make inferences or draw conclusions . / To present an analytical response to literature. / To apply for jobs. / To communicate research findings. / To convey technical information.
2.3. Write in a variety of forms.		
Write in a variety of forms and genres (narratives, journals, poems, essays, reports, stories, etc.).	Write in a variety of forms and genres (narratives, journals, poems, essays, stories, research reports, etc.).	Write in a variety of forms and genres (tall tales, myths, fables, reports, experiments, directions, dramas, narratives, journals, poems, essays, stories, etc.).
	Vary form, detail, and structure of writing in accordance with intended audience and purpose.	Interweave elements of exposition, argumentation, narration, figurative, and rhythmic language as needed according to audience and purpose.
2.4. Write for career applications		
Identify the kinds of documents one might be required to write in a career setting.	Identify particular forms one might be required to use when writing in career settings, for example, software programs or research reports.	Identify particular writing skills required for occupational/career areas of interest.
Write non-technical documents that could be used in a career setting such as memos, letters, and directions.	Produce technical and non-technical documents using resources from career settings *such as evacuation manuals, consumer spending graphs, and demographic tables.*	Produce technical and non-technical documents for career audiences *such as a homepage, research report, or blueprint*.

Cite sources when writing reports or technical documents.	Identify different forms used to cite sources when writing reports or technical documents *for example, references, footnotes, and endnotes.*	Understand the importance of using reference style consistently when writing reports or technical documents.

3. 3 The student understands and uses the steps of the writing process.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
3.1. Pre-write		
Generate own ideas (brainstorm); organize and plan writing (outlines, webbing, story mapping, listing, jotting, free writing, etc.).	Use a variety of prewriting strategies (story mapping, listing, webbing, jotting, outlining, free writing, brainstorming, etc.).	Generate ideas and plan writing independently *such as extensive planning, and defining and choosing an appropriate mode of expression.*
Use available tools and technology *such as a simple word processor consistently through the writing process.*	Use available tools and technology *such as a simple word processor consistently through the writing process.*	Use available tools and technology *such as a simple word processor consistently through the writing process.*
Use resources in schools, libraries, and community.	Gather information from a variety of sources *such as interviews, multimedia, and periodicals.*	Analyze and synthesize information from a variety of sources *such as interviews, multimedia, books, and periodicals*.
3.2. Draft		
Write using own vocabulary, spelling, and drawings.	Elaborate on an initial idea.	Formulate and construct ideas independently.
	Coordinate ideas and perspectives and take variables into account.	Coordinate a number of ideas and points of view.
Form complete phrases, sentences, and thoughts.	Construct a clear narrative or argument.	Present argumentation effectively by using clarity, coherency, and precision; draft text that uses logical flow of ideas and relationships.
3.3. Revise		
Collect input from others.	Confer with others to improve text; evaluate suggestions from others.	Confer with others to improve text; incorporate suggestions from others.
Add appropriate language and/or graphics to enhance text and style.	Add and delete information and graphics as needed to enhance text and style.	Investigate additional information sources to improve text; use language to enrich text and enhance style.
3.4. Edit		
Use a dictionary as a reference.	Use applicable reference tools.	Adapt new reference technologies to further the purpose of writing.
Correct errors with assistance.	Correct some errors independently.	Demonstrate self-correction.

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
Add missing or necessary words.	Adjust word choice and sentence structure.	Change text order to improve argument, flow of information, and logic.
Correct common errors in spelling, punctuation, and capitalization.	Correct mechanics and grammar.	Correct mechanics and grammar.

3.5. Publish

Select a display form and publishing options, *such as a book or a poster.*	Select from a variety of publishing options, *such as school newspaper, bulletin boards, or multimedia formats.*	Identify viable markets and forums for specific pieces of writing.
Produce a legible final product.	Produce a legible, neat final product.	Produce a legible, professional-looking final product.
Use technology when needed.	Use different technologies to produce a finished product.	Use a variety of technological resources to produce a final product.

4. The student analyzes and evaluates the effectiveness of written work.

To meet this standard, the student will:

BENCHMARK 1—GRADE 4	BENCHMARK 2—GRADE 7	BENCHMARK 3—GRADE 10
4.1. Assess own strengths and needs for improvement.		
Use established criteria to reflect on and improve writing.	Establish and apply own criteria to improve writing.	Articulate own and established criteria to improve writing**;** defend choices to deviate from established criteria
	Analyze the works of effective writers to improve writing.	Assess own strengths and developmental needs as a writer.
	Articulate the qualities that make a piece of writing effective.	Demonstrate knowledge of the qualities that make a piece of writing effective.
4.2. Seek and offer feedback.		
Accept and employ feedback on own writing when appropriate.	Accept feedback and edits to revise own writing when appropriate.	Seek, evaluate, accept, and apply feedback; hold on to one's own vision.
Offer positive feedback on others' writing.	Offer feedback with guidance on others' writing with regard to: / Concept and design / Style / Conventions	Independently offer specific feedback on others' writing with regard to: / Concept and design / Style / Conventions

Appendix C

State of Alaska Student Content Standards

(Alaska Department of Education and Early Development 2003)

Arts

A A student should be able to create and perform in the arts.

A student who meets the content standard should:

1. participate in dance, drama, music, visual arts, and create writing;
2. refine artistic skills and develop self-discipline through rehearsal, practice, and revision;
3. appropriately use new and traditional materials, tools, techniques, and processes in the arts;
4. demonstrate the creativity and imagination necessary for innovative thinking and problem solving;
5. collaborate with others to create and perform works of art;
6. integrate two or more art forms to create a work of art; and
7. investigate careers in arts production.

B A student should be able to understand the historical and contemporary role of the arts in Alaska, the nation, and the world.

A student who meets the content standard should:

1. recognize Alaska Native cultures and their arts;
2. recognize United States and world cultures and their arts;
3. recognize the role of tradition and ritual in the arts;
4. investigate the relationships among the arts and the individual, the society, and the environment;
5. recognize universal themes in the arts such as love, war, childhood, and community;
6. recognize specific works of art created by artists from diverse backgrounds;
7. explore similarities and differences in the arts of world cultures;
8. respect differences in personal and cultural perspectives; and
9. investigate careers relating to arts history and culture.

C A student should be able to critique the student's art and the art of others.

A student who meets the content standard should:

1. know the criteria used to evaluate the arts; these may include craftsmanship, function, organization, originality, technique, and theme;
2. examine historical and contemporary works of art, the works of peers, and the student's

own works as follows:
    - identify the piece;
    - describe the use of basic elements;
    - analyze the use of basic principles;
    - interpret meaning and artist's intent;
    - express and defend an informed opinion;
3. accept and offer constructive criticism;
4. recognize and consider an individual's artistic expression;
5. exhibit appropriate audience skills; and
6. investigate careers relating to arts criticism.

D A student should be able to recognize beauty and meaning through the arts in the student's life.

A student who meets the content standard should:

1. make statements about the significance of the arts and beauty in the student's life;
2. discuss what makes an object or performance a work of art;
3. recognize that people tend to devalue what they do not understand;
4. listen to another individual's beliefs about a work of art and consider the individual's reason for holding those beliefs;
5. consider other culture's beliefs about works of art;
6. recognize that people connect many aspects of life through the arts;
7. make artistic choices in everyday living; and
8. investigate careers related to the search for beauty and meaning, which is aesthetics.

English/Language Arts

A A student should be able to speak and write well for a variety of purposes and audiences.

A student who meets the content standard should:

1. apply elements of effective writing and speaking; these elements include ideas, organization, vocabulary, sentence structure, and personal style;
2. in writing, demonstrate skills in sentence and paragraph structure, including grammar, spelling, capitalization, and punctuation;
3. in speaking, demonstrate skills in volume, intonation, and clarity;
4. write and speak well to inform, to describe, to entertain, to persuade, and to clarify thinking in a variety of formats, including technical communication;
5. revise, edit, and publish the student's own writing as appropriate;
6. when appropriate, use visual techniques to communicate ideas; these techniques may include role playing, body language, mime, sign language, graphics, Braille, art, and dance;
7. communicate ideas using varied tools of electronic technology; and
8. evaluate the student's own speaking and writing and that of others using high standards.

B A student should be a competent and thoughtful reader, listener, and viewer of literature, technical materials, and a variety of other information.

A student who meets the content standard should:

1. comprehend meaning from written text and oral and visual information by applying a variety of reading, listening, and viewing strategies; these strategies include phonic, context, and vocabulary cues in reading, critical viewing, and active listening;
2. reflect on, analyze, and evaluate a variety of oral, written, and visual information and experiences, including discussions, lectures, art, movies, television, technical materials, and literature; and
3. relate what the student views, reads, and hears to practical purposes in the student's own life, to the world outside, and to other texts and experiences.

C A student should be able to identify and select from multiple strategies in order to complete projects independently and cooperatively.

A student who meets the content standard should:

1. make choices about a project after examining a range of possibilities;
2. organize a project by
    - understanding directions;

    - making and keeping deadlines; and
    - seeking, selecting, and using relevant resources;
3. select and use appropriate decision-making processes;
4. set high standards for project quality; and
5. when working on a collaborative project,
    - take responsibility for individual contributions to the project;
    - share ideas and workloads;
    - incorporate individual talents and perspectives;
    - work effectively with others as an active participant and as a responsive audience; and
    - evaluate the processes and work of self and others.

D

A student should be able to think logically and reflectively in order to present and explain positions based on relevant and reliable information.

A student who meets the content standard should:

1. develop a position by
    - reflecting on personal experiences, prior knowledge, and new information;
    - formulating and refining questions;
    - identifying a variety of pertinent sources of information;
    - analyzing and synthesizing information; and
    - determining an author's purposes;
2. evaluate the validity, objectivity, reliability, and quality of information read, heard, and seen;
3. give credit and cite references as appropriate; and
4. explain and defend a position orally, in writing, and with visual aids as appropriate.

E

A student should understand and respect the perspectives of others in order to communicate effectively.

A student who meets the content standard should:

1. use information, both oral and written, and literature of many types and cultures to understand self and others;
2. evaluate content from the speaker's or author's perspective;
3. recognize bias in all forms of communication; and
4. recognize the communication styles of different cultures and their possible effects on others.

Reading

RELATIONSHIP TO ALASKA CONTENT STANDARDS FOR ENGLISH / LANGUAGE ARTS: The CONTENT STANDARDS FOR ALASKA STUDENTS were adopted by the Alaska State Board of Education in 1994 and 1995. The Reading Performance Standards support the sections of the English/Language Arts Content Standards noted below. The Benchmark Assessments and High School Qualifying Examination will assess students' competencies on these performance standards.

A. A student should be a competent and thoughtful reader, listener, and viewer of literature, technical materials, and a variety of other information. A student who meets the content standard should:

1) comprehend meaning from written text and oral and visual information by applying a variety of reading, listening, and viewing strategies; these strategies include phonic, context, and vocabulary cues in reading, critical viewing, and active listening.;
2) reflect on, analyze, and evaluate a variety of oral, written, and visual information and experiences, including discussions, lectures, art, movies, television, technical materials, and literature; and,
3) relate what the student views, reads, and hears to practical purposes in the student's own life, to the world outside, and to other texts and experiences.

B. A student should be able to think logically and reflectively in order to present and explain positions based on relevant and reliable information. A student who meets the content standard should:

1) develop a position by
   A) reflecting on personal experience, prior knowledge, and new information,
   B) formulating and refining questions,
   C) identifying a variety of pertinent sources of information,
   D) analyzing and synthesizing information, and
   E) determining an author's purposes; and
2) evaluate the validity, objectivity, reliability, and quality of information read, heard, and seen.

C. A student should understand and respect the perspectives of others in order to communicate effectively. A student who meets the content standard should:

1) use information, both oral and written, and literature of many types and cultures to understand self and others;
2) recognize content from the speaker's or author's perspective;
3) recognize bias in all forms of communication; and
4) recognize the communication styles of different cultures and the possible effects on others.

Geography

A A student should be able to make and use maps, globes, and graphs to gather, analyze, and report spatial (geographic) information.

A student who meets the content standard should:

1. use maps and globes to locate places and regions;
2. make maps, globes, and graphs;
3. understand how and why maps are changing documents;
4. use graphic tools and technologies to depict and interpret the world's human and physical systems;
5. evaluate the importance of the locations of human and physical features in interpreting geographic patterns; and
6. use spatial (geographic) tools and technologies to analyze and develop explanations and solutions to geographic problems.

B A student should be able to utilize, analyze, and explain information about the human and physical features of places and regions.

A student who meets the content standard should:

1. know that places have distinctive geographic characteristics;
2. analyze how places are formed, identified, named, and characterized;
3. relate how people create similarities and differences among places;
4. discuss how and why groups and individuals identify with places;
5. describe and demonstrate how places and regions serve as cultural symbols, such as the Statue of Liberty;
6. make informed decisions about where to live, work, travel, and seek opportunities;
7. understand that a region is a distinct area defined by one or more cultural or physical features; and
8. compare, contrast, and predict how places and regions change with time.

C A student should understand the dynamic and interactive natural forces that shape the earth's environments.

A student who meets the content standard should:

1. analyze the operation of the earth's physical systems, including ecosystems, climate systems, erosion systems, the water cycle, and tectonics;
2. distinguish the functions, forces, and dynamics of the physical processes that cause variations in natural regions; and
3. recognize the concepts used in studying environments and recognize the diversity and

productivity of different regional environments.

D A student should understand and be able to interpret spatial (geographic) characteristics of human systems, including migration, movement, interactions of cultures, economic activities, settlement patterns, and political units in the state, nation, and world.

A student who meets the content standard should:

1. know that the need for people to exchange goods, services, and ideas creates population centers, cultural interaction, and transportation and communication links;
2. explain how and why human networks, including networks for communications and for transportation of people and goods, are linked globally;
3. interpret population characteristics and distributions;
4. analyze how changes in technology, transportation, and communication impact social, cultural, economic, and political activity; and
5. analyze how conflict and cooperation shape social, economic, and political use of space.

E A student should understand and be able to evaluate how humans and physical environments interact.

A student who meets the content standard should:

1. understand how resources have been developed and used;
2. recognize and assess local, regional, and global patterns of resource use;
3. understand the varying capacities of physical systems, such as watersheds, to support human activity;
4. determine the influence of human perceptions on resource utilization and the environment;
5. analyze the consequences of human modification of the environment and evaluate the changing landscape; and
6. evaluate the impact of physical hazards on human systems.

F A student should be able to use geography to understand the world by interpreting the past, knowing the present, and preparing for the future.

A student who meets the content standard should:

1. analyze and evaluate the impact of physical and human geographical factors on major historical events;
2. compare, contrast, and predict how places and regions change with time;
3. analyze resource management practices to assess their impact on future environmental quality;
4. interpret demographic trends to project future changes and impacts on human environmental systems;
5. examine the impacts of global changes on human activity; and

6. utilize geographic knowledge and skills to support interdisciplinary learning and build competencies required of citizens.

Government and Citizenship

A A student should know and understand how societies define authority, rights, and responsibilities through a governmental process.

A student who meets the content standard should:

1. understand the necessity and purpose of government;
2. understand the meaning of fundamental ideas, including equality, authority, power, freedom, justice, privacy, property, responsibility, and sovereignty;
3. understand how nations organize their governments; and
4. compare and contrast how different societies have governed themselves over time and in different places.

B A student should understand the constitutional foundations of the American political system and the democratic ideals of this nation.

A student who meets the content standard should:

1. know that places have distinctive geographic characteristics;
2. analyze how places are formed, identified, named, and characterized;
3. relate how people create similarities and differences among places;
4. discuss how and why groups and individuals identify with places;
5. describe and demonstrate how places and regions serve as cultural symbols, such as the Statue of Liberty;
6. make informed decisions about where to live, work, travel, and seek opportunities;
7. understand that a region is a distinct area defined by one or more cultural or physical features; and
8. compare, contrast, and predict how places and regions change with time.

C A student should understand the character of government of the state.

A student who meets the content standard should:

1. understand the various forms of the state's local governments and the agencies and commissions that influence students' lives and property;
2. accept responsibility for protecting and enhancing the quality of life in the state through the political and governmental processes;
3. understand the Constitution of Alaska and sec. 4 of the Alaska Statehood Act, which is known as the Statehood Compact;
4. understand the importance of the historical and current roles of Alaska Native communities;

5. understand the Alaska Native Claims Settlement Act and its impact on the state;
6. understand the importance of the multicultural nature of the state;
7. understand the obligations that land and resource ownership place on the residents and government of the state; and
8. identify the roles of and relationships among the federal, tribal, and state governments and understand the responsibilities and limits of the roles and relationships.

D A student should understand the role of the United States in international affairs.

A student who meets the content standard should:

1. analyze how domestic politics, the principles of the United States Constitution, foreign policy, and economics affect relations with other countries;
2. evaluate circumstances in which the United States has politically influenced other nations and how other nations have influenced the politics and society of the United States;
3. understand how national politics and international affairs are interrelated with the politics and interests of the state;
4. understand the purpose and function of international government and non-governmental organizations in the world today; and
5. analyze the causes, consequences, and possible solutions to current international issues.

E A student should have the knowledge and skills necessary to participate effectively as an informed and responsible citizen.

A student who meets the content standard should:

1. know the important characteristics of citizenship;
2. recognize that it is important for citizens to fulfill their public responsibilities;
3. exercise political participation by discussing public issues, building consensus, becoming involved in political parties and political campaigns, and voting;
4. establish, explain, and apply criteria useful in evaluating rules and laws;
5. establish, explain, and apply criteria useful in selecting political leaders;
6. recognize the value of community service; and
7. implement ways of solving problems and resolving conflict.

F A student should understand the economies of the United States and the state and their relationships to the global economy.

A student who meets the content standard should:

1. understand how the government and the economy interrelate through regulations, incentives, and taxation;

2. be aware that economic systems determine how resources are used to produce and distribute goods and services;
3. compare alternative economic systems;
4. understand the role of price in resource allocation;
5. understand the basic concepts of supply and demand, the market system, and profit;
6. understand the role of economic institutions in the United States, including the Federal Reserve Board, trade unions, banks, investors, and the stock market;
7. understand the role of self-interest, incentives, property rights, competition, and corporate responsibility in the market economy;
8. understand the indicators of an economy's performance, including gross domestic product, inflation, and the unemployment rate;
9. understand those features of the economy of the state that make it unique, including the importance of natural resources, government ownership and management of resources, Alaska Native regional corporations, the Alaska Permanent Fund Corporation, the Alaska Housing Finance Corporation, and the Alaska Industrial Development and Export Authority; and
10. understand how international trade works.

G A student should understand the impact of economic choices and participate effectively in the local, state, national, and global economies.

A student who meets the content standard should:

1. apply economic principles to actual world situations;
2. understand that choices are made because resources are scarce;
3. identify and compare the costs and benefits when making choices;
4. make informed choices on economic issues;
5. understand how jobs are created and their role in the economy;
6. understand that wages and productivity depend on investment in physical and human capital; and
7. understand that economic choices influence public and private institutional decisions.

History

A A student should understand that history is a record of human experiences that links the past to the present and the future.

A student who meets the content standard should:

1. understand chronological frameworks for organizing historical thought and place significant ideas, institutions, people, and events within time sequences;
2. know that the interpretation of history may change as new evidence is discovered;
3. recognize different theories of history, detect the weakness of broad generalization, and evaluate the debates of historians;
4. understand that history relies on the interpretation of evidence;
5. understand that history is a narrative told in many voices and expresses various perspectives of historical experience;
6. know that cultural elements, including language, literature, the arts, customs, and belief systems, reflect the ideas and attitudes of a specific time and know how the cultural elements influence human interaction;
7. understand that history is dynamic and composed of key turning points;
8. know that history is a bridge to understanding groups of people and an individual's relationship to society; and
9. understand that history is a fundamental connection that unifies all fields of human understanding and endeavor.

B A student should understand historical themes through factual knowledge of time, places, ideas, institutions, cultures, people, and events.

A student who meets the content standard should:

1. comprehend the forces of change and continuity that shape human history through the following persistent organizing themes:
    - the development of culture, the emergence of civilizations, and the accomplishments and mistakes of social organizations;
    - human communities and their relationships with climate, subsistence base, resources, geography, and technology;
    - the origin and impact of ideologies, religions, and institutions upon human societies;
    - the consequences of peace and violent conflict to societies and their cultures;
    - major developments in societies as well as changing patterns related to class, ethnicity, race, and gender;
2. understand the people and the political, geographic, economic, cultural, social, and environmental events that have shaped the history of the state, the United States, and the world;
3. recognize that historical understanding is relevant and valuable in the student's life and

for participating in local, state, national, and global communities;
4. recognize the importance of time, ideas, institutions, people, places, cultures, and events in understanding large historical patterns; and
5. evaluate the influence of context upon historical understanding.

C A student should develop the skills and processes of historical inquiry.

A student who meets the content standard should:

1. use appropriate technology to access, retrieve, organize, and present historical information;
2. use historical data from a variety of primary resources, including letters, diaries, oral accounts, archeological sites and artifacts, art, maps, photos, historical sites, documents, and secondary research materials, including almanacs, books, indices, and newspapers;
3. apply thinking skills, including classifying, interpreting, analyzing, summarizing, synthesizing, and evaluating, to understand the historical record; and
4. use historical perspective to solve problems, make decisions, and understand other traditions.

D A student should be able to integrate historical knowledge with historical skill to effectively participate as a citizen and as a lifelong learner.

A student who meets the content standard should:

1. understand that the student is important in history;
2. solve problems by using history to identify issues and problems, generate potential solutions, assess the merits of options, act, and evaluate the effectiveness of actions;
3. define a personal position on issues while understanding the historical aspects of the positions and roles assumed by others;
4. recognize and demonstrate that various issues may require an understanding of different positions, jobs, and personal roles depending on place, time, and context;
5. base personal citizenship action on reasoned historical judgment with recognition of responsibility for self and others; and
6. create new approaches to issues by incorporating history with other disciplines, including economics, geography, literature, the arts, science, and technology.

Mathematics

A A student should understand mathematical facts, concepts, principles, and theories.

A student who meets the content standard should:

1. understand and use numeration, including
    - numbers, number systems, counting numbers, whole numbers, integers, fractions, decimals, and percents; and
    - irrationals and complex numbers;
2. select and use appropriate systems, units, and tools of measurement, including estimation;
3. perform basic arithmetic functions, make reasoned estimates, and select and use appropriate methods or tools for computation or estimation including mental arithmetic, paper and pencil, a calculator, and a computer;
4. represent, analyze, and use mathematical patterns, relations, and functions using methods such as tables, equations, and graphs;
5. construct, draw, measure, transform, compare, visualize, classify, and analyze the relationships among geometric figures; and
6. collect, organize, analyze, interpret, represent, and formulate questions about data and make reasonable and useful predictions about the certainty, uncertainty, or impossibility of an event.

B A student should understand and be able to select and use a variety of problem-solving strategies.

A student who meets the content standard should:

1. use computational methods and appropriate technology as problem-solving tools;
2. use problem solving to investigate and understand mathematical content;
3. formulate mathematical problems that arise from everyday situations;
4. develop and apply strategies to solve a variety of problems;
5. check the results against mathematical rules;
6. use common sense to help interpret results;
7. apply what was learned to new situations; and
8. use mathematics with confidence.

C A student should understand and be able to form and use appropriate methods to define and explain mathematical relationships.

A student who meets the content standard should:

1. express and represent mathematical ideas using oral and written presentations, physical

materials, pictures, graphs, charts, and algebraic expressions;
2. relate mathematical terms to everyday language;
3. develop, test, and defend mathematical hypotheses; and
4. clarify mathematical ideas through discussion with others.

D A student should be able to use logic and reason to solve mathematical problems.

A student who meets the content standard should:

1. analyze situations;
2. draw logical conclusions;
3. use models, known facts, and relationships to explain the student's reasoning;
4. use deductive reasoning to verify conclusions, judge the validity of arguments, and construct valid arguments; and
5. use inductive reasoning to recognize patterns and form mathematical propositions.

E A student should be able to apply mathematical concepts and processes to situations within and outside of school.

A student who meets the content standard should:

1. explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations;
2. use mathematics in daily life; and
3. use mathematics in other curriculum areas.

Mathematics Performance Standards

Content Standard A1: Numeration

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M1.1.1 Read, write, order, count, and model one-to-one correspondence with whole numbers to100.	M1.2.1 Read, write, model, order, and count with positive whole numbers to 1,000,000 and negative whole numbers.	M1.3.1 Read, write, model, and order real numbers, explaining scientific notation, exponents, and percents.	M1.4.1 Read, write, model, order, and define real numbers and subsets.
M1.1.2 Use, model, and identify place value positions of 1's, 10's, and 100's.	M1.2.2 Use, model, and identify place value positions from 0.001 to 1,000,000.	M1.3.2 Model counting in a different base system.	M1.4.2 Add in a different base system.
M1.1.3 Model and explain the processes of addition and subtraction, describing the relationship between the operations.	M1.2.3 Model and explain the processes of multiplication and division. Describe the relationships among the four basic operations.		M1.4.3 Compare and contrast the relationship between various applications of the same operation.
M1.1.4 Select and use various representations of ordinal and cardinal numbers.	M1.2.4 Identify and describe different uses for the same numerical representation.	M1.3.3 Translate between equivalent representations of the same number. Select a representation that is appropriate for the situation.	M1.4.4 Translate between equivalent representations of the same exponential expression.
M1.1.5 Identify, model, and label simple fractions, describing and defining them as equal parts of a whole, a region, or a set.	M1.2.5 Model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money.	M1.3.4 Describe and model the relationship of fractions to decimals, percents, ratios, and proportions.	
M1.1.6 Identify, describe, and extend patterns inherent in the number system. Skip count by 2's 5's and 10's. Add and subtract by 10. Identify even and odd	M1.2.6 Identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers.	M1.3.5 Use, explain, and define the rules of divisibility, prime and composite numbers, multiples, and order of operations.	

numbers.			
M1.1.7 Demonstrate the commutative and identity properties of addition.	M1.2.7 Demonstrate the commutative and identity properties of multiplication.	M1.3.6 Use commutative, identity, associative, and distributive properties with variables.	M1.4.5 Recognize, describe, and use properties of the real number system.

Content Standard A2: Measurement

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M2.1.1 Compare and order objects by various measurable attributes including calendar, temperature, length, weight, capacity, area, and volume.	M2.2.1 Estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems.	M2.3.1 Estimate and measure various dimensions to a specified degree of accuracy.	M2.4.1 Evaluate measurements for accuracy, precision, and error with respect to the measuring tools, methods, and the computational process.
M2.1.2 Compare objects to standard and non-standard units to identify objects that are greater than, less than, and equal to, a given unit .	M2.2.2 Identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week).	M2.3.2 Estimate and convert measurements within the same system.	M2.4.2 Estimate and convert measurements between different systems.
	M2.2.3 Use a variety of measuring tools; describe the attribute(s) they measure.	M2.3.3 Use a variety of methods and tools to construct and compare plane figures.	M2.4.3 Apply various measurement systems to describe situations and solve problems.
M2.1.3 Choose a unit of measure, estimate the length or weight of objects and then measure to check for reasonableness.	M2.2.4 Estimate and measure the dimensions of geometric figures.	M2.3.4 Describe and apply the relationships between dimensions of geometric figures to solve problems using indirect measurement; describe and apply the concepts of rate and scale.	M2.4.4 Use indirect methods, including the Pythagorean Theorem and right triangle trigonometry, to find missing dimensions.
M2.1.4 Tell time to the nearest half hour, distinguishing between morning, afternoon, and evening.	M2.2.5 Tell time using analog and digital clocks identifying AM and PM; find elapsed time.	M2.3.5 Apply information about time zones and elapsed time to solve problems.	
M2.1.5 Identify coins, their value,	M2.2.6 Read, write, and use		

and the value of given sets of coins.	money notation, determining possible combinations of coins and bills to equal given amounts; count back change for any given situation.		

Content Standard A3: Estimation and Computation

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	**Between ages 15-18, students know and are able to do everything required at earlier ages and:**
M3.1.1 Make reasonable estimates of "how many" and "how much"; estimate the results of simple addition and subtraction problems.	M3.2.1 Describe and use a variety of estimation strategies including rounding to the appropriate place value, multiplying by powers of 10, and using front-end estimation to check the reasonableness of solutions.	M3.3.1 Apply, explain, and assess the appropriateness of a variety of estimation strategies including truncating and rounding to compatible numbers.	M3.4.1 Use estimation to solve problems and to check the accuracy of solutions; state whether the estimation is greater or less than the exact answer.
M3.1.2 Recall and use basic addition and subtraction facts orally and with paper and pencil without a calculator.	M3.2.2 Recall and use basic multiplication and division facts orally, with paper and pencil without a calculator.	M3.3.2 Apply basic operations efficiently and accurately, using estimation to check the reasonableness of results.	
M3.1.3 Add and subtract whole numbers to 100 using a variety of models and algorithms.	M3.2.3 Add and subtract whole numbers and fractions with common denominators to 12 and decimals, including money amounts, using models and algorithms.	M3.3.3 Add and subtract fractions, decimals, and percents.	M3.4.2 Add and subtract real numbers using scientific notation, powers, and roots.
M3.1.4 Model multiplication as repeated addition and grouping objects; model division as "sharing equally" and grouping objects.	M3.2.4 Multiply and divide multi-digit whole numbers by 2-digit numbers, limiting the 2-digit divisors to those that end in 0; multiply and divide decimals that represent money by whole	M3.3.4 Multiply and divide rational numbers in various forms including fractions, decimals, and percents.	M3.4.3 Multiply and divide real numbers in various forms including scientific notation, powers, and roots.

	numbers.		
	M3.2.5 Find equivalent fractions. Convert between fractions and mixed numbers.	M3.3.5 Convert between equivalent fractions, decimals, percents, and proportions. Convert from exact to decimal representations of irrational numbers.	M3.4.4 Select, convert, and apply an equivalent representation of a number for a specified situation.
	M3.2.6 Develop and interpret scales and scale models.	M3.3.6 Solve problems using ratios and proportions.	M3.4.5 Use ratios and proportions to model and solve fraction and percent problems with variables.

Content Standard A4: Functions and Relationships

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M4.1.1 Recognize, describe, create, and extend repeating and increasing patterns with a variety of materials including symbols, objects, and manipulatives.	M4.2.1 Use patterns and their extensions to make predictions and solve problems; describe patterns found in the number system including those formed by multiples, factors, perfect squares, and powers of 10.	M4.3.1 Identify numeric and geometric patterns to find the next term and predict the nth term.	M4.4.1 Identify, graph, and describe the graphs of basic families of functions including linear, absolute value, quadratic, and exponential using a graphing calculator.
M4.1.2 Generate and solve simple functions by identifying and applying addition and subtraction patterns.	M4.2.2 Generate and solve simple functions by identifying and applying multiplication and division patterns.	M4.3.2 Identify and describe how a change in one variable in a function affects the remaining variables (e.g.,, how changing the length affects the area and volume of a rectangular prism).	M4.4.2 Create and solve linear and quadratic equations and inequalities.
M4.1.3 Use a calculator to find and extend patterns in the number system.	M4.2.3 Use a calculator to find a missing item in a number sequence.	M4.3.3 Use a calculator to find a missing item in an arithmetic and a geometric sequence; predict the	M4.4.3 Create and solve simple systems of equations, algebraically and graphically,

		graph of each function.	using a graphing calculator.
M4.1.4 Complete open space sentences with missing numbers; use appropriate vocabulary including greater than, less than, and equal to; and use the correct symbols.	M4.2.4 Use words, lists, and tables to represent and analyze patterns.	M4.3.4 Translate among and use tables of ordered pairs, graphs on coordinate planes, and linear equations as tools to represent and analyze patterns.	M4.4.4 Use discrete structures, such as networks, matrices, sequences, and iterations as tools to analyze patterns, expressions, and equations.
	M4.2.5 Explain the purpose of variables and use them in open sentences to express relationships and describe simple functions.	M4.3.5 Find the value of a variable by evaluating formulas and algebraic expressions for given values.	M4.4.5 Add, subtract, multiply, divide, and simplify rational expressions; add, subtract, and multiply polynomials.

Content Standard A5: Geometry

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M5.1.1 Identify, sort, describe, model, and compare circles, triangles, and rectangles including squares regardless of orientation.	M5.2.1 Identify and compare various triangles and quadrilaterals according to their sides and/or angles.	M5.3.1 Identify, classify, compare, and sketch regular and irregular polygons.	M5.4.1 Identify and use the properties of polygons, including interior and exterior angles, and circles (including angles, arcs, chord, secants, and tangents) to solve problems.
M5.1.2 Identify, sort, describe, model, and compare solid figures including cubes, cylinders, and spheres.	M5.2.2 Compare and contrast plane and solid figures (e.g.,, circle/sphere, square/cube, triangle/pyramid) using relevant attributes, including the number of vertices, edges, and the number and shape of faces.	M5.3.2 Model, identify, draw, and describe 3-dimensional figures including tetrahedrons, dodecahedrons, triangular prisms, and rectangular prisms.	M5.4.2 Create 2-dimensional representations of 3-dimensional objects.
M5.1.3 Identify and create examples of line symmetry; compare and describe given	M5.2.3 Identify and model geometric figures that are congruent, similar, and/or	M5.3.3 Apply the properties of equality and proportionality to solve problems involving congruent or	M5.4.3 Identify congruent and similar figures using Euclidean and coordinate geometries; apply

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
circles, triangles, and rectangles as larger, smaller, or congruent.	symmetrical.	similar shapes.	this information to solve problems.
M5.1.4 Demonstrate conservation of area using drawings or manipulatives**.**	M5.2.4 Distinguish between area and perimeter; find both using a variety of methods including rulers, grid paper, and tiles.	M5.3.4 Estimate and determine volume and surface areas of solid figures using manipulatives and formulas; estimate and find circumferences and areas of circles.	
M5.1.5 Describe and identify geometric transformations including slides, flips, and turns.	M5.2.5 Identify and model transformations of geometric figures, describing the motions as slides, flips, or rotations.	M5.3.5 Draw and describe the results of transformations including translations (slides), rotations (turns), reflections (flips), and dilations (shrinking or enlarging).	M5.4.4 Use transformations to demonstrate geometric properties**.**
M5.1.6 Use comparative directional and positional words: above, below, inside, outside, on, in, right and left, horizontal, vertical, and middle.	M5.2.6 Locate and describe objects in terms of their position with and without compass directions; identify coordinates for a given point or locate points of given coordinates on a grid.	M5.3.6 Use coordinate geometry to represent and interpret relationships defined by equations and formulas including distance and midpoint.	M5.4.5 Use coordinate geometry to graph linear equations, determine slopes of lines, identify parallel and perpendicular lines, and to find possible solutions to sets of equations.
M5.1.7 Draw and build familiar shapes.	M5.2.7 Sketch and identify line segments, midpoints, intersections, parallel, and perpendicular lines.	M5.3.7 Draw, measure, and construct geometric figures including perpendicular bisectors, polygons with given dimensions and angles, circles with given dimensions, perpendicular and parallel lines.	M5.4.6 Construct geometric models, transformations, and scale drawings using a variety of methods including paper folding, compass, straight edge, protractor, and technology.

Content Standard A6: Statistics/Probability

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M6.1.1 Collect, record, organize, display, and explain the classification of data.	M6.2.1 Collect, organize, and display data creating a variety of visual displays including tables, charts, and line graphs.	M6.3.1 Collect, analyze, and display data in a variety of visual displays including frequency distributions, circle graphs, box and whisker plots, stem and leaf plots, histograms, and scatter plots with and without technology.	M6.4.1 Analyze and draw inferences from a wide variety of data sources that summarize data; constructing graphical displays with and without technology.
M6.1.2 Describe data from a variety of visual displays including tallies, tables, pictographs, bar graphs, and Venn diagrams.	M6.2.2 Present the data using a variety of appropriate representations and explain the meaning of the data.	M6.3.2 Interpret and analyze information found in newspapers, magazines, and graphical displays.	M6.4.2 Determine the line of best fit and use it to predict unknown data values.
M6.1.3 Use the terms "maximum" and "minimum" when working with a data set.	M6.2.3 Describe and interpret a data set using mean, median, mode, and range.	M6.3.3 Determine and justify a choice of mean, median, or mode as the best representation of data for a practical situation.	M6.4.3 Describe data, selecting measures of central tendencies and distribution, to convey information in the data.
M6.1.4 Find and record the possibilities of simple probability experiments; explain differences between chance and certainty, giving examples.	M6.2.4 Estimate whether a game is mathematically fair or unfair; analyze and present probability data using simple fractions.	M6.3.4 Make projections based on available data and evaluate whether or not inferences can be made given the parameters of the data.	M6.4.4 Analyze the validity of statistical conclusions and the use, misuse, and abuse of data caused by a wide variety of factors including choices of scale, inappropriate choices of measures of center, incorrect curve fitting, and inappropriate uses of controls or sample groups.

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M6.1.5 Conduct a survey and tally the results.	M6.2.5 Conduct simple probability experiments using concrete materials and represent the results using fractions and probability.	M6.3.5 Use tree diagrams and sample spaces to make predictions about independent events.	M6.4.5 Analyze data from multiple events and predict theoretical probability; find and compare experimental and theoretical probability for a simple situation, discussing possible differences between two results.
		M6.3.6 Design and conduct a simulation to study a problem and communicate the results.	M6.4.6 Design, conduct, analyze, and communicate the results of multi-stage probability experiments.

Content Standard B: Problem-Solving

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M7.1.1 Formulate problems from practical and mathematical activities.	M7.2.1 Read and summarize a problem, using mathematical terms and symbols.	M7.3.1 Analyze and summarize a problem using the relationships between the known facts and unknown information.	M7.4.1 Recognize and formulate mathematical problems from within and outside the field of mathematics.
M7.1.2 Develop and apply strategies including guess and check, modeling and acting out, drawings, and extending patterns to solve a variety of problems.	M7.2.2 Select and apply a variety of strategies including making a table, chart or list, drawing pictures, making a model, and comparing with previous experience to solve problems.	M7.3.2 Select, modify, and apply a variety of problem-solving strategies including graphing, inductive and deductive reasoning, Venn diagrams, and spreadsheets.	M7.4.2 Apply multi-step, integrated, mathematical problem-solving strategies, persisting until a solution is found or it is clear no solution exits.
M7.1.3 Predict an answer before solving a problem and compare results to check for reasonableness.	M7.2.3 Explain and verify results of the original problem and apply what was learned to new situations.	M7.3.3 Evaluate, interpret, and justify solutions to problems.	M7.4.3 Verify the answer by using an alternative strategy.

Content Standard C: Communication

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M8.1.1 Translate problems from everyday language into math language and symbols.	M8.2.1 Use the mathematical vocabulary appropriate to the problem.	M8.3.1 Use math vocabulary, symbols, and notation to represent information in the	M8.4.1 Use appropriate technology to represent the information and ideas in a

		problem.	problem.
M8.1.2 Use manipulatives, models, pictures, and language to represent and communicate mathematical ideas.	M8.2.2 Represent mathematical and practical situations using concrete, pictorial, and symbolic representation.	M8.3.2 Represent a problem numerically, graphically, and symbolically; translate among these alternative representations.	M8.4.2 Use numerical, graphic, and symbolic representations to support oral and written communication about math ideas.
M8.1.3 Use everyday language to explain thinking about problem solving strategies and solutions to problems.	M8.2.3 Organize and communicate mathematical problem solving strategies and solutions to problems.	M8.3.3 Use appropriate vocabulary, symbols, and technology to explain, justify, and defend mathematical solutions.	M8.4.3 Explain, justify, and defend mathematical ideas, solutions, and methods to various audiences.

Content Standard D: Reasoning

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M9.1.1 Draw conclusions about mathematical problems.	M9.2.1 Draw logical conclusions about mathematical situations.	M9.3.1 Use informal deductive and inductive reasoning in both concrete and abstract contexts.	M9.4.1 Follow and evaluate an argument, judging its validity using inductive or deductive reasoning and logic.
M9.1.2 Find examples that support or refute mathematical statements.	M9.2.2 Given a rule or generalization, determine whether the example fits.	M9.3.2 State counterexamples to disprove statements.	M9.4.2 Make and test conjectures.
M9.1.3 Explain why a prediction, estimation, or solution is reasonable.	M9.2.3 Justify answers and mathematical strategies as reasonable.	M9.3.3 Justify and defend the validity of mathematical strategies and solutions using examples and counterexamples.	M9.4.3 Use methods of proofs including direct, indirect, and counterexamples, to validate conjectures.

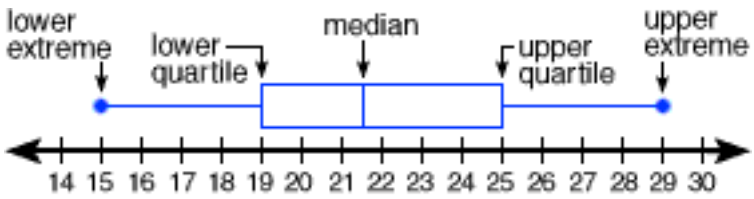
Content Standard E: Connections

Between ages 5-7, students:	**Between ages 8-10, students know and are able to do everything required at earlier ages and:**	**Between ages 11-14, students know and are able to do everything required at earlier ages and:**	*Between ages 15-18, students know and are able to do everything required at earlier ages and:*
M10.1.1 Apply mathematical skills and processes to literature.	M10.2.1 Apply mathematical processes to social studies.	M10.3.1 Apply mathematical skills and processes to science and humanities.	M10.4.1 Apply mathematical skills and processes to global issues.
M10.1.2 Apply mathematical skills and processes to situations with self and family.	M10.2.2 Apply mathematical skills and processes to situations with friends and school.	M10.3.2 Apply mathematical skills and processes to situations with peers and community.	M10.4.2 Describe how mathematics can be used in knowing how to prepare for careers.

GLOSSARY

(1) **Absolute Values** – The distance form 0 to the graph of a number on the number line.
(2) **Abstract Context** – A math problem presented without a description of a real-world application.
(3) **Accuracy** – Exactness; correctness.
(4) **Acute Angle** – An acute angle is an angle whose measure is between 0 degrees and 90 degrees.
(5) **Algebraic Expression** – An expression that is written using variables and numbers.
(6) **Algebraically** – Designating an expression, equation, or function in which numbers, letters, and arithmetic operations are contained or used.
(7) **Algorithm** – A systematic procedure that, if followed, accomplishes a particular task.
(8) **Associative** – An operation (*) is said to be associative if it does not matter where parentheses are placed when three elements are combined. (a*b) **c=a**(b*c) is true if * is associative.
(9) **Attribute** – A distinctive feature, characteristic.
(10) **Base System** – A place value system where the base is a number that is raised to various powers to generate the principle counting units of the number system. (e.g. 123 in base 10 is 1×10^2, $+ 2 \times 10^1 + 3 \times 10^0$. 123 in base 5 is $1 \times 5^2 + 2 \times 5^1 + 3 \times 5^0$.)
(11) **Basic Operations** – Operations of addition, subtraction, multiplication and division.
(12) **Bisector** – A Bisector divides something into two equal parts.
(13) **Box and Whisker Plots** – A graph that shows how far apart and how evenly data are distributed.

Example:



(14) **Cardinal Number** – A number, such as 3 or 11 or 412, used to indicate quantity but not order.
(15) **Chart** – A presentation of information in the form of graphs or tables.
(16) **Chord** – A line segment joining two points on circle.
(17) **Commutative** – The operation * on a set is commutative if a * b = b * a for all members of a set.
(18) **Compass Direction** – Geographical direction of the earth (north, south, east, west).
(19) **Compatible Numbers** – Pairs of numbers that are easy to compute mentally.
(20) **Composite Number** – A whole number, greater than zero, that has more than two whole number factors.
(21) **Concrete Representation** – A math problem presented in context of a real world application.
(22) **Congruent** – Objects that have the same shape and size.

(23) **Conservation of Area** – Area measure of a shape stays the same even though the shape changes dimensions.
(24) **Coordinate Geometry** – A geometry where conclusions are drawn based on information about figures located on a coordinate plane.
(25) **Coordinate Plane** – The plane formed by two perpendicular number lines called axes.
(26) **Coordinates** – Numbers in and ordered pair(97)
(27) **Counterexamples** – Examples that prove a statement to be untrue.
(28) **Curve Fitting** – Finding an equation of a curve that best describes a given set of points.
(29) **Deductive Reasoning** – Process of demonstrating that if certain statements (axioms, postulates, theorems) are accepted as true then other statements can be proved to follow from them. A good rule of thumb when thinking of deduction is to view it as *general* cases that are applied to prove a *specific* case.
(30) **Degree of Accuracy** – A pre-specified level of exactness or correctness.
(31) **Direct Proof** – Proving that a statement is true by using deductive reasoning.
(32) **Distributive** – The property, which states that multiplying a sum by a number gives the same result as multiplying each addend by the number and then adding the products.

$$a(b + c)=a * b + a * c$$

Examples:

$$3(4 + 5)= 3 * 4 + 3 * 5$$
$$3(a +b) = 3 a + 3 b$$

(33) **Divisibility** – When one number is divided by another and the remainder is zero (there is no remainder).
(34) **Dodecahedrons** – A dodecahedron is a solid shape with twelve faces. All the faces of a regular dodecahedron are regular pentagons.
(35) **Equation** – A mathematical sentence that uses an equals sign to show that two quantities are equal.
(36) **Equivalent Fractions** – Fractions that name the same number.
(37) **Equivalent Representations** – Equal numbers or expressions that are represented in different forms. (e.g., fractions, decimals, percents, scientific notation and exponents.)

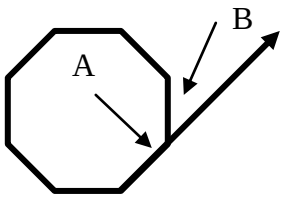
Example:

½ = .5 = 50%

(38) **Error** – The difference between an estimated solution and the exact solution.
(39) **Euclidean Geometry** – A geometry where conclusions are drawn based on the propositions given by Euclid around 250 BC.
(40) **Even Numbers** – Even numbers are numbers ending in 0 or 2 or 4 or 6 or 8. (Multiplies of 2)
(41) **Experimental Probability** – The ratio of the number of times an event occurs in an experiment to the total number of outcomes.
(42) **Exponent** – The number that indicates how many times the base is used as a factor. Example: $2^3 = 2x2x2 = 8$

(43) **Exponential** – Adjective describing an expression or function containing an exponent.
(44) **Expression** – A mathematical phrase that uses numbers, variables, and operation symbols to represent a value.
(45) **Exterior Angles** – An angle that forms a linear pair with an interior angle of a polygon (<B is an exterior angle)

Example:



(46) **Factors** – Any of two or more whole numbers that are multiplied to form a product. (ex: 1, 2, 4, and 8 are factors of 8)
(47) **Finite Graphs** – Graphs on the coordinate plane having an upper and a lower bound.
(48) **Formula** – A rule that is expressed using variables, symbols and / or numbers (e.g. $A = \pi r^2$ or $P = 2(L + W)$
(49) **Four (or basic) Operations** – Mathematical operations of addition, subtraction, multiplication, and division.
(50) **Frequency Distribution** – A table that pairs each item in a set of data with its frequency. (Number of times that item occurs)
(51) **Front-End Estimation** – An estimation strategy in which numbers are rounded to their leading digits.
(52) **Function** – A relation or rule in which each element in the domain (input) is matched with exactly one element of the range (output).
(53) **Geometric Figure** – A shape having geometric properties such as length, width, area, etc.
(54) **Geometric Model** – Representation of a real-world situation using geometric methods.
(55) **Geometric Sequence** – An ordered list of numbers that has a common ratio between successive terms. Each successive term is formed by multiplying the preceding term by the common ratio (e.g., 1, 3, 9, 27, … the common ratio is 3).
(56) **Geometric Shapes** – Plane or solid figures having geometric properties.
(57) **Graphic Representations** – Charts, diagrams, tables, graphs or other pictorial representations of mathematical ideas.
(58) **Graphically** – Using a graphic representation to illustrate a mathematics problem.
(59) **Guess and Check** – A problem solving strategy where a guess is offered and then checked for accuracy.
(60) **Histogram** – A representation of a frequency distribution by means of contiguous bars whose width represents equal intervals and whose height represents the frequency of data values.
(61) **Identity** – The property by which adding 0 to any number results in a sum identical to the given number; and the property by which multiplying 1 by any number results in a product identical to the given number.
(62) **Independent Events** – Independent events are ones for which the outcome of one event is not affected by the outcome of another event. Dependent events are ones for which the outcome of one event is affected by the outcome of another event. For

example, drawing a card from a deck of cards and replacing it, then drawing a second card, are independent events. Drawing a card and not replacing it, and then drawing a second card, are dependent events.

(63) **Indirect Measurements** – Measurements determined by methods other than the use of measurement tools. (e.g. calculating the distance using the Pythagorean Theorem, similar figures, or trigonometric ratios).

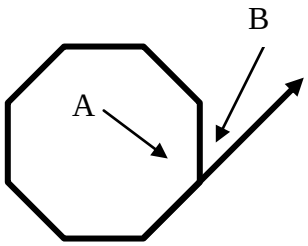
(64) **Indirect Proofs** – Proof by contradiction.

(65) **Inductive Reasoning** – Process of observing data, recognizing patterns, and making generalizations from the observations. A good rule of thumb for remembering the process of induction is one that moves from *specific* cases to *general* rule.

(66) **Inequality** – A mathematical sentence that shows the relationship between quantities that are not equal, using $<$, $>$, $\leq$, $\geq$, $\neq$.

(67) **Interior Angles** – The Angles formed within a polygon by the intersection of 2 sides ($<A$ is an interior angle)

Example:



(68) **Irregular Polygon** – A polygon whose sides and angles are not congruent.

(69) **Iteration** – The process of repeating the same procedure over and over again.

(70) **Line of Symmetry** – A line that divides a figure into two congruent parts.

(71) **Linear** – Relating to a function that has a constant rate of change and can be modeled by a straight line.

(72) **Linear Equation** – An equation whose graph is a line.

Examples: $y = x + 9$, $3x - 2y = 10$, $y = -4$
Counterexamples: $y = 3x^2 + 6$, $4xy = 12$, $1/y = 4x$

(73) **Manipulatives** – A wide variety of physical materials and supplies that students use to foster the learning of abstract ideas in math.

(74) **Mathematical Problem-Solving Strategies** – Strategies used to solve problems, such as draw a picture, guess and check, look for a pattern, make an organized list, make a table or chart, solve a simpler problem, work backward, use manipulatives, act it out.

(75) **Matrices** – A rectangular array of numbers. Uses included spreadsheets, transformations, and linear algebra.

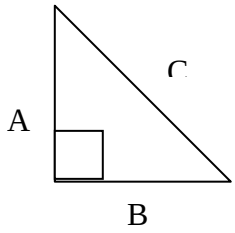
(76) **Mean (or arithmetic mean)** – The sum of a set of *n* numbers divided by *n*. Average

(77) **Measures of Center** – A single score that can best represent the whole set of data. (e.g. mean, mode and median of a data set)

(78) **Measuring Tools** – Tools used to measure length, capacity, weight, mass, degree, etc.

(79) **Median** – the value of the middle number in an ordered set of data, or the average of the two middle numbers in the set.
(80) **Metric System** – A system of measure with basic units of: meter for length, liter for capacity, gram for mass, and degrees Celsius for temperature.
(81) **Mode** – The mode is the "most popular" value, or the most frequently occurring item in a set of data.
(82) **Model** – A representation of something in the real world, using geometry, algebra, or other mathematics.
(83) **Multiple** – A multiple of a number is the product of the number and a whole number. (Multiples of 8 = 8, 16, 24, 32…)
(84) **Non-Standard Units** – measuring units that are not *Metric* or *US Customary System* measuring units.
(85) **Number Sequence** – an ordered list of numbers.
(86) **Number System** – In this context, the number system is the base 10 system.
(87) **Number Theory** – The study of topics such as primes, composites, factors, multiples, etc.
(88) **Numeric** – Expressed or counted by numbers.
(89) **Numerical Representation** – An expression that includes only numbers.
(90) **Obtuse Angle** – An angle whose measure is between 90º and 180º.
(91) **Odd Numbers** – Numbers not divisible by two. Odd numbers have one, three, five , seven, or nine in the ones' place.
(92) **One to One Correspondence** – Matching two sets of elements where each element of one set is paired with one and only one element from the other set.
(93) **Open Sentence** – An open sentence is a mathematical sentence where at least one of its terms is unknown. (e.g. 3 + ___ = 5 or 3 + a = 5) An open sentence is neither true nor false.
(94) **Operation** – A way of combining elements in a set. (e.g. addition, subtraction, multiplication, division)
(95) **Order** – The arrangement of numbers in a sequence.
(96) **Order of Operations** – The correct order of evaluating numerical expressions. First, do work in parentheses or brackets, second, evaluate powers and roots, third do multiplication and division from left to right, and lastly, addition and subtraction from left to right.
(97) **Ordered Pairs** – A pair of numbers used to locate a point on the coordinate plane, whose first number represents the position with reference to the x-axis (horizontal) and whose second number represents the position with reference to the y-axis (vertical).
(98) **Ordinal Numbers** – Numbers indicating position in a series or order. The ordinal numbers are *first, second, third, etc*.
(99) **Pattern** – The arrangement of numbers, pictures, etc. in an organized and predictable way.
(100) **Percent** – Percent is a ratio whose second term is 100. (e.g. 20:100, 20/100 or 20%)
(101) **Perfect square** – A number whose square root is a whole number.
(102) **Perpendicular** – Lines that interest to form right angles.
(103) **Pictograph** – A graph that uses pictures to show and compare information.
(104) **Pictorial Representation** – Use of a drawing or picture to represent data.

(105) **Place Value** – The value of a digit in a number, written in standard notation, as determined by its position. In a base 10 system, each place has a value ten times that of the place to its right and one-tenth the value of the place to its left.
(106) **Plane Figure** – A figure whose points all lie on the same plane.
(107) **Polygon** – A plane closed figure whose sides consist of three or more coplanar segments that intersect only at their endpoints.
(108) **Polynomials** – Algebraic expressions with more than one term.
(109) **Power** – The power of a number is the number of times that number is used as a factor. (e.g., 2 to the power 5 is 2 x 2 x 2 x 2 x 2 and is written 2^5.)
(110) **Precision** – A property of measurement that is related to the unit of measure used; the smaller the unit of measure, the more precise the measurement is. (27mm is more precise than 3 cm.)
(111) **Prime Number** – A prime number has exactly two factors, itself and one.
(112) **Proportion** – An equation stating that two ratios are equal.
(113) **Pythagorean Theorem** – For every right triangle, the sum of the areas of the squares on the legs equals the area of the square on the hypotenuse. If *a* and *b* are the lengths of the legs, and *c* is the length of the hypotenuse, then $a^2 + b^2 = c^2$.



(114) **Quadratic** – A function or equation involving a variable raised to the second power, and no higher power.
(115) **Range** – (Statistics) The difference between the greatest and the least numbers in a set of data.
(116) **Ratio** – A ratio is a comparison of two numbers or quantities (e.g. 5 to 7, 5:7, 5/7)
(117) **Rational Expression** – A polynomial or a quotient of polynomials.
(118) **Rational Number** – Any number that can be expressed as a ratio a/b when a and b are integers and b ? 0.
(119) **Ray** – A part of a line that has one endpoint and extends endlessly in the other direction.
(120) **Real Numbers** – the set of numbers that includes all rational and irrational numbers.
(121) **Rectangular Prism** – A solid figure with parallel, congruent rectangular bases, and whose faces are parallelograms.
(122) **Regular Polygon** – A polygon that has all its sides the same length and all its angles the same size.
(123) **Relationship** – A way of connecting sets of things, such as numbers or people.
(124) **Right Angle** – An angle with measure of 90°.
(125) **Right Triangle Trigonometry** – the study of the relationship between angle measures and ratios of side lengths of right triangles. The common ratios are sine, cosine and tangent.
(126) **Roots** –
a) a is the xth root of b it $a^x = b$.

b) solutions to an equation.

(127) **Rounding** – The process of dropping digits to the right of the decimal point or removing non-zero digits to the left of the decimal point and replacing them with zeros.

(128) **Sample Groups** – A representative portion of the populations from which information is gathered.

(129) **Sample Space** – Set of all possible outcomes of an experiment.

(130) **Scale** – A scale is a ratio that compares the dimensions of a model to the actual dimensions of the object.

(131) **Scale Drawing** – A drawing made so that all distances in the drawing are proportional to actual distances.

(132) **Scatter Plot** – A graph made by plotting points on a coordinate plane to show the relationship between two variables in a data set.

(133) **Scientific Notation** – A method of expressing a number as the product of a number from 1 up to, but not including 10, and a power of 10. (e.g. $483 = 4.83 \times 10^2$)

(134) **Secant** – A line that intersects a circle at two points.

(135) **Sequence** – An ordered list of numbers.

(136) **Sets of Equations** – See the systems of equations.

(137) **Similar** – Figures that have the same shape but may not have the same size.

(138) **Skip Count** – Counting by multiples. (e.g. 3,6,9,12….)

(139) **Slope of a Line** – The measure of the steepness of a line; the ratio of vertical change to horizontal change.

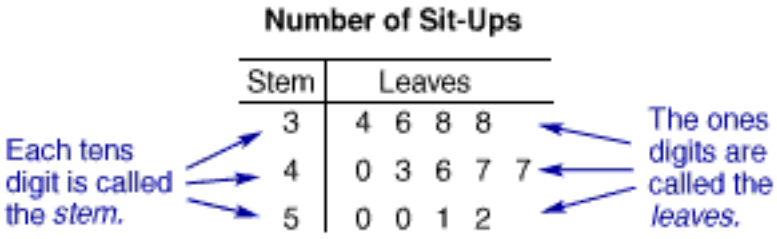
(140) **Solid Figure** – Three-dimensional figure. (e.g., sphere, cube, pyramid, etc.).

(141) **Standard System** – Also known as US Customary System of measurement. A system for measuring length in inches, feet, yards, miles; capacity in cups, pints, quarts, gallons; weight in ounces, pounds, tons; temperature in degrees Fahrenheit.

(142) **Standard Units** – US Customary and Metric units of measure.

(143) **Stem and Leaf Plots** – A method of organizing data from least to greatest using the digits of the greatest place value to group data.

Example:



Key: 3 ¦ 6 = 36

(144) **Subset** – If every element of a set B is also an element of the set A, then B is a subset of A.

(145) **Survey** – A method of gathering information about a population.

(146) **Symbolic** – Of, pertaining to, or expressed by a symbol or symbols.

(147) **Symmetrical** – A figure having a line of symmetry.

(148) **Systems of Equations** – Two or more linear equations used to determine a common solution.
(149) **Systems (of Measurement**) – Metric Measure and US Customary Measure.
(150) **Table** – An organized display of data using columns and rows to delineate categories of data.
(151) **Tally** – A mark used in recording a number of acts or objects, most often in a series of five, consisting of four vertical lines crossed diagonally or horizontally by a fifth line.
(152) **Tangen**t – A line intersecting a circle at only one point and perpendicular to the radius at that point.
(153) **Tetrahedron** – A polyhedron with four triangular faces.
(154) **Theoretical Probability** – The ratio of the number of times an event could occur to total possible outcomes.
(155) **Transformation** – A change in size, shape, or position of a geometric figure (e.g. translations or slides, reflections or flips, rotations or turns, and dilations or enlargements or reductions).
(156) **Tree Diagram** – A branching diagram that shows all possible outcomes of an experiment.
(157) **Triangular Prism** – A solid figure having two parallel congruent triangular bases and parallelograms as sides.
(158) **Truncating** – Truncating a number is to cut off abruptly rather than round a number.
(159) **Unit of Measure** – The measurement quantity used in describing an attribute of an object. (e.g., inches, cm, feet, etc. are units of measure used to describe length. Quarts, gallons, liters are units of measure used to describe capacity).
(160) **Validity** – The state of a conclusion correctly derived from premises.
(161) **Variable** – A letter or symbol used to represent one or more numbers in an expression, equation or inequality.
(162) **Venn Diagrams** – A diagram that is used to show relationships between sets.
(163) **Vertex** – A point where two or more rays or segments meet, where sides of a polygon meet, or where edges of a polyhedron meet. (plural: vertices)

Whole Numbers – The set of whole numbers is the set whose numbers are zero and the counting numbers. (e.g., numbers 0,1,2,3 and so on.

Science

A A student should understand scientific facts, concepts, principles, and theories.

A student who meets the content standard should:

1. understand models describing the nature of molecules, atoms, and sub-atomic particles and the relation of the models to the structure and behavior of matter (Structure of Matter);
2. understand the physical, chemical, and nuclear changes and interactions that result in observable changes in the properties of matter (Changes and Interactions of Matter);
3. understand models describing the composition, age, and size of our universe, galaxy, and solar system and understand that the universe is constantly moving and changing (Universe);
4. understand observable natural events such as tides, weather, seasons, and moon phases in terms of the structure and motion of the earth (Earth);
5. understand the strength and effects of forces of nature, including gravity and electromagnetic radiation (Forces of Nature);
6. understand that forces of nature cause different types of motion and describe the relationship between these forces and motion (Motion);
7. understand how the earth changes because of plate tectonics, earthquakes, volcanoes, erosion and deposition, and living things (Processes that Shape the Earth);
8. understand the scientific principles and models that
    - describe the nature of physical, chemical, and nuclear reactions;
    - state that whenever energy is reduced in one place, it is increased somewhere else by the same amount; and
    - state that whenever there is a transformation of energy, some energy is spent in ways that make it unavailable for use (Energy Transformations);
9. understand the transfers and transformations of matter and energy that link living things and their physical environment, from molecules to ecosystems (Flow of Matter and Energy);
10. understand that living things are made up mostly of cells and that all life processes occur in cells (Cells);
11. understand that similar features are passed on by genes through reproduction (Heredity);
12. distinguish the patterns of similarity and differences in the living world in order to understand the diversity of life and understand the theories that describe the importance of diversity for species and ecosystems (Diversity);
13. understand the theory of natural selection as an explanation for evidence of changes in life forms over time (Evolution and Natural Selection);
14. understand
    - the interdependence between living things and their environ-ments;
    - that the living environment consists of individuals, populations, and communities; and
    - that a small change in a portion of an environment may affect the entire environment (Interdependence);

15. use science to understand and describe the local environment (Local Knowledge); and
16. understand basic concepts about the theory of relativity, which changed the view of the universe by uniting matter and energy and by linking time with space (Relativity).

B A student should possess and understand the skills of scientific inquiry.

A student who meets the content standard should:

1. use the processes of science; these processes include observing, classifying, measuring, interpreting data, inferring, communicating, controlling variables, developing models and theories, hypo-thesizing, predicting, and experimenting;
2. design and conduct scientific investigations using appropriate instruments;
3. understand that scientific inquiry often involves different ways of thinking, curiosity, and the exploration of multiple paths;
4. understand that personal integrity, skepticism, openness to new ideas, creativity, collaborative effort, and logical reasoning are all aspects of scientific inquiry;
5. employ ethical standards, including unbiased data collection and factual reporting of results; and
6. employ strict adherence to safety procedures in conducting scientific investigations.

C A student should understand the nature and history of science.

A student who meets the content standard should:

1. know how the words "fact," "observation," "concept," "principle," "law," and "theory" are generally used in the scientific community;
2. understand that scientific knowledge is validated by repeated specific experiments that conclude in similar results;
3. understand that society, culture, history, and environment affect the development of scientific knowledge;
4. understand that some personal and societal beliefs accept non- scientific methods for validating knowledge;
5. understand that sharing scientific discoveries is important to influencing individuals and society and in advancing scientific knowledge;
6. understand that scientific discovery is often a combination of an accidental happening and observation by a knowledgeable person with an open mind;
7. understand that major scientific breakthroughs may link large amounts of knowledge, build upon the contributions of many scientists, and cross different lines of study; and
8. understand that acceptance of a new idea depends upon sup- porting evidence and that new ideas that conflict with beliefs or common sense are often resisted.

D A student should be able to apply scientific knowledge and skills to make reasoned decisions about the use of science and scientific innovations.

A student who meets the content standard should:

1. apply scientific knowledge and skills to understand issues and everyday events;
2. understand that scientific innovations may affect our economy, safety, environment, health, and society and that these effects may be long or short term, positive or negative, and expected or unexpected;
3. recommend solutions to everyday problems by applying scientific knowledge and skills;
4. evaluate the scientific and social merits of solutions to everyday problems;
5. participate in reasoned discussions of public policy related to scientific innovations and proposed technological solutions to problems; and
6. act upon reasoned decisions and evaluate the effectiveness of the action.

Skills For A Healthy Life

A

A student should be able to acquire a core knowledge related to well-being.

A student who meets the content standard should:

1. understand that a person's well-being is the integration of health knowledge, attitudes, and behaviors;
2. understand how the human body is affected by behaviors related to eating habits, physical fitness, personal hygiene, harmful substances, safety, and environmental conditions;
3. understand and identify the causes, preventions, and treatments for diseases, disorders, injuries, and addictions;
4. recognize patterns of abuse directed at self or others and understand how to break these patterns;
5. use knowledge and skills to promote the well-being of the family;
6. use knowledge and skills related to physical fitness, consumer health, independent living, and career choices to contribute to well-being;
7. understand the physical and behavioral characteristics of human sexual development and maturity; and
8. understand the ongoing life changes throughout the life span and healthful responses to these changes.

B

A student should be able to demonstrate responsibility for the student's well-being.

A student who meets the content standard should:

1. demonstrate an ability to make responsible decisions by discriminating among risks and by identifying consequences;
2. demonstrate a variety of communication skills that contribute to well-being;
3. assess the effects of culture, heritage, and traditions on personal well-being;
4. develop an awareness of how personal life roles are affected by and contribute to the well-being of families, communities, and cultures;
5. evaluate what is viewed, read, and heard for its effect on personal well-being; and
6. understand how personal relationships, including those with family, friends, and co-workers, impact personal well-being.

C

A student should understand how well-being is affected by relationships with others.

A student who meets the content standard should:

1. resolve conflicts responsibly;
2. communicate effectively within relationships;
3. evaluate how similarities and differences among individuals contribute to relationships;
4. understand how respect for the rights of self and others contributes to relationships;
5. understand how attitude and behavior affect the well-being of self and others; and
6. assess the effects of culture, heritage, and traditions on well-being.

D A student should be able to contribute to the well-being of families and communities.

A student who meets the content standard should:

1. make responsible decisions as a member of a family or community;
2. take responsible actions to create safe and healthy environments;
3. describe how public policy affects the well-being of families and communities;
4. identify and evaluate the roles and influences of public and private organizations that contribute to the well-being of communities;
5. describe how volunteer service at all ages can enhance community well-being; and
6. use various methods of communication to promote community well-being.

Technology

A A student should be able to operate technology-based tools.

A student who meets the content standard should:

1. use a computer to enter and retrieve information;
2. use technological tools for learning, communications, and productivity;
3. use local and world-wide networks;
4. manage and maintain technology tools; and
5. diagnose and solve common technology problems.

B A student should be able to use technology to locate, select, and manage information.

A student who meets the content standard should:

1. identify and locate information sources using technology;
2. choose sources of information from a variety of media; and
3. select relevant information by applying accepted research methods.

C A student should be able to use technology to explore ideas, solve problems, and derive meaning.

A student who meets the content standard should:

1. use technology to observe, analyze, interpret, and draw conclusions;
2. solve problems both individually and with others; and
3. create new knowledge by evaluating, combining, or extending information using multiple technologies.

D A student should be able to use technology to express ideas and exchange information.

A student who meets the content standard should:

1. convey ideas to a variety of audiences using publishing, multi- media, and communications tools;
2. use communications technology to exchange ideas and information; and
3. use technology to explore new and innovative methods for interaction with others.

E A student should be able to use technology responsibly and understand its impact on individuals and society.

A student who meets the content standard should:

1. evaluate the potentials and limitations of existing technologies;
2. discriminate between responsible and irresponsible uses of technology;
3. respect others' rights of privacy in electronic environments;
4. demonstrate ethical and legal behavior regarding intellectual property, which is the manifestation of an original idea, such as computer software, music, or literature;
5. examine the role of technology in the workplace and explore careers that require the use of technology;
6. evaluate ways that technology impacts culture and the environment;
7. integrate the use of technology into daily living; and
8. recognize the implications of emerging technologies.

World Languages

A A student should be able to communicate in two or more languages, one of which is English.

A student who meets the content standard should:

1. understand written and oral communication in two or more languages;
2. write and speak understandably in two or more languages;
3. use two or more languages effectively in real life situations; and
4. use two or more languages to learn new information in academic subjects.

B A student should expand the student's knowledge of peoples and cultures through language study.

A student who meets the content standard should:

1. understand the relationship between language and culture;
2. learn about and experience surface characteristics of the culture, including art, cuisine, dance, dress, geography, history, music, and literature;
3. learn about and experience deep characteristics of the culture, including folkways, mores, laws, traditions, customs, and patterns of behavior;
4. improve the student's understanding of the student's language and culture through experiences with other languages and cultures;
5. apply knowledge of the functions and structure of one language to the study of another language; and
6. recognize through language study that all cultures contribute to the global society.

C A student should possess the language skills and cultural knowledge necessary to participate successfully in multilingual communities and the international marketplace.

A student who meets the content standard should:

1. interact appropriately in multilingual communities through various means, including printed and electronic media, audio and visual sources, face-to-face conversations, pen pals, and travel;
2. use experiences with language and culture to explore the student's personal interests and career options;
3. learn how language skills and cultural knowledge enhance a person's competitiveness in the international marketplace; and
4. apply language skills and cultural knowledge to enhance the student's intellectual and

social growth and to promote life-long learning.

Appendix D

Standards for Alaska's Teachers

(Alaska Department of Education and Early Development 2004)

1. A teacher can describe the teacher's philosophy of education and demonstrate its relationship to the teacher's practice.

Performances that reflect attainment of this standard include

a. engaging in thoughtful and critical examination of the teacher's practice with others, including describing the relationship of beliefs about learning, teaching, and assessment practice to current trends, strategies, and resources in the teaching profession; and
b. demonstrating consistency between a teacher's beliefs and the teacher's practice.

2. A teacher understands how students learn and develop, and applies that knowledge in the teacher's practice.

Performances that reflect attainment of this standard include

a. accurately identifying and teaching to the developmental abilities of students; and
b. applying learning theory in practice to accommodate differences in how students learn, including accommodating differences in student intelligence, perception, and cognitive style.

3. A teacher teaches students with respect for their individual and cultural characteristics.

Performances that reflect attainment of this standard include

a. incorporating characteristics of the student's and local community's culture into instructional strategies that support student learning;
b. identifying and using instructional strategies and resources that are appropriate to the individual and special needs of students; and
c. applying knowledge of Alaska history, geography, economics, governance, languages, traditional life cycles and current issues to the selection of instructional strategies, materials, and resources.

4. A teacher knows the teacher's content area and how to teach it.

Performances that reflect attainment of this standard include

a. demonstrating knowledge of the academic structure of the teacher's content area, its tools of inquiry, central concepts, and connections to other domains of knowledge;
b. identifying the developmental stages by which learners gain mastery of the content area, applying appropriate strategies to assess a student's stage of learning in the subject, and applying appropriate strategies, including collaborating with others, to facilitate students' development;
c. drawing from a wide repertoire of strategies, including, where appropriate, instructional applications of technology, and adapting and applying these strategies within the instructional context;

d. connecting the content area to other content areas and to practical situations encountered outside the school; and
e. staying current in the teacher's content area and demonstrating its relationship with and application to classroom activities, life, work, and community.

5. A teacher facilitates, monitors, and assesses student learning.

Performances that reflect attainment of this standard include

a. organizing and delivering instruction based on the characteristics of the students and the goals of the curriculum;
b. creating, selecting, adapting, and using a variety of instructional resources to facilitate curricular goals and student attainment of performance standards;
c. creating, selecting, adapting, and using a variety of assessment strategiesthat provide information about and reinforce student learning and that assist students in reflecting on their own progresss;
d. organizing and maintaining records of students' learning and using a variety of methods to communicate student progress to students, parents, administrators, and other appropriate audiences; and
e. reflecting on information gained from assessments and adjusting teaching practice, as appropriate, to facilitate student progress toward learning and curricular goals.

6. A teacher creates and maintains a learning environment in which all students are actively engaged and contributing members.

Performances that reflect attainment of this standard include

a. creating and maintaining a stimulating, inclusive, and safe learning community in which students take intellectual risks and work independently and collaboratively;
b. communicating high standards for student performance and clear expectations of what students will learn;
c. planning and using a variety of classroom management techniques to establish and maintain an environment in which all students are able to learn; and
d. assisting students in understanding their role in sharing responsibility for their learning.

7. A teacher works as a partner with parents, families, and the community.

Performances that reflect attainment of this standard include

a. promoting and maintaining regular and meaningful communication between the classroom and students' families;
b. working with parents and families to support and promote student learning;
c. participating in school-wide efforts to communicate with the broader community and to involve parents and families in student learning;
d. connecting, through instructional strategies, the school and classroom activities with student homes and cultures, work places, and the community; and
e. involving parents and families in setting and monitoring student learning goals.

8. A teacher participates in and contributes to the teaching profession.

Performances that reflect attainment of this standard include

a. maintaining a high standard of professional ethics;

b. maintaining and updating both knowledge of the teacher's content area or areas and best teaching practice;
c. engaging in instructional development activities to improve or update classroom, school, or district programs; and
d. communicating, working cooperatively, and developing professional relationships with colleagues.

Appendix E

Standards for Alaska's Schools

(Alaska Department of Education and Early Development 2004)

1. Classroom and instructional strategies support and promote student learning focused on the attainment of high standards by all students.
   A school demonstrates this standard by giving evidence that it:
   a. bases curriculum, instruction, and assessment on clear student standards and objectives;
   b. has established student standards that are meaningful, agreed upon, and emphasize the importance of learning;
   c. assesses student performance in multiple ways; and
   d. holds high expectations for the achievement of all students.
2. A climate of high expectations exists not only for students, but also for all staff, and high expectations are communicated to everyone in the community that the school serves, with incentives, recognition, and rewards in place to promote excellence.
3. School time is used for learning.
4. Fair discipline practices and policies are established, communicated, and consistently enforced.
5. The school environment is supportive and physically safe.
6. Appropriate technology is used to apply academic skills to simulate real life, workplace situations in addition to performing research and exploration.
7. All staff are involved in ongoing and continuous staff development that focuses on school improvement goals and student performance standards.
8. Strong leadership that uses established research to guide the instructional program is in evidence.
9. Resources are focused on established student standards and school improvement efforts to guide the instructional program.
10. The decision-making process for school plans and goals includes everyone in the community that the school serves.
11. Programs and support are provided to help high needs students achieve school success.
12. The school goals and staff behavior promote equity and respect for diversity among students, teachers, administrators, families, and community members of different socio-economic status and cultural background.
13. Non-English-speaking and limited-English proficient students are provided with a strong academic core program that supports the students' first language.
14. Partnerships and collaboration are established between the school and parents, families, businesses, and other community members.
    A school demonstrates this standard by giving evidence that:
    a. various types of involvement promote a variety of opportunities for school, families, and community to work together;
    b. collaboration between the school and agencies, businesses, and the community supports special programs for high needs students and families; and
    c. staff and school procedures promote community connections and cross-cultural communications with parents and families.

Appendix F

Alaska's Standards for Culturally-Responsive Schools

(Alaska Native Knowledge Network 1998)

Cultural Standards for Students

A. Culturally-knowledgeable students are well grounded in the cultural heritage and traditions of their community.
Students who meet this cultural standard are able to:
1. assume responsibility for their role in relation to the wellbeing of the cultural community and their life-long obligations as a community member;
2. recount their own genealogy and family history;
3. acquire and pass on the traditions of their community through oral and written history;
4. practice their traditional responsibilities to the surrounding environment;
5. reflect through their own actions the critical role that the local heritage language plays in fostering a sense of who they are and how they understand the world around them;
6. live a life in accordance with the cultural values and traditions of the local community and integrate them into their everyday behavior.
7. determine the place of their cultural community in the regional, state, national and international political and economic systems;

B. Culturally-knowledgeable students are able to build on the knowledge and skills of the local cultural community as a foundation from which to achieve personal and academic success throughout life.
Students who meet this cultural standard are able to:
1. acquire insights from other cultures without diminishing the integrity of their own;
2. make effective use of the knowledge, skills and ways of knowing from their own cultural traditions to learn about the larger world in which they live;
3. make appropriate choices regarding the long-term consequences of their actions;
4. identify appropriate forms of technology and anticipate the consequences of their use for improving the quality of life in the community.

C. Culturally-knowledgeable students are able to actively participate in various cultural environments.
Students who meet this cultural standard are able to:
1. perform subsistence activities in ways that are appropriate to local cultural traditions;
2. make constructive contributions to the governance of their community and the well-being of their family;
3. attain a healthy lifestyle through which they are able to maintain their own social, emotional, physical, intellectual and spiritual well-being;
4. enter into and function effectively in a variety of cultural settings.

D. Culturally-knowledgeable students are able to engage effectively in learning activities that are based on traditional ways of knowing and learning.
Students who meet this cultural standard are able to:
1. acquire in-depth cultural knowledge through active participation and meaningful interaction with Elders;
2. participate in and make constructive contributions to the learning activities associated with a traditional camp environment;
3. interact with Elders in a loving and respectful way that demonstrates an appreciation of their role as culture-bearers and educators in the community;
4. gather oral and written history information from the local community and provide an appropriate interpretation of its cultural meaning and significance;
5. identify and utilize appropriate sources of cultural knowledge to find solutions to everyday problems;
6. engage in a realistic self-assessment to identify strengths and needs and make appropriate decisions to enhance life skills.

E. Culturally-knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them.
Students who meet this cultural standard are able to:
1. recognize and build upon the inter-relationships that exist among the spiritual, natural and human realms in the world around them, as reflected in their own cultural traditions and beliefs as well as those of others;
2. understand the ecology and geography of the bioregion they inhabit;
3. demonstrate an understanding of the relationship between world view and the way knowledge is formed and used;
4. determine how ideas and concepts from one knowledge system relate to those derived from other knowledge systems;
5. recognize how and why cultures change over time;
6. anticipate the changes that occur when different cultural systems come in contact with one another;
7. determine how cultural values and beliefs influence the interaction of people from different cultural backgrounds;
8. identify and appreciate who they are and their place in the world.

Cultural Standards for Educators

A. Culturally-responsive educators incorporate local ways of knowing and teaching in their work.
Educators who meet this cultural standard:
1. recognize the validity and integrity of the traditional knowledge system;
2. utilize Elders' expertise in multiple ways in their teaching;
3. provide opportunities and time for students to learn in settings where local cultural knowledge and skills are naturally relevant;
4. provide opportunities for students to learn through observation and hands-on demonstration of cultural knowledge and skills;
5. adhere to the cultural and intellectual property rights that pertain to all aspects of the local knowledge they are addressing;
6. continually involve themselves in learning about the local culture.

B. Culturally-responsive educators use the local environment and community resources on a regular basis to link what they are teaching to the everyday lives of the students.
Educators who meet this cultural standard:

1. regularly engage students in appropriate projects and experiential learning activities in the surrounding environment;
2. utilize traditional settings such as camps as learning environments for transmitting both cultural and academic knowledge and skills;
3. provide integrated learning activities organized around themes of local significance and across subject areas;
4. are knowledgeable in all the areas of local history and cultural tradition that may have bearing on their work as a teacher, including the appropriate times for certain knowledge to be taught;
5. seek to ground all teaching in a constructive process built on a local cultural foundation.

C. Culturally-responsive educators participate in community events and activities in an appropriate and supportive way.
Educators who meet this cultural standard:

1. become active members of the community in which they teach and make positive and culturally-appropriate contributions to the well being of that community;
2. exercise professional responsibilities in the context of local cultural traditions and expectations;
3. maintain a close working relationship with and make appropriate use of the cultural and professional expertise of their co-workers from the local community.

D. Culturally-responsive educators work closely with parents to achieve a high level of complementary educational expectations between home and school.
Educators who meet this cultural standard:

1. promote extensive community and parental interaction and involvement in their children's education;
2. involve Elders, parents and local leaders in all aspects of instructional planning and implementation;
3. seek to continually learn about and build upon the cultural knowledge that students bring with them from their homes and community;
4. seek to learn the local heritage language and promote its use in their teaching.

E. Culturally-responsive educators recognize the full educational potential of each student and provide the challenges necessary for them to achieve that potential.
Educators who meet this cultural standard:

1. recognize cultural differences as positive attributes around which to build appropriate educational experiences;
2. provide learning opportunities that help students recognize the integrity of the knowledge they bring with them and use that knowledge as a springboard to new understandings;
3. reinforce the student's sense of cultural identity and place in the world;

4. acquaint students with the world beyond their home community in ways that expand their horizons while strengthening their own identities;
5. recognize the need for all people to understand the importance of learning about other cultures and appreciating what each has to offer.

Cultural Standards for Curriculum

A. A culturally-responsive curriculum reinforces the integrity of the cultural knowledge that students bring with them.

A curriculum that meets this cultural standard:

1. recognizes that all knowledge is imbedded in a larger system of cultural beliefs, values and practices, each with its own integrity and interconnectedness;
2. insures that students acquire not only the surface knowledge of their culture, but are also well grounded in the deeper aspects of the associated beliefs and practices;
3. incorporates contemporary adaptations along with the historical and traditional aspects of the local culture;
4. respects and validates knowledge that has been derived from a variety of cultural traditions;
5. provides opportunities for students to study all subjects starting from a base in the local knowledge system.

B. A culturally-responsive curriculum recognizes cultural knowledge as part of a living and constantly adapting system that is grounded in the past, but continues to grow through the present and into the future.

A curriculum that meets this cultural standard:

1. recognizes the contemporary validity of much of the traditional cultural knowledge, values and beliefs, and grounds students learning in the principles and practices associated with that knowledge;
2. provides students with an understanding of the dynamics of cultural systems as they change over time, and as they are impacted by external forces;
3. incorporates the in-depth study of unique elements of contemporary life in Native communities in Alaska, such as the Alaska Native Claims Settlement Act, subsistence, sovereignty and self-determination.

C. A culturally-responsive curriculum uses the local language and cultural knowledge as a foundation for the rest of the curriculum.

A curriculum that meets this cultural standard:

1. utilizes the local language as a base from which to learn the deeper meanings of the local cultural knowledge, values, beliefs and practices;
2. recognizes the depth of knowledge that is associated with the long inhabitation of a particular place and utilizes the study of "place" as a basis for the comparative analysis of contemporary social, political and economic systems;
3. incorporates language and cultural immersion experiences wherever in-depth cultural understanding is necessary;
4. views all community members as potential teachers and all events in the community as potential learning opportunities;
5. treats local cultural knowledge as a means to acquire the conventional curriculum content as outlined in state standards, as well as an end in itself;

6. makes appropriate use of modern tools and technology to help document and transmit traditional cultural knowledge;
7. is sensitive to traditional cultural protocol, including role of spirituality, as it relates to appropriate uses of local knowledge.

D. A culturally-responsive curriculum fosters a complementary relationship across knowledge derived from diverse knowledge systems.

A curriculum that meets this cultural standard:

1. draws parallels between knowledge derived from oral tradition and that derived from books;
2. engages students in the construction of new knowledge and understandings that contribute to an ever-expanding view of the world.

E. A culturally-responsive curriculum situates local knowledge and actions in a global context.

A curriculum that meets this cultural standard:

1. encourages students to consider the inter-relationship between their local circumstances and the global community;
2. conveys to students that every culture and community contributes to, at the same time that it receives from the global knowledge base;
3. prepares students to "think globally, act locally."

Cultural Standards for Schools

A. A culturally-responsive school fosters the on-going participation of Elders in all aspects of the schooling process.

A school that meets this cultural standard:

1. maintains multiple avenues for Elders to interact formally and informally with students at all times;
2. provides opportunities for students to regularly engage in the documenting of Elders' cultural knowledge and produce appropriate print and multimedia materials thatshare this knowledge with others;
3. includes explicit statements regarding the cultural values that are fostered in the community and integrates those values in all aspects of the school program and operation;
4. utilizes educational models that are grounded in the traditional world view and ways of knowing associated with the cultural knowledge system reflected in the community.

B. A culturally-responsive school provides multiple avenues for students to access the learning that is offered, as well as multiple forms of assessment for students to demonstrate what they have learned.

A school that meets this cultural standard:

1. utilizes a broad range of culturally-appropriate performance standards to assess student knowledge and skills;
2. encourages and supports experientially oriented approaches to education that makes extensive use of community-based resources and expertise;

3. provides cultural and language immersion programs in which student acquire in-depth understanding of the culture of which they are members;
4. helps students develop the capacity to assess their own strengths and weaknesses and make appropriate decisions based on such a self-assessment.

C. A culturally-responsive school provides opportunities for students to learn in and/or about their heritage language.
A school that meets this cultural standard:
1. provides language immersion opportunities for students who wish to learn in their heritage language;
2. offers courses that acquaint all students with the heritage language of the local community;
3. makes available reading materials and courses through which students can acquire literacy in the heritage language;

D. A culturally-responsive school has a high level of involvement of professional staff who are of the same cultural background as the students with whom they are working.
A school that meets this cultural standard:
1. encourages and supports the professional development of local personnel to assume teaching and administrative roles in the school;
2. recruits and hires teachers whose background is similar to that of the students they will be teaching;
3. provides a cultural orientation camp and mentoring program for new teachers to learn about and adjust to the cultural expectations and practices of the community and school;
4. fosters and supports opportunities for teachers to participate in professional activities and associations that help them expand their repertoire of cultural knowledge and pedagogical skills.

E. A culturally-responsive school consists of facilities that are compatible with the community environment in which they are situated.
A school that meets this cultural standard:
1. provides a physical environment that is inviting and readily accessible for local people to enter and utilize;
2. makes use of facilities throughout the community to demonstrate that education is a community-wide process involving everyone as teachers;
3. utilizes local expertise, including students, to provide culturally-appropriate displays of arts, crafts and other forms of decoration and space design.
4. provides opportunities for teachers to gain familiarity with the heritage language of the students they teach through summer immersion experiences.

F. A culturally-responsive school fosters extensive on-going participation, communication and interaction between school and community personnel.
A school that meets this cultural standard:

1. holds regular formal and informal events bringing together students, parents, teachers and other school and community personnel to review, evaluate and plan the educational program that is being offered;
2. provides regular opportunities for local and regional board deliberations and decision-making on policy, program and personnel issues related to the school;
3. sponsors on-going activities and events in the school and community that celebrate and provide opportunities for students to put into practice and display their knowledge of local cultural traditions.

Appendix G

Washington State Pedagogy Assessment

(Office of the Superintendent of Public Instruction 2004)

1. The teacher candidate sets learning targets that address the Essential Academic Learning Requirements and the state learning goals.

Source of Evidence *Instructional Plan, Instructional Plan Rationale*

Criterion	Not Met	Met	Comments (evidence of performance)
A. Alignment	The plan's learning targets are not aligned with EALRs, state learning goals, district goals, and school and classroom goals.	The plan's learning targets are explicitly aligned with EALRs, state learning goals, district goals, and school and classroom goals.	o Met o Not Met oNot Observed
B. Meaningfulness/ Importance	The plan's learning targets represent trivial learning and lack potential for fostering student critical thinking and problem solving.	The plan's learning targets represent valuable learning and foster student critical thinking and problem solving.	o Met o Not Met oNot Observed
C. Developmental and Instructional Appropriateness	The plan's learning targets are not appropriate for the development, prerequisite knowledge, skills, experiences, and backgrounds of students or student characteristics and needs.	The plan's learning targets are suitable for all students in the class and are adapted where necessary to the needs of individual students.	o Met o Not Met oNot Observed
D. Accuracy	The plan's learning targets represent activities rather than learning outcomes and cannot be assessed.	The plan's learning targets define learning outcomes and can be assessed.	o Met o Not Met oNot Observed
E. Multicultural Perspectives	The plan's learning targets lack transformative multicultural knowledge, reasoning, performance skills, products, or dispositions.	The plan's learning targets are grounded in transformative multicultural knowledge, reasoning, performance skills, products, or dispositions.	o Met o Not Met oNot Observed

2. The teacher candidate demonstrates knowledge of the characteristics of students and their communities.

Source of Evidence *Instructional Plan, Instructional Plan Rationale*

Criterion	Not Met	Met	Comments (evidence of performance)
A. Developmental Characteristics	The plan reflects minimal or inaccurate understanding of students' developmental characteristics	The plan reflects understanding of students' developmental characteristics	o Met o Not Met oNot Observed
B. Exceptionalities	The plan reflects minimal or inaccurate understanding of students' exceptionalities and special learning needs.	The plan reflects understanding of students' exceptionalities and special learning needs.	o Met o Not Met oNot Observed
C. Cultural backgrounds, ethnicity, language development, socioeconomic status (SES), gender	The plan reflects minimal or inaccurate understanding of students' cultural backgrounds, ethnicity, first language development, English acquisition, SES, and gender.	The plan reflects understanding of students' cultural backgrounds, ethnicity, first language development, English acquisition, SES, and gender.	o Met o Not Met oNot Observed
D. Approaches to Learning	The plan reflects minimal or inaccurate understanding of students' varied approaches to learning.	The plan reflects understanding of students' varied approaches to learning	o Met o Not Met oNot Observed
E. Prior Knowledge	The plan reflects minimal or inaccurate understanding of students' knowledge and skills relative to the learning targets.	The plan reflects understanding of students' knowledge and skills relative to the learning targets for each student, including those with special needs.	o Met o Not Met oNot Observed
F. Community Factors that Impact Student Learning	The plan reflects minimal or inaccurate understanding of community factors that impact student learning.	The plan reflects understanding of how to use students' community as support for activities, resources, and learning strategies.	o Met o Not Met oNot Observed

3. The teacher candidate plans and establishes effective interactions with families to support student learning and well-being.
Source of Evidence *Plan for using personal contact with families (e.g. telephone, home visit, family conferences, and/or written messages).*

Criterion	Not Met	Met	Comments (evidence of performance)
A. Appropriateness	There are no plans for interactions with families OR interactions are presented in the plan are inappropriate for the language and level of understanding of families.	The plan's interactions with families are specifically adapted to the language and level of understanding of each student and his/her family, including low-status/historically marginalized families.	o Met o Not Met oNot Observed
B. Purpose	Interactions in the plan focus primarily on negative student behavior and performance.	The plan for family interaction provides and elicits information regarding student learning and well-being, including low-status/historically marginalized families.	o Met o Not Met oNot Observed
C. Cultural Responsiveness	Interactions in the plan are routine with little or no effort to make interactions culturally responsive.	The plan's interactions with families are culturally responsive for each students and his/her family.	o Met o Not Met oNot Observed
D. Two-way Communication	The plan provides limited opportunities for families to engage in communication about the learning progress and well being of their children.	The plan provides adequate opportunities for families to engage in communication about the learning progress and well being of their children.	o Met o Not Met oNot Observed

4. The teacher candidate designs assessment strategies that measure student learning.

Source of Evidence *Instructional plan. Include descriptions or documentation related to the assessment strategies (e.g. copy of assignments, description of strategies, rubric).*

Criterion	Not Met	Met	Comments (evidence of performance)
A. Alignment	The plan's assessment strategies are not aligned with the learning targets.	The plan's assessment strategies are aligned with the learning targets.	o Met o Not Met oNot Observed
B. Technical soundness	The plan's assessment strategies do not measure the intended outcomes of the learning targets.	The plan includes assessments that measure the student outcomes reflected in the learning targets.	o Met o Not Met oNot Observed
C. Formative and Summative Assessment	The plan does not provide for the use of both formative and summative assessment data to evaluate the impact on student learning.	The plan provides for the use of both formative and summative assessment data to evaluate the impact on student learning	o Met o Not Met oNot Observed
D. Multiple Modes and Approaches	The plan's assessment strategies employ a single assessment mode or approach.	The plan includes opportunities for students to engage in a variety of assessments that measure their performance relative to the learning targets.	o Met o Not Met oNot Observed
E. Feedback	The plan's assessment strategies provide no opportunities for students to receive feedback.	The plan includes opportunities for students to receive feedback regarding their performance relative to the learning targets.	o Met o Not Met oNot Observed

5. The teacher candidate designs instruction based on research and principles of effective practice.
Source of Evidence *Instructional* p*lan, Instructional Plan Rationale.*

Criterion	Not Met	Met	Comments (evidence of performance)
A. Alignment	The plan's learning activities are not aligned with learning targets and assessments.	The plan's learning activities are aligned with learning targets and assessments.	o Met o Not Met oNot Observed
B. Lesson Sequence	The plan's learning activities are unrelated to prior learning and do not support the learning targets.	The plan's learning activities account for prior learning and support the learning targets.	o Met o Not Met oNot Observed
C. Research-based Pedagogy	The plan fails to connect instruction to research and principles of effective practice that are developmentally appropriate, culturally responsive, gender sensitive, and inclusive of all students including low-status/historically marginalized students.	The plan is based on research and principles of effective practices that are developmentally appropriate, culturally responsive, gender sensitive, and inclusive of all students including low-status/historically marginalized students.	o Met o Not Met oNot Observed
D. Academic Knowledge and Perspective	The plan reflects a single viewpoint OR uses multicultural or gender academic knowledge only as an add-on to instruction that reflects the dominant culture.	The plan describes how instructional strategies extend beyond the existing diversity of the students in the class and expand material to incorporate a range of transformative multicultural and general-relevant subject matter content.	o Met o Not Met oNot Observed
E. Culturally Responsive Learning Activities	The plan employs a single learning strategy or method throughout the lesson OR limits student opportunity to learn from one another in a democratic and caring environment.	The plan employs a variety of learning experiences that build on and recognize the academic competence of each student and encourages critical thinking and collaborative learning in a democratic and caring environment.	o Met o Not Met oNot Observed

Criterion	Not Met	Met	Comments (evidence of performance)
F. Materials and Resources	The plan utilizes learning materials and learning tasks that primarily represent the dominant culture or a single gender.	The plan utilizes learning materials and engages in learning tasks that incorporate transformative multicultural and gender perspectives.	o Met o Not Met oNot Observed
G. Use of Technology	The plan incorporates few opportunities for students to learn with varied technologies.	The plan utilizes technology to support and enhance instruction and student learning.	o Met o Not Met oNot Observed
H. Heterogeneous Grouping	The plan's learning activities exclude heterogeneous cooperative learning groups.	The plan provides opportunities for students to engage in a variety of learning experiences including heterogeneous cooperative learning groups that build and recognize academic competence of all students, including low=status/historically marginalized students.	o Met o Not Met oNot Observed
I. Student Engagement	The plan provides no opportunities fro students to become intrinsically motivated or engaged in their own learning.	The plan describes how students will become intrinsically motivated and engaged in their own learning.	o Met o Not Met oNot Observed

6. The teacher candidate aligns instruction with the plan and communicates accurate content knowledge.
Source of Evidence Classroom observation.

Criterion	Not Met	Met	Comments (evidence of performance)
A. Alignment	Classroom instruction and the instructional plan are not aligned.	Classroom instruction is aligned with the instructional plan.	o Met o Not Met oNot Observed
B. Meaningful Opportunities to Learn	Students have limited opportunities to learn the key skills and concepts needed to reach the learning targets.	Students are learning the key skills and concepts needed to reach the learning targets.	o Met o Not Met oNot Observed
C. Accuracy	The teacher candidate makes content errors.	The teacher candidate demonstrates accurate knowledge.	o Met o Not Met oNot Observed
D. Interdisciplinary Instruction	Students participate in tasks that focus on a single discipline without making connections to other subject areas.	Students are engaged in tasks that provide interdisciplinary connections with other subject areas.	o Met o Not Met oNot Observed
E. Culturally Responsive and Gender-Sensitive Instruction	Students participate in tasks that represent a limited cultural and gender-sensitive perspective.	Students respond using multicultural and gender-sensitive perspectives.	o Met o Not Met oNot Observed

7. Students participate in a learning community that supports student learning and well-being.
Source of Evidence Classroom observation.

Criterion	Not Met	Met	Comments (evidence of performance)
A. Democratic Classroom	Students do not participate in the development of classroom behavioral expectations and norms.	Students participate in the development of classroom behavioral expectations and norms (e.g. provide input regarding rules or procedures; are involved in conflict resolution).	o Met o Not Met oNot Observed
B. Respect	Classroom interactions between students and teacher candidate or between peers are disrespectful.	Classroom interactions between students and teacher candidate or between peers reflect respect for others.	o Met o Not Met oNot Observed
C. Learning Community	In group activities, some students act independently or fail to support one another's inquiry/learning or exclude low-status/historically marginalized students.	Students support one another in group learning activities and include low-status/historically marginalized students.	o Met o Not Met oNot Observed
D. Self-Directed Learning	Students have no opportunity to express their opinions and provide suggestions regarding their own learning.	Students express their opinions and provide suggestions regarding their own learning.	o Met o Not Met oNot Observed
E. Diverse Perspectives	Students demonstrate disrespect for the multicultural and gender perspectives expressed by others.	Students show respect for multicultural and gender perspectives expressed by others.	o Met o Not Met oNot Observed
F. Heterogeneous Groups	Students do not participate in heterogeneous cooperative learning groups OR heterogeneous learning groups fail to build the academic competence of all students including low-status/historically marginalized students.	Students engage in a variety of learning experiences including heterogeneous cooperative learning groups that build and recognize the academic competence students including low-status/historically marginalized students.	o Met o Not Met oNot Observed

8. Students engage in learning activities that are based on research and principles of effective practice.
Source of Evidence Classroom observation.

Criterion	Not Met	Met	Comments (evidence of performance)
A. Questioning and Discussion Techniques	Students experience learning activities that include limited opportunities to pose and answer questions.	Students answer and pose questions and engage in cooperative discussions that enhance learning, critical thinking, transformative multicultural thinking, and problem solving.	o Met o Not Met oNot Observed
B. Delivery and Pacing	Students experience learning activities that are too slow or rushed OR are not mindful of the academic competence of low-status/historically marginalized students.	Students engage in learning activities that are paced appropriately for all students, are culturally responsive, and allow for reflection and closure as appropriate.	o Met o Not Met oNot Observed
C. Differentiated Instruction	Students experience undifferentiated learning activities.	Students engage in learning activities that are adjusted to meet their individual backgrounds, strengths, and needs and are culturally and gender responsive.	o Met o Not Met oNot Observed
D. Active Learning	Students are not engaged in learning activities OR low-status/historically marginalized students are disproportionately disengaged.	Students are cognitively engaged in the learning activities and initiate or adapt activities to enhance understanding.	o Met o Not Met oNot Observed
E. Technology	Students have no opportunities to use technology as part of the learning or assessment process.	Students use technology when engaging in learning or the demonstration of their learning.	o Met o Not Met oNot Observed

9. Students experience effective classroom management and discipline.
Source of Evidence Classroom observation.

Criterion	Not Met	Met	Comments (evidence of performance)
A. Use of Classroom Materials	Students use the classroom space and materials with little regard for order and others.	Students find, use, and return classroom materials respectfully and efficiently with regard for order and others.	o Met o Not Met oNot Observed
B. Equitable Discipline	Some students, such as low-status/historically marginalized students, are disproportionately disciplined in comparison to other students.	Students are fairly and equitably disciplined	o Met o Not Met oNot Observed
C. Transitions	Students have limited success changing from one learning task to another without disruptions in the flow of learning.	Students move between learning tasks in an efficient manner.	o Met o Not Met oNot Observed
D. Responsive to Interventions	Students demonstrate little or no response to interventions.	Students positively respond to teacher suggestions and interventions in order to make adjustments to appropriate learning behaviors.	o Met o Not Met oNot Observed
E. Democratic Practices	Students have limited opportunities to experience democratic classroom practices.	Students are engaged in democratic classroom management practices.	o Met o Not Met oNot Observed

10. The teacher candidate and students engage in activities that assess student learning.

Source of Evidence Classroom observation, documentation of student learning (e.g. formative or summative results)

Criterion	Not Met	Met	Comments (evidence of performance)
A. Alignment	Students are not engaged in assessments that are aligned with learning targets.	Students engage in assessment activities that are aligned with learning targets.	o Met o Not Met oNot Observed
B. Multiple Modes and Approaches	All students engage in the same assessment strategy to measure their performance.	Students engage in a variety of assessments that measure their performance relative to the learning targets.	o Met o Not Met oNot Observed
C. Feedback	Some students receive limited feedback regarding their performance.	Students receive constructive, timely feedback based on assessment results.	o Met o Not Met oNot Observed
D. Understanding of Assessment	Students demonstrate a lack of understanding of the relationship between assessment activities and the learning targets.	Students demonstrate an understanding of the relationship between the assessments and learning targets.	o Met o Not Met oNot Observed
E. Self-Assessment	Students are not involved in self-assessment related to the learning targets.	Students engage in self-assessment related to the learning targets.	o Met o Not Met oNot Observed
F. Student Reflection	Students do not reflect on their performance relative to learning targets.	Students reflect on their performance in order to evaluate progress over time relative to learning targets.	o Met o Not Met oNot Observed
G. Positive Impact on Student Learning	Assessment results reflect insignificant learning relative to the learning targets by at least some students.	Assessment results show the expected amount of learning relative to the learning targets by all students.	o Met o Not Met oNot Observed

The Candidate o has o has not met all the standards and criteria of the Performance-Based Pedagogy Assessment.

Appendix H

Bloom's Taxonomy

(Bloom 1956)

In 1956, Benjamin Bloom headed a group of educational psychologists who developed a classification of levels of intellectual behavior important in learning. This became a taxonomy including three overlapping domains; the cognitive, psychomotor, and affective. Each of the domains can be utilized through the interaction of media.

Cognitive learning is demonstrated by knowledge recall and the intellectual skills: comprehending information, organizing ideas, analyzing and synthesizing data, applying knowledge, choosing among alternatives in problem-solving, and evaluating ideas or actions. This domain on the acquisition and use of knowledge is predominant in the majority of courses. Bloom identified six levels within the cognitive domain, from the simple recall or recognition of facts, as the lowest level, through increasingly more complex and abstract mental levels, to the highest order which is classified as evaluation. Verb examples that represent intellectual activity on each level are listed here.

Knowledge: arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce state.
Comprehension: classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate,
Application: apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write.
Analysis: analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.
Synthesis: arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, write.
Evaluation: appraise, argue, assess, attach, choose compare, defend estimate, judge, predict, rate, core, select, support, value, evaluate.

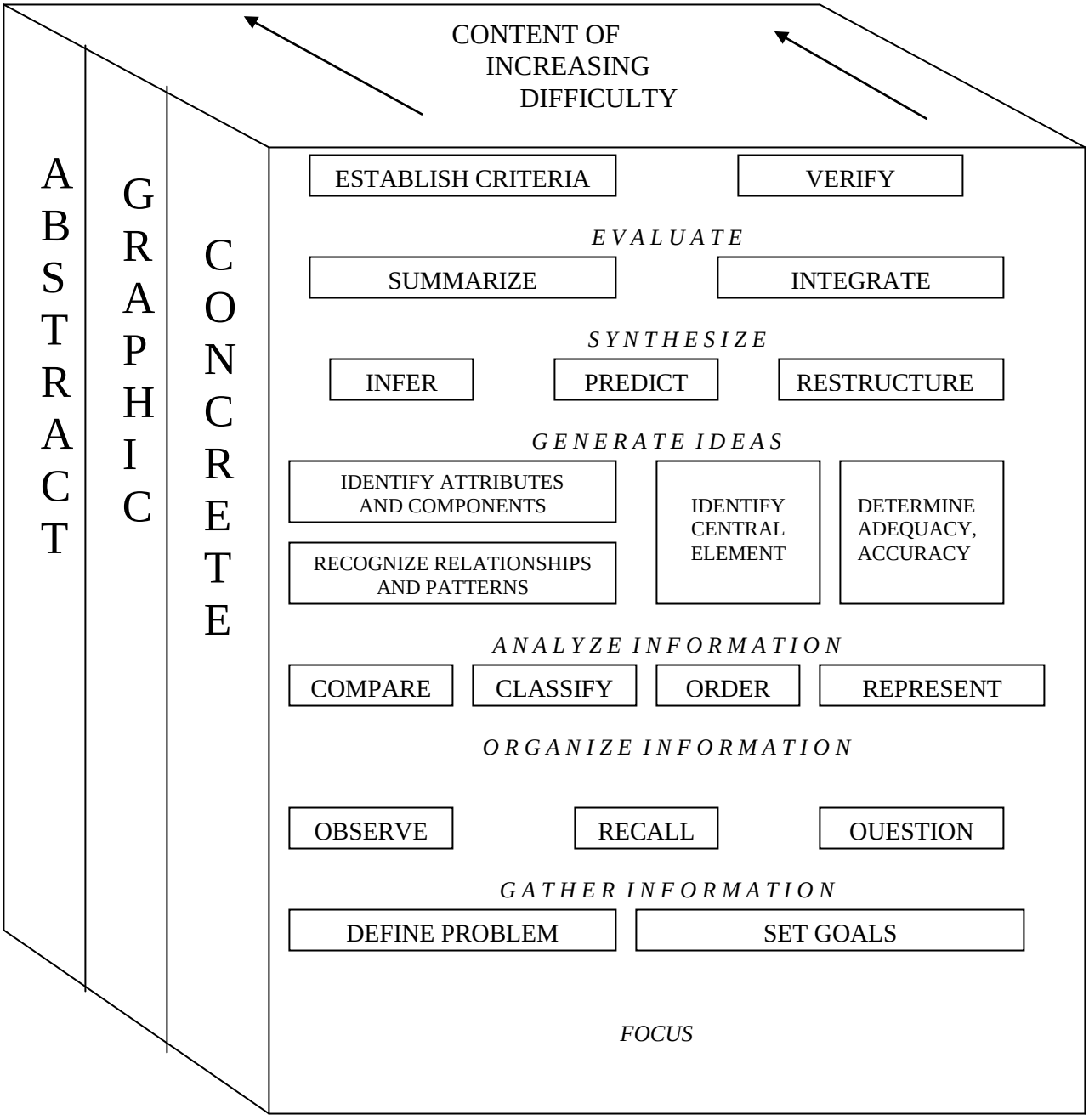
Affective learning is demonstrated by behaviors indicating attitudes of awareness, interest, attention, concern, and responsibility, ability to listen and respond in interactions with others, and ability to demonstrate those attitudinal characteristics or values which are appropriate to the test situation and the field of study. This domain relates to emotions, attitudes, appreciations, and values, such as enjoying, conserving, respecting, and supporting. Verbs applicable to the affective domain include accepts, attempts, challenges, defends, disputes, joins, judges, praises, questions, shares, supports, and volunteers.

Psychomotor learning is demonstrated by physical skills; coordination, dexterity, manipulation, grace, strength, speed; actions which demonstrate the fine motor skills such as use of precision instruments or tools, or actions which evidence gross motor skills such as the use of the body in dance or athletic performance. Verbs applicable to the psychomotor domain include bend, grasp, handle, operate, reach, relax, shorten, stretch, write, differentiate (by touch), express (facially), perform (skillfully).
(Source: http://www.dlrn.org/library/dl/guide4.html)

Appendix I

Dimensions of Thinking Model

Developmental Relationships in Thinking



Appendix J

Gardner's Multiple Intelligences Theory

Howard Gardner proposes that there is not a single "intelligence," but rather that there are eight:

Verbal/Linguistic intelligence involves sensitivity to spoken and written language, the ability to learn languages, and the capacity to use language to accomplish certain goals. This intelligence includes the ability to effectively use language to express oneself rhetorically or poetically; and language as a means to remember information. Writers, poets, lawyers and speakers are among those that Howard Gardner sees as having high linguistic intelligence.

Logical-mathematical intelligence consists of the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically. In Howard Gardner's words, in entails the ability to detect patterns, reason deductively and think logically. This intelligence is most often associated with scientific and mathematical thinking.

Musical intelligence involves skill in the performance, composition, and appreciation of musical patterns. It encompasses the capacity to recognize and compose musical pitches, tones, and rhythms. According to Howard Gardner musical intelligence runs in an almost structural parallel to linguistic intelligence.

Bodily-kinesthetic intelligence entails the potential of using one's whole body or parts of the body to solve problems. It is the ability to use mental abilities to coordinate bodily movements. Howard Gardner sees mental and physical activity as related.

Visual/Spatial intelligence involves the potential to recognize and use the patterns of wide space and more confined areas.

Interpersonal intelligence is concerned with the capacity to understand the intentions, motivations and desires of other people. It allows people to work effectively with others. Educators, salespeople, religious and political leaders and counselors all need a well-developed interpersonal intelligence.

Intrapersonal intelligence entails the capacity to understand oneself, to appreciate one's feelings, fears and motivations. In Howard Gardner's view it involves having an effective working model of ourselves, and to be able to use such information to regulate our lives.

> ***Naturalist intelligence/Nature smarts*** *Biologist, botanist.* "Deals with sensing patterns in and making connections to elements in nature. Using this same intelligence, people possessing enhanced levels of this intelligence may also be very interested in other species, or in the environment and the earth. Children possessing this type of intelligence may have a strong affinity to the outside world or to animals, and this interest often begins at an early age. They may enjoy subjects, shows and stories that deal with animals or natural phenomena. Or they may show unusual interest in subjects like biology, zoology, botany, geology, meteorology, paleontology, or astronomy. People possessing

nature smarts are keenly aware of their surroundings and changes in their environment, even if these changes are at minute or subtle levels. Often this is due to their highly-developed levels of sensory perception. Their heightened senses may help them notice similarities, differences and changes in their surroundings more rapidly than others. People with naturalistic intelligence may be able to categorize or catalogue things easily too. Frequently, they may notice things others might not be aware of. As children these people often like to collect, classify, or read about things from nature -- rocks, fossils, butterflies, feathers, shells, and the like.

If your child:

- Notices patterns and things from nature easily,
- Has keen senses and observes and remembers things from his/her environment and surroundings,
- Likes animals and likes to know and remember things about them,
- Really appreciates being outside and doing things like camping, hiking or climbing, even just like sitting quietly and noticing the subtle differences in the world of nature, or
- Makes keen observations about natural changes, interconnections and patterns," (Wilson 1997)

Existential intelligence "Individuals who exhibit the proclivity to pose (and ponder) questions about life, death, and ultimate realities" (2004); "Individuals, who like and enjoy thinking, and questioning, and are curios about life, death, and ultimate realities. Gardner's definition for this intelligence is to exhibit the proclivity to pose and ponder questions about life, death and ultimate realities. Children with this intelligence may show curiosity about:

What the Earth was like years ago
Why they are here on Earth
If there is life on another planet
Where living things go after they die
If there is another dimension
If there are ghosts or spirits
Who were the famous philosophers and their thoughts about life and human being" (Casacanada 2000).

Cosmic intelligence or awareness "I would define *cosmic intelligence* as: the recognition and ability to discern, subtle and overt patterns in the activity of natural elements, other species, and humans. Cosmic intelligence would also include the ability to recognize universal connections and patterns. Or it might include an acute awareness of universal changes and the possibility of spiritual or cosmic links in which one is both aware and respectful of the interconnectedness of all life forces" In discussions on these issues, many of my students appear to have mixed opinions as to whether there is a specific eighth intelligence, or if that eighth intelligence is appropriately labeled and described as "naturalistic," as opposed to something larger like *cosmic intelligence"* (Wilson 1997).

Appendix K

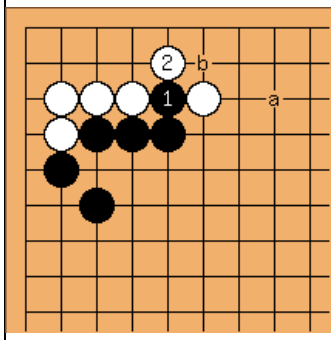
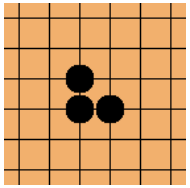
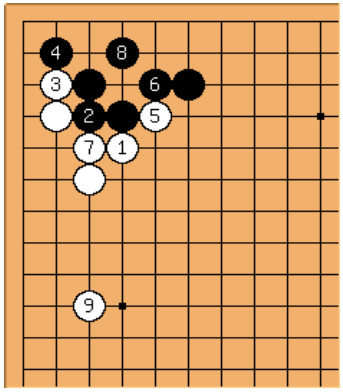
Given's Natural Learning Systems of the Brain

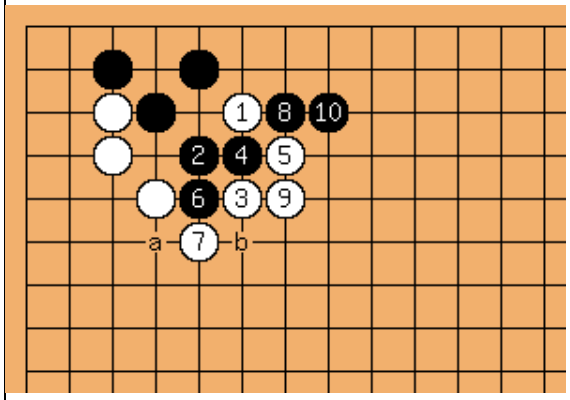
Five Learning Systems

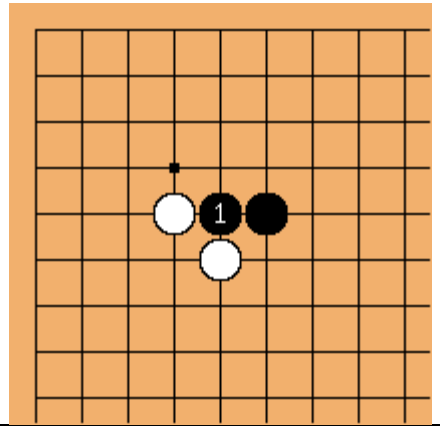
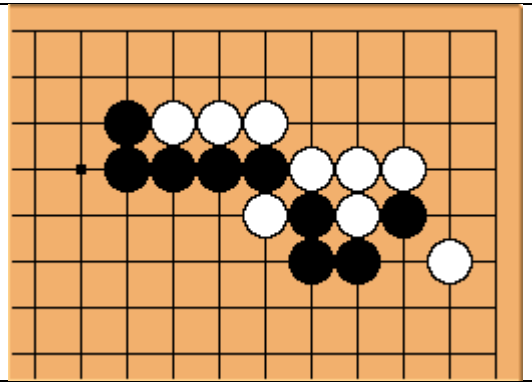
1. **E**motional – Functions of Emotion
    b. Nature vs. Nurture:
    c. Educational Considerations:
2. **S**ocial –
    a. Functions of Social System
        i.
        ii.
        iii.
        iv.
    b. Educational Considerations:
3. **C**ognitive –
    a. Modules of Cognition
    b. Consciousness
    c. Multiplex Cognitive Processing
    d. Educational Considerations:
4. **P**hysical –
    a. Touch
    b. Tactual learning
    c. Kinesthetic Learning
    d. Educational Considerations –
5. **R**eflective –
    a. Basis of Reflective Learning
    b. Conscience and the Human Spirit
    c. Neurobiological Basis of Reflective Thinking: "
    d. Stages of Reflective Learning
        i. Trust vs. Mistrust
        ii. Autonomy vs. shame and doubt
        iii. Initiative vs. guilt
        iv. Mastery vs. inferiority
        v. Identity vs. role confusion
    e. Educational Considerations:
        i. Understanding the teacher's role:
        ii. Allot time for reflective thought. P. 127. (Given 2002)

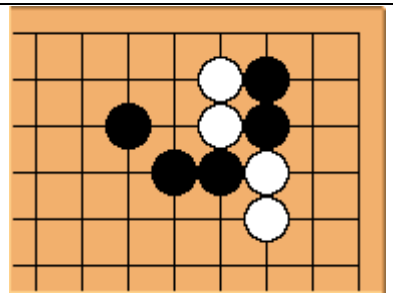
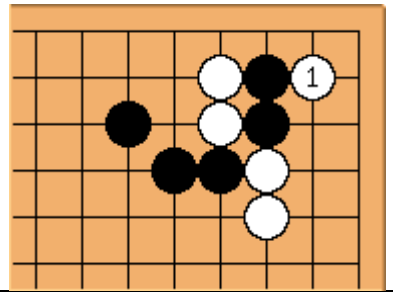
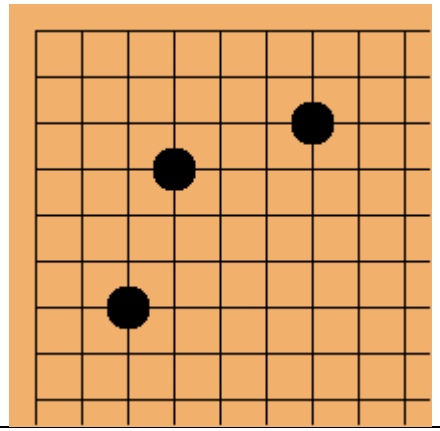
Appendix L

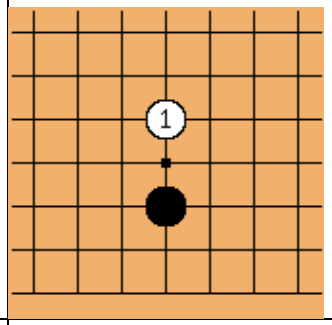
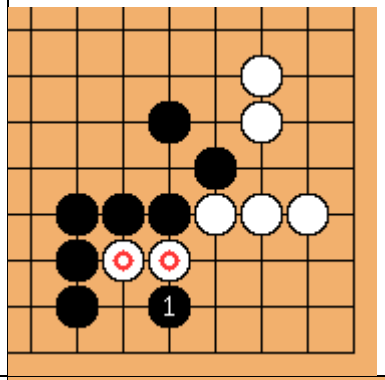
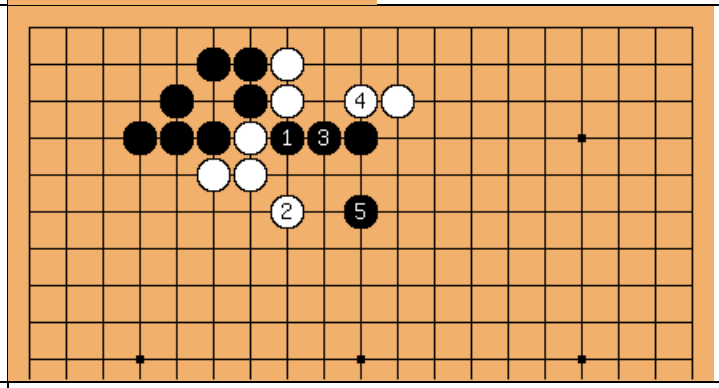
Go Terms

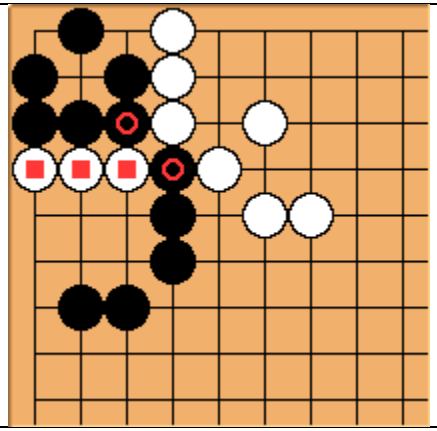
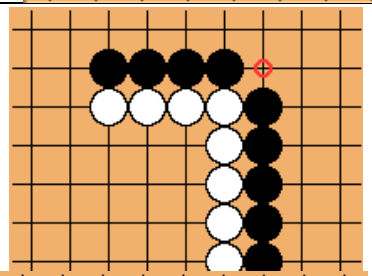
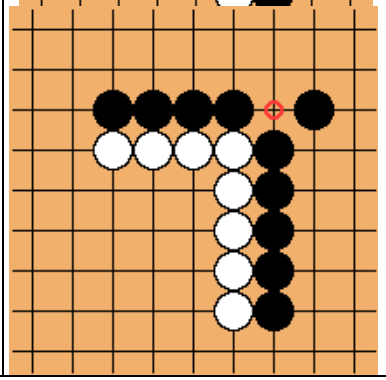
English	Chinese	Japanese	Korean	Description
Potential	味道 (wèi dào)	Aji (味)	(뒷맛) Twitmat/Maat 맛	Residual threats remaining in a position (Bradley 2001)
Bad aji	味 (èr wèi)	**味が悪い** (aji ga warui) **味消** (Aji Keshi – destroying aji)		 A bad move which needlessly neutralizes the player's own Aji (Bradley 2001). *Aji keshi* is a move that unnecessarily removes one's own good aji in the opponent's position. As an example, the exchange of ❶for ❷in this diagram is a bad move. By playing this way, Black loses the chance later, when there might have appeared a black stone at *a*, to peep at ❷, followed by White at ①, and Black *b*. This loss of potential is much more important than the meager one point of territory that Black gains (S).
Empty triangle/Good empty triangle	空角 (kōng jiǎo)	**空き三角** (Akisankaku/Guzumi)	(빈삼각) BinSamGak	This shape is an **empty triangle** in Japanese). It is also called the  (*akisankaku* devil's shape (*onigatachi*), brings to long nose of of Japanese  because it mind the one kind demon (S). **Good empty triangle:** Efficiency is one aspect of shape. Late in the game, especially, it can be obviously correct to make an empty triangle and making an empty triangle can also be the vital point. ((치중수/置中

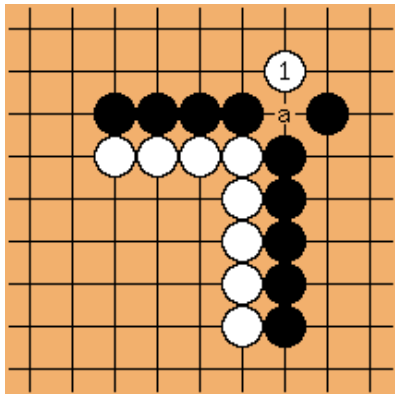
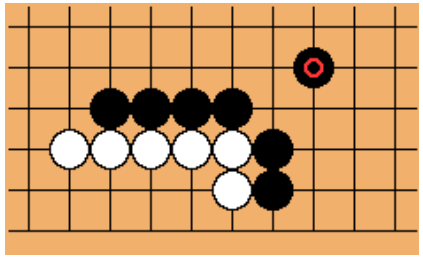
English	Chinese	Japanese	Korean	Description
				手) ChiJoongSu?- A move that goes at opponent's vital point) 2 is the vital point, even though it is an empty triangle (s).
Over-stretched shape		余り形 (Amari Gatachi)		 White attacks Black but fails to benefit adequately from the attack. Not sure what the roots of this word are. *Gatachi* is a vocalized version of *katachi*, or shape. *amari* is one of those words difficult to translate, but it might mean "left over". That would be consistent with the idea that *amarigatachi* is inadequate shape left over after attacking (S).
		余し (amashi)		A strategy and a style. It means to take territory with every opportunity, even by not defending some weak groups. This way one puts pressure on the opponent, leaving them the problem to keep the balance by attacking the weak groups (S). Allowing the opponent to take good points, taking space in compensation.
Check	打吃 (dǎ chī)	当たり(Atari)	(단수/單手) Dansu	A condition in which one or more units has been reduced to only a single liberty, and is therefore subject to capture on the opponent's next play (Bradley 2001)
		当て (Ate)		Same as Atari (Bradley 2001)

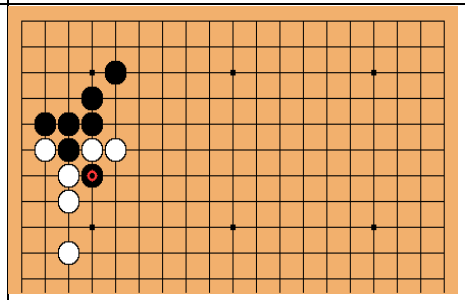
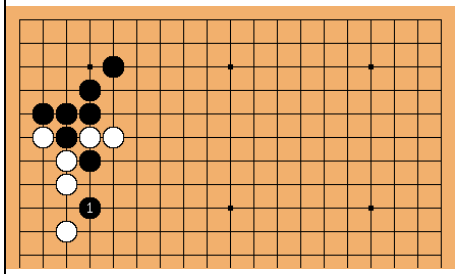
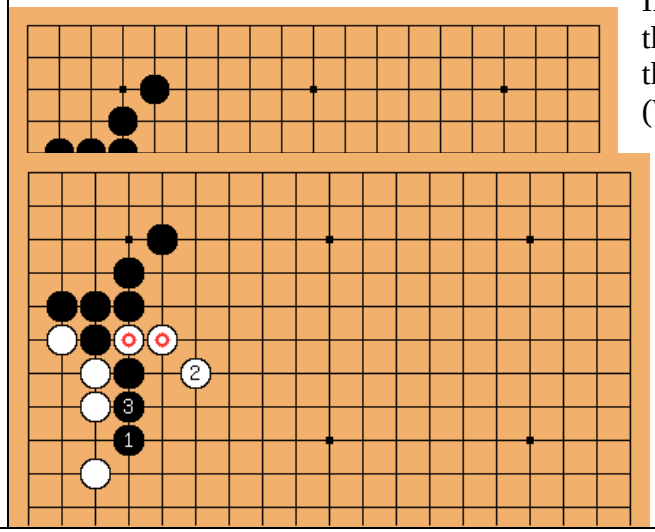
English	Chinese	Japanese	Korean	Description
		当て込み (Atekomi)		 *Atekomi* is a play aiming to cut a diagonal play (kosumi). That is, it creates a cutting point from the opponent's diagonal (S).
Thick	厚味 (hòu wèi)	厚い (atsui)		
Thickness	厚味 (hòu wèi)	厚み(Atsumi)	(세력) SeRyeok	 A strong formation of stones, typically exerting outward.

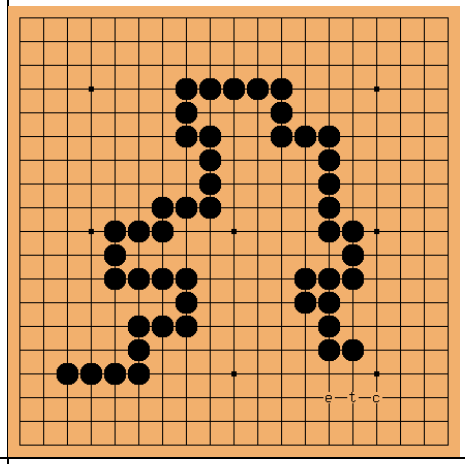
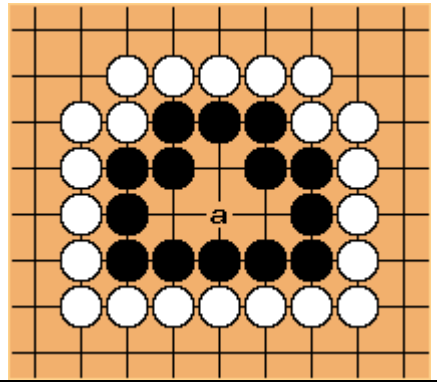
English	Chinese	Japanese	Korean	Description
Belly Attachment			(붙임) Buchim	 White to play and capture the two black stones that cut off the two white stones (S).  The *belly attachment* does the trick
Butterfly				 The name for this three-stone enclosure, and the advice to avoid it, come from a Korean web site (S).

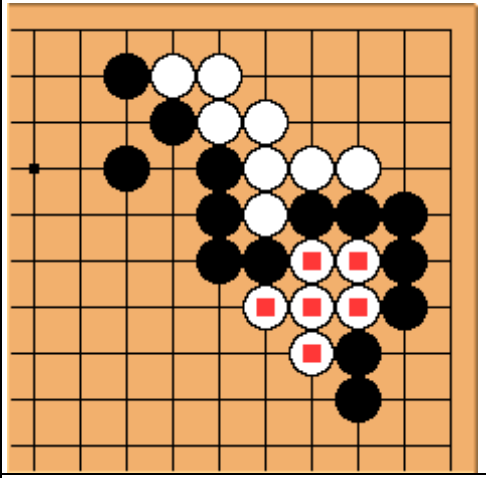
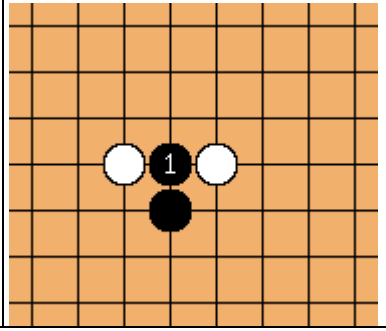
English	Chinese	Japanese	Korean	Description
Cap		Boshi	모자씌움/帽子씌움 or 모착/帽着) MoJaSs or MoChak	 Boshi means **capping play** and is visualized in the following diagram. It can be seen as the counterpart of the ikken tobi (S).
Clamp				 1 here is known as the **clamp**. Notice that it applies pressure on the two white stones (S).
Connection, esp. of A three stone wall		Bo tsugi (棒継ぎ)		 The "staff connection," is the term for a wall of three stones (S).
Connect (two groups)		Katatsugi (カタ継ぎ).	(연결/連結) YeonGyeol	

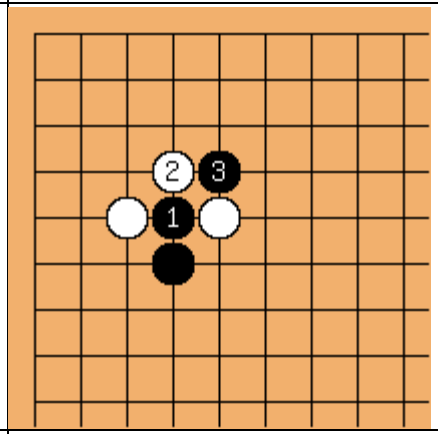
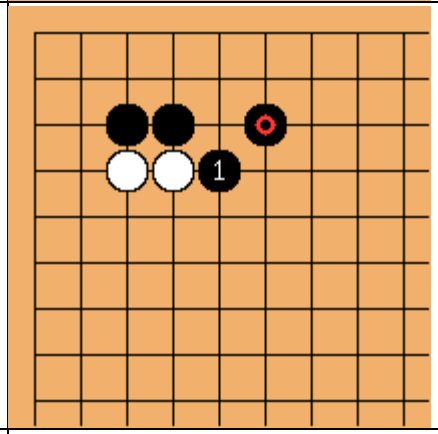
English	Chinese	Japanese	Korean	Description
An additional time period in which X number of stones must be played	讀秒	**秒読み** (Byo-yomi)	(초읽이) Choilgi	Time where X no. of moves must be made in Y amount of time.
Cut			(끊다) Kkeunhta	 A cut is the action or the move which separates two connected groups of stones. Cutting is a central concept in go - you are normally well advised to keep your own groups connected but cut your opponent's apart
Cutting point				 A **cutting point** is an empty point between two chains of stones. If the opponent plays at that point, the two chains are **cut.** Black has a **cutting point** at the circled point (S).  If the cutting stone can be captured immediately, there is no cutting point. In this position, a white move at the marked point puts itself in atari. Black's stones are in fact connected by a hanging connection (S).

English	Chinese	Japanese	Korean	Description
				 White can of course threaten to cut. After White 1, there is again a cutting point at *a*, so Black now has to connect there. White 1 is called peep.  It is important to defend your cutting points. There is a general question about how to defend. It is one of the simpler issues about good shape. In this diagram, the marked black stone protects the cutting point in a fancy way (see keima protecting the cutting point). If White cuts, her cutting stone will be captured in a ladder towards the bottom, or in a loose ladder towards the left. So in a broader sense, there is no cutting point, yet this position still contains some aji (S).

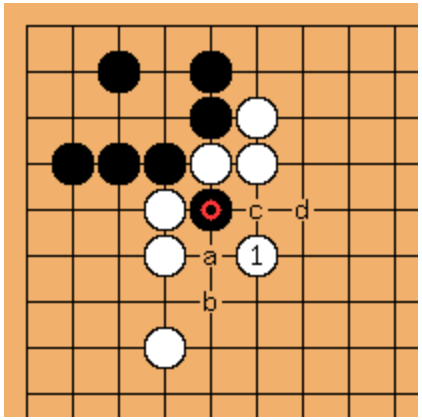
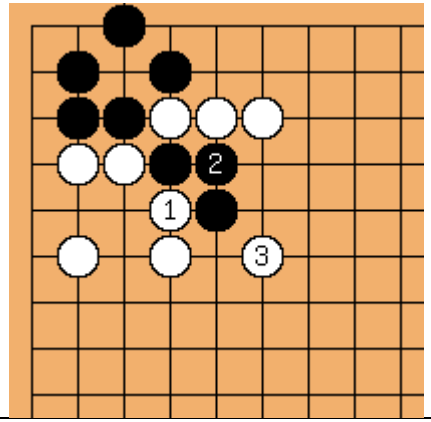
English	Chinese	Japanese	Korean	Description
Cutting stones				 A group of stones that divides the enemy forces into two or more groups. May initially consist of a single stone at a cutting point (S). Here the ◎ stone is a cutting stone (S).
				 Black shouldn't sacrifice it, because if it lives the white group above it will be weak, and the white group on the side a little weak (S). 1 here is a good way to save the cutting stone from capture (S).
				 If the game goes this way ❶breaks the possible ladder (White ❹at ❺) (S).The result is clearly advantageous to Black. The two ◎stones have become very weak and it

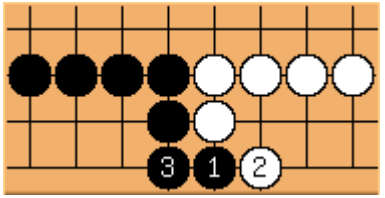
English	Chinese	Japanese	Korean	Description
				would be very troublesome to save them. But they are themselves cutting stones: if Black captures them, the initial cutting stone connects to the corner (S). Therefore White should take better care of the upper stones. This development is fine for Black, though.
Dragon	Long			 A dragon is a long connected shape spanning large areas of the board. Usually dragons share the same liberties in one long connected shape but in general they are just long shapes that span a large part of the board (S).
Farmer's hat				 The farmer's hat is a basic idea in life and death, it is a big eye with *a* being the vital point. If Black plays at *a*, he as three eyes; and if White plays at *a*, Black is dead. The farmer's hat has five inside liberties (S).
Middle game	中盤 (zhōng pán)	中盤 (Chuban)	중반(chung ban)	
Neutral Liberty	單官	駄目(Dame)	(공배) Gongbae	A neutral liberty shared by safe White and Black groups. Does not count as a point for either side (Bradley 2001)

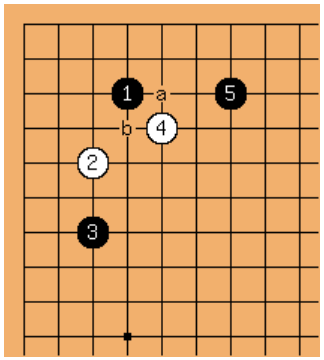
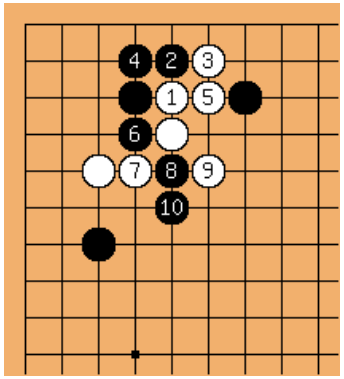
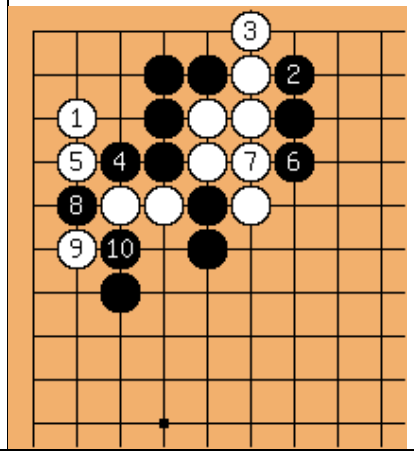
English	Chinese	Japanese	Korean	Description
	(dān guān)			
Liberty shortage		駄目ズマリ (Damezumari)		Shortage of liberties (Bradley 2001)
Step	段 (duàn)	段 (Dan)	단	The designation of playing strength for those of expert and master level. Ranges from 1-dan to 8-dan for amateurs, and 1-dan to 9-dan for professional Go players (Bradley 2001). the ranking above kyu and below professional dan; generally 1 – 7 (or 9); 7 is high.
Dumpling	團子 (tuán zǐ)	団子 (Dango)	(포도송이) PoDoSongI	 A shapeless mass of stones with little eye making potential. A solid mass of stones without eyes and few liberties (S).
Thrust/pushing in		出 (De)		 A move which pushes between two opposing stones in an attempt to separate them (Bradley 2001).

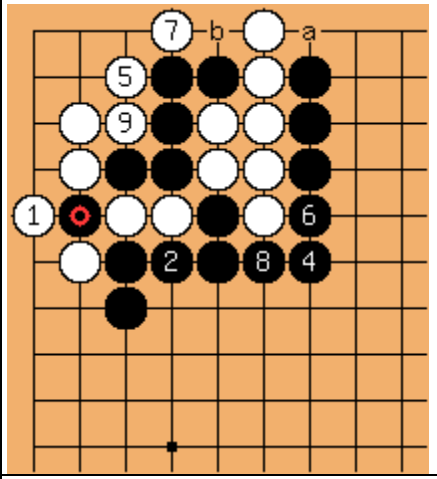
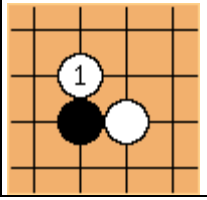
English	Chinese	Japanese	Korean	Description
Push through/out & cut		Degiri		 Push through and cut (Bradley 2001) It's the combination of ❶and ❸ that is degiri. One may get into the inaccurate habit of calling ❶the cut (it's a disconnection, but not at a cutting point). Seeing a short sequence such as this as a unit is on the whole an advance, though (S).
Bulge		Fukure		 Black 1 is a bulge play (*fukure* in Japanese). It is a *hane* play, backed up by the marked stone already in place. Black gains great power locally, this way. Therefore the point 1 is the vital point here: if White takes it instead Black would start to worry about cutting points (S)
		Fujite		Fujite stands for a sealed move in a timed game that has to be interrupted (e.g. in the Japanese Kisei title match, which features games spread out over two consecutive days). The concern is that without a sealed move, there would be a disadvantage for the player who has to place the last stone on the board before the interruption. His opponent would have thinking time during the interruption not counted against the time on his clock. To solve this issue, the last player to move decides on where he wants to play and writes down the move on a piece of paper sealed in an envelope. The envelope is

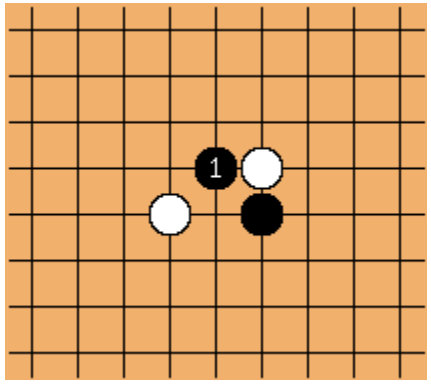
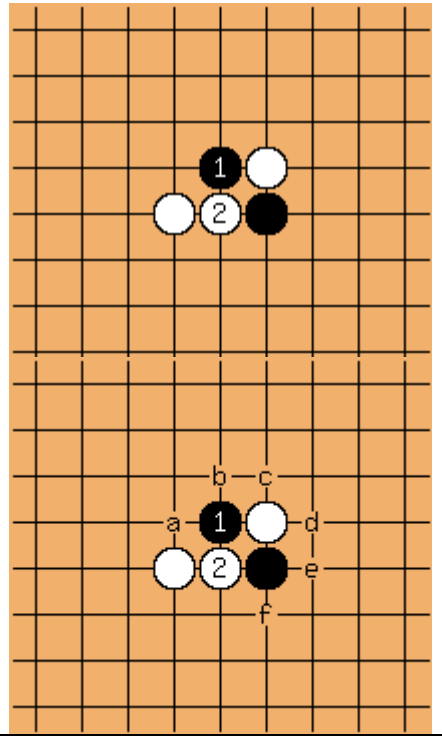
English	Chinese	Japanese	Korean	Description
				opened and the move played when the game is resumed (S).
Corner territory exchange		振り替り (Furikawari)	바꿔치기	Exchange of corner territory for an outside ponnuki (Bradley 2001). A *furikawari* is a sudden exchange of potential territories (which may involve quite large groups of stones changing hands, too) (S).
Opening Gambit	布局 (bù jú)	布石 (Fuseki)	포석 (Poseok) (초반/初盤) ChoBan	The full-board opening (Bradley 2001). More accurately it means the initial disposition of stones (S).

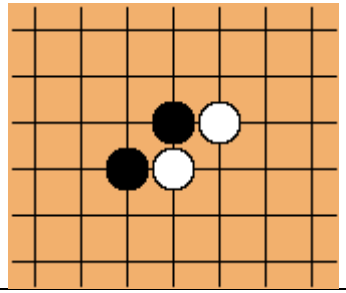
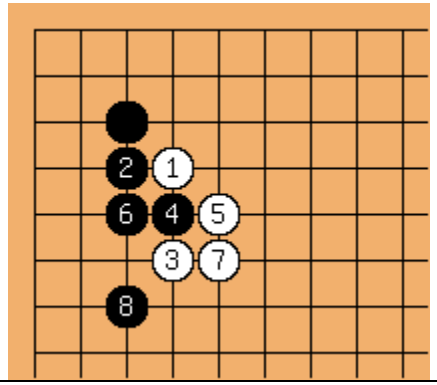
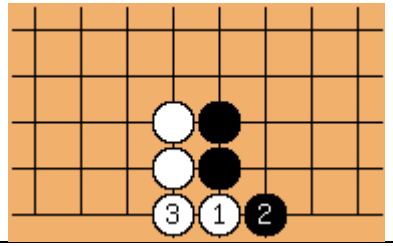
English	Chinese	Japanese	Korean	Description
Net	Jia	下駄 (Geta)	(장문/欌門) JangMun	A trap or snare which can effectively capture opposing stones even when they still have several liberties (Bradley 2001).  Is a technique where one or a few stones are captured by blocking the exits. The basic form of a net is ❶in this diagram. The marked black stone now cannot escape: If Black plays *a*, White answers at *b*; if Black *c*, she answers at *d* (S).  A slightly more complicated net is ❸in this diagram. Try to check for yourself that Black can indeed not escape, after this move
Go	圍碁 (wei qi)	碁 (Go)	바둑 (Baduk)	
Go Board	棋盤 (Qipan)	碁盤 (Goban)	바둑판(Baduk P'an)	"Goban" is the Japanese word for "go board" (碁盤). Chinese: *qipan* (棋盘). Note that there are traditionally small markings at nine of the 'points' (the star points or *hoshi*). The central point is called

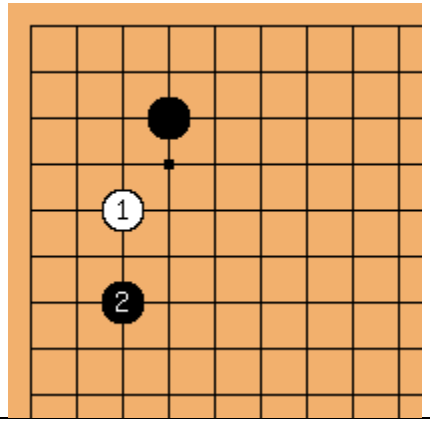
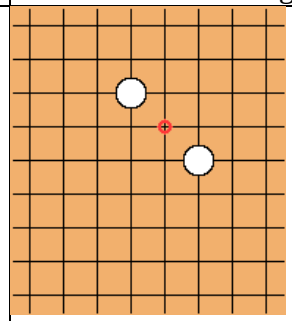
English	Chinese	Japanese	Korean	Description
				tengen (Japanese) or *tianyuan* (Chinese) - the Korean word is *chunweon*
Go bowls	棋合（qí hé)	碁笥 (goke), 碁器 (goki)		
Go club		Gokaisho		Go club
5-5 point		Gonogo		The 5-5 point has occasionally been used as the first play in the corner. The idea was experimented with during the Shin Fuseki period.
No Response	後手（huo shuo)	後手(Gote)	(후수/後手) Husu	"Slow Hand". The converse of sente. A move which makes no significant threat, and which therefore does not require an immediate response by the opponent (Bradley 2001).  In this endgame example, the sequence played is gote for Black, since he starts and finishes the sequence (S). A passive move; a move which does not need to be answered.
	後中先（hoù zhōng xiān)	後手の先手 (Gote No Sente)		A gote move which contains (often hidden) aggressive potential (Bradley 2001). A gote move preparing a sente followup.
Small Knight's move/Large knight's move			(행마/行馬) Haengma	**Haengma** [1] is a Korean word which means roughly *the way the stones move*, forward momentum. The term is used to describe various connections and their implications. Some connections are strong, but move across the board slowly (not gaining much territory[2]), while the faster connections are weaker (S).

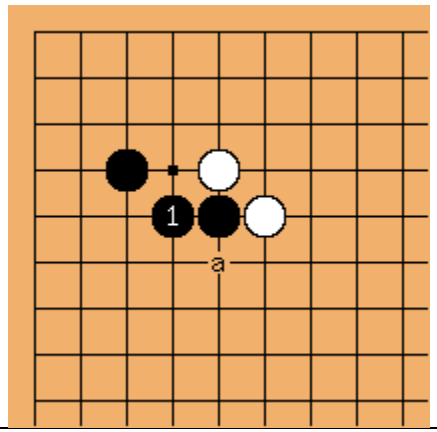
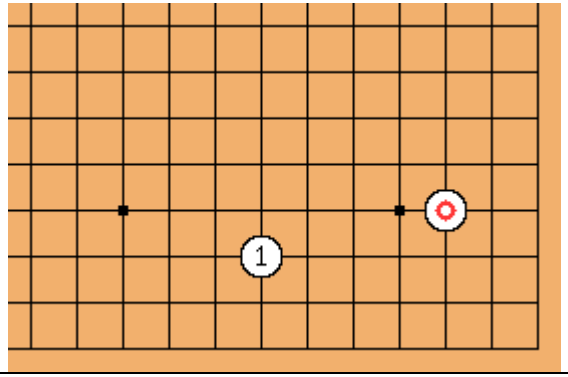
English	Chinese	Japanese	Korean	Description
Trick play	騙（piàn zhāo)	だまし手 (damashite); ハメ手 (Hamete), ゴマカシ手 (gomakashite)	(속임수) or (함정수/陷穽手) SoGimSu? or HamJeongSu	 An unsound move made to try to fool the opponent into making an error. (Bradley 2001). A *hamete* is a trick play, a move that yields an unreasonably big advantage to the player if it is not answered correctly (S). A famous example of hamete is ❺in this diagram. Typical continuations for this joseki would be at *a* or *b*  ❸and ❺: she is taken in by this hamete  White happily captures the corner, blissfully unaware that Black is intending to sacrifice the corner (S).

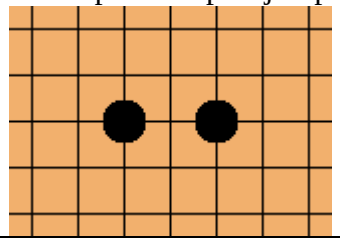
English	Chinese	Japanese	Korean	Description
				 The sequence up to White 9 results in a huge success for Black. White has 18 points in the corner, but Black has such a thick wall outside that its value is much bigger than White's corner. Besides, Black *a* is sente. (The Iron Wall page shows a continuation of this example.)
Diagonal attachment		Hane	(밭전자/밭田字) BatJeonJa?	 A diagonal attachment against an enemy stone. (Bradley 2001).

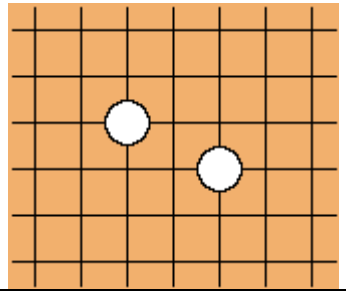
English	Chinese	Japanese	Korean	Description
Inside Hane		Hanedashi		 1 is hanedashi -- the hane inside  White is certain to cut. Black will play any of the lettered moves (S).

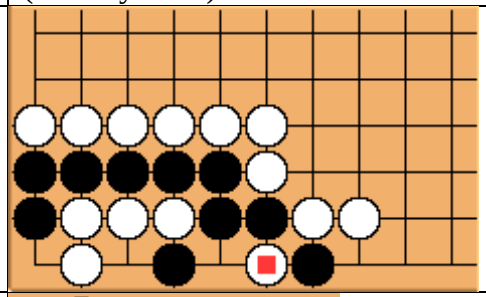
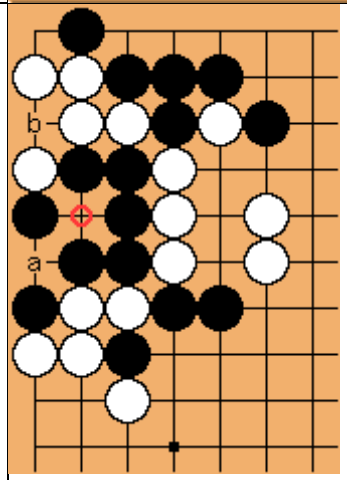
English	Chinese	Japanese	Korean	Description
Staircase		Hanekaeshi		 The main point is that whoever is to play should consider making a solid connection, rather than playing either available atari
		Hanekomi		 Hanekomi is a Japanese term for a move which is a hane and also wedges in between two of the opponent's stones, i.e. both a hane and a warikomi. (S)
Hane Connect		Hane tsugi		 **Hane Tsugi** or *hane-connect* is the sequence of moves ①to ③. It is a typical endgame move. This diagram gives the basic shape. There are a few issues (S).

English	Chinese	Japanese	Korean	Description
Pincer		Hasami (ハサミ)	협공/挟攻) HyeopGong	 Pincer (Bradley 2001). A play that attacks by preventing the opponent's extension down the side (Kosugi 1973).
Move/Place a stone			(착수/着手) Chaksu	
Squeeze tsuke		Hasami-tsuke		As shown in the diagram (see Appendix M)
Diagonal jump (Bad shape)	愚形 (yú xíng)	チキリトビ (chikiri tobi, same as Hazama tobi); 愚形 (gukei)(	우형	 The shape created by the two White stones is called *hazama tobi* in Japanese. Usually it is a bad shape, as it can easily be cut apart. At special circumstances, though, it can be very powerful, but you should have an answer ready if your opponent plays in the middle (the marked point). It is also called an elephant's move, because the elephant in Chinese chess moves this way (S).

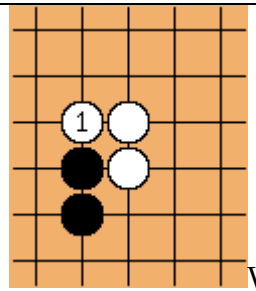
English	Chinese	Japanese	Korean	Description
Draw Back		Hiki		 Draw back (Bradley 2001) In this joseki Black 1 draws back, a less complex continuation than the stretch (*nobi*) at *a* (S).
Extension		Hiraki		 An extension (Bradley 2001) Tobi is for a jump in the centre, *hiraki* an extension along a side (S).
Honest move		(Honte)		A move which is *honte* (本手 'the honest move') is one that is played to reduce the amount of aji in one's position. If one plays honte, one accepts that one gets less points than one would otherwise get, or even that one has gote rather than sente, getting in return a solid position with little bad aji, thus freeing one's hands in the future. The kanji 本 for *hon* in *honte* 本手 is the same as in *hon* 本 "book" or *nihon* 日本 "Japan" and its meaning in this case is "real", "genuine", or "true" as in *honmono* 本物 "the real thing". So *honte* would be a move which is real or straight-forward, as opposed to tricky or

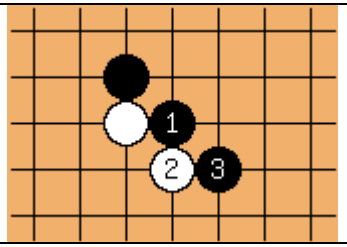
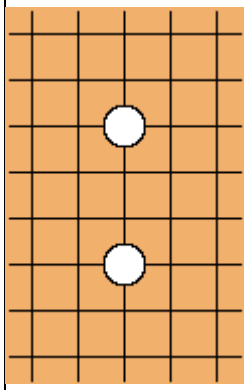
English	Chinese	Japanese	Korean	Description
				flashy. Maybe "sober" is a good attribute of a *honte*. I guess "honest" is OK as a translation, but it has always seemed to me to be a little strange, as if someone picked an ordinary English word that looked the most like "honte".
Apex of empty triangle		グズミ(guzumi)	마늘모	A (good, honte) move that becomes the apex of an empty triangle.
Throw-in		Horikomi		A "Throw-in" sacrifice which kills an eye and/or whose capture reduces the opponent's liberty count. (Bradley 2001)
4-4 point		Hoshi (星)	Hwajeom/HuaJum	One of the nine handicap points (Bradley 2001). The 4-4 point. A 13x13 board has only five hoshi
Go	Wei qi	Igo	Baduk	The name of the game (Bradley 2001). The "I" in Igo means "to surround" and the "go" means "game," so the name means "the surrounding game." "Go" is a shortened version of the Japanese name (Yasuda 2004).
		Ikken		One point interval (Bradley 2001)
One point jump		Ikken Tobi		A one point skip or jump (Bradley 2001). 
		Ikken Basami		A one point pincer (Bradley 2001)
Stone	Shi	Ishi		Stone (Bradley 2001)
Under the stones		Ishhi-no-shita	(후절수/後切手) Hujeolsu	Under the stones (Bradley 2001). A play **under the stones** is a play in a space which has become free because some of your own stones have been captured. There are some spectacular tesuji where you plan to do this, losing stones deliberately, and carry that out unexpectedly.
Corner sequence		Joseki	(정석/定石) Jeongseok	An analyzed sequence of corner plays which theoretically leads to a dynamically equal result for both sides (Bradley 2001)

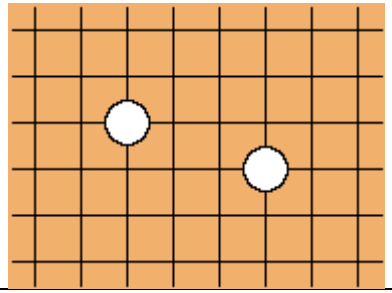
English	Chinese	Japanese	Korean	Description
Corner enclosure move		Kakari	(걸침) GeolChim	An approach move against a corner stone to prevent a Shimari (Bradley 2001). A move that approaches a single enemy corner stone from the outside (Kosugi 1973)
Clamp		Kake		A move which clamps an opposing stone (Bradley 2001)
Diagonal-virtual connection/Hanging connection		Kaketsugi		A diagonal virtual connection (Bradley 2001). A connection like the one in the diagram. The virtue of a kaketsugi is that it makes some eye-shape. The draw-back is the Black can play "a" (Kosugi 1973) (see Appendix M).
Solid connection		Katatsugi		The solid connection (Bradley 2001)
Shoulder attack		Katatsuki		A shoulder attack. A move played diagonally next to an opposing stone (Bradley 2001)
Shape		Katachi (形)	(모양) Moyang	"Shape" (may be good or bad) (Bradley 2001). A quality of a group of stones of the same color. This quality is highly influenced by the enemy stones present in the same area.
Small knight's move		Keima	(날일자/날日字) NalIlJa	A small knight's shape (Bradley 2001).  Sometimes the term *kogeima* (or *small knight's move*) is used, in order to distinguish this relationship from the *ogeima* (large knight's move).
		Keshi		"Erase." When trying to reduce an opponent's Moyo (sphere of influence), Keshi consists of "light" moves, not too deep within the area of the opponent's strength (Bradley 2001)
Forcing move		Kikashi		A forcing move which must be answered, and which therefore necessarily retains Sente, but which is incidental to the main flow of play. Such stones are typically abandoned after they have served their purpose of forcing the opponent's response, serving only as Aji thereafter (Bradley 2001)

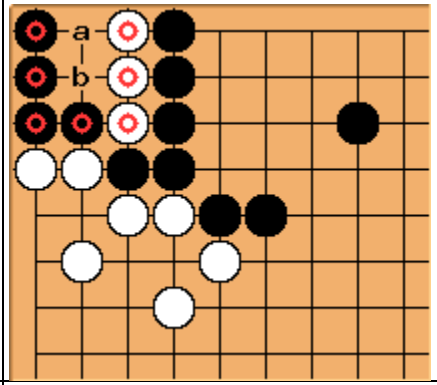
English	Chinese	Japanese	Korean	Description
Cut		Kiri		A move played between opposing stones in order to separate them (Bradley 2001)
Eternity	长生 (cháng shēng)	長生 (Ko (Chosei))	(괘/覇) Pae	 "Eternity." An important, oft recurring tactical situation in which a single stone is captured and the NO REPETITION RULE applies (Bradley 2001). Eternal life i.e. super ko in Ing terms.
Double Ko				 This diagram shows an occurrence of a double ko. (From Large Avalanche Turn Inward). The black group has one liberty (the marked eye) and two kos, giving him always two liberties. If White takes away a liberty by taking the ko at *a*, Black can take the ko at *b*. It is then up to White to find a ko threat. Black can answer the ko threat, and when White recaptures at *b*, Black takes at *a*. It is again White who has to play a ko threat, which Black can answer. It should be clear that White cannot win in this situation - Black is alive in double ko. Velobici: The middle group (black with marked eye in the diagram), surrounding an opponent's inside group, is itself surrounded by an outside group. In order for such a group to live in *double ko*, these conditions must be met: 1. the middle group must have an eye, 2. the middle group must have two kos 3. at least one of the kos must involve the opponent's inside group (ko a 'b' in diagram)

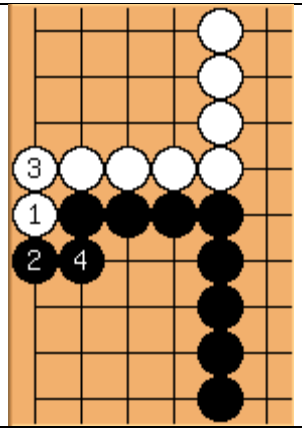
English	Chinese	Japanese	Korean	Description
		Kogeima		Same as Keima
		Komi	(덤) Deom	The points added to White's final score in "even" (no handicap) games to compensate for Black's first move advantage (Bradley 2001)
		逆込み (gyaku komi)		Points given to black.
	逆先手 (nì xiān shǒu)	**逆先手** (gyaku sente)	역선수	Same as gyaku yose.
	逆先手 (nì xiān shǒu)	Gyaku yose	역끝내기	A gote move that deprives the opponent of a sente move.
		Komoku	Sohmok	The 3-4 point
Diagonal extension		Kosumi	마늘모 or 입구자/入口字 (MaNeulMo or IpGuJa)	The diagonal extension
Diagonal tsuke		Kosumi-tsuke		A diagonal extension that attaches to an opposing stone (Bradley 2001) (see Appendix M)
Rank		Kyu	(급/級) Gup	The designator of playing strength for players of less than Dan rank. For amateurs, ranges from 35 Kyu (beginner) to 1 Kyu (just below expert strength) (Bradley 2001)
Bend/turn		Magari	(젖힘) JeotChim	"Bend: or "turn" (Bradley 2001)

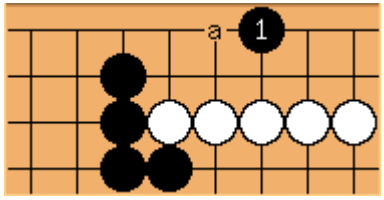
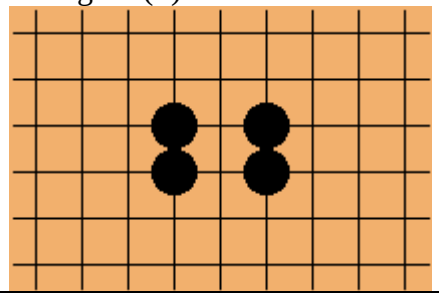
English	Chinese	Japanese	Korean	Description
				 White ① here makes a major difference, whether considered from the point of view of influence or territory.
Eye		Me		Eye (Bradley 2001)
Capturing race		Me-ari me-nashi	(수상전/手相戰) SuSangJeon	A semeai (A life-or-death fight/race to capture) in which only one side has an eye (Bradley 2001)
		Miai	(맛보기) Matbogi	Two complementary points of approximately equal importance in a given situation, such that whichever one a player occupies the opponent can (and usually must) occupy the other (Bradley 2001)
Eye/point		Moku		"Eye" or "point." See ME (Bradley 2001)
3-5 point		Mokuhazushi	Waemok	The 3-5 point
		Moyo		A large sphere of influence or potential territory (Bradley 2001)
Opposing 3-4 points		Mukai-komoku		Opposing komoku, such as the 4-3 point on the top and the 4-3 point on the bottom.
		Nadare		The "Avalanche" joseki (Bradley 2001)
		Nakade		"Central Placement." A sacrifice inside the opponent's space to reduce it to one eye (Bradley 2001)
		Narabi		To extend along a line from a stone not in contact with an opposing stone (Bradley 2001)
Double hane		Nidan Bane		"Two-step hane" (Bradley 2001) (see Appendix M)

English	Chinese	Japanese	Korean	Description
				
Two point jump		Niken tobi		 The basic two-space jump without any other stones close by is a loose connection - the opponent can cut the two stones apart in many ways. The two-space jump is often used, nonetheless, because it is light, quick and there are often supporting stones around. However, it may often be preferable to use a large knight's move instead - it is slightly more strongly connected and also gives a better direction, and can often be almost sente, since it can be used to press the opponent low (S).
		Ni-ren-sei		A fuseki pattern in which a player occupies both 4-4 points on a single side (Bradley 2001)
Cross-cut		Nobi		To extend along a line from a stone in contact with an opposing stone (Bradley 2001). An extension away from an opponents tsuke, cross-cut, etc. (Kosugi 1973) (see Appendix M)
Peep		Nozoki	(들여다보다) DeulYeoDaBoDa	A “peep” into the space in an opponent’s one point jump (Bradley 2001)
Capture		Nuki		A capture (Bradley 2001)
Captured stones	死子（sǐ zǐ)	上げ石 (age ishi)	사석	

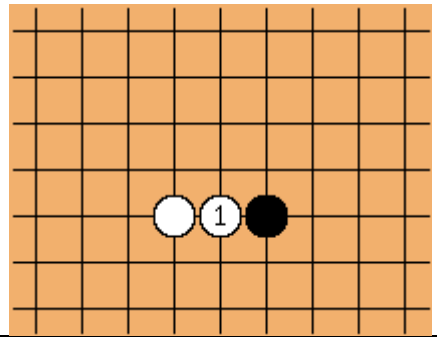
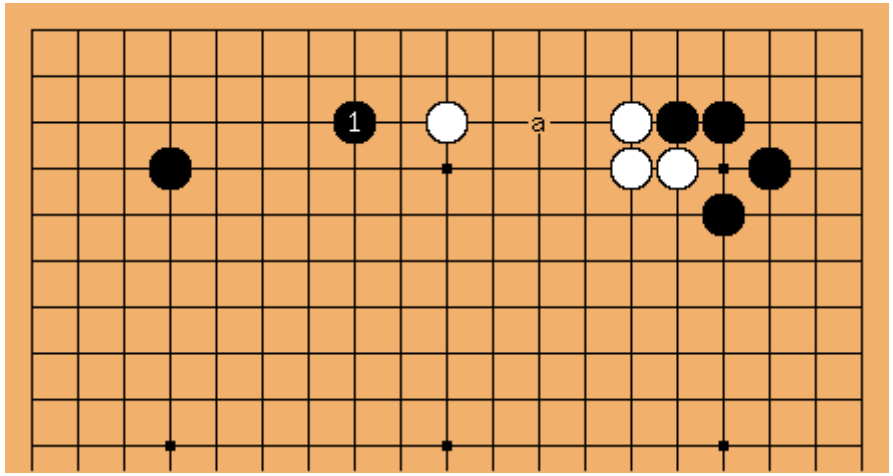
English	Chinese	Japanese	Korean	Description
Large knight's move		Ogeima (大ゲイマ)	(눈목자/눈目字) NunMokJa	 "Large Knight's Move" (Bradley 2001) An *ogeima* is often referred to as a 'large knight's move', as the pattern is an extended version of the way the chess piece moves (S).
Pinned		Oi-otoshi	Chok-chok-soo	Stones in atari that cannot be connected are said to be pinned (K)
		Onadare		The "Large Avalanche" joseki
Greetings to play Go	拍一盘 (pai yi pan) Play Go	Onegaishimasu (oh-nay-guy-she-mass)		Polite invitation to play a game of Go.
3-6 point		Oomokuhazushi		The 3-6 point opening was developed in the late 1920s. It has only been played at all often by the Korean player Yang Keon (S).
4-6 point		Ootakamoku		The 4-6 point was developed about 1934 by Sekiyama Riichi, during the ShinFuseki period. This move has been played recently by Yamashita Keigo (S).
		Osae		A blocking move (Bradley 2001)
Death star		Ponnuki	Bbangdaerim	A powerful shape created when 4 stones capture a single opposing stone (Bradley 2001)
		Sabaki		"Disposal." Light resilient shape which allows a group to be easily settled, or to be partly or totally sacrificed if necessary without significant penalty (Bradley 2001). A series of light moves played where the opposing stones are strong in order to reduce their territorial potential (Nagahara 1982).
Descent		Sagari		"Descent." A move extending down from a second or third line stone toward the board edge (Bradley 2001)
3-3 point		San-san	(삼삼/三三)	The 3 -3 point in the corner

English	Chinese	Japanese	Korean	Description
			SamSam	
		San-ren-sei		A fuseki pattern in which a player occupies all three handicap points on one side (Bradley 2001)
		Sashi-komi		An insertion into an opponent's wall, usually to probe for weaknesses. Similar to Warikomi (Bradley 2001)
Dual-life		Seki	(빅) Bik (Beek)	 Means **mutual life**. In its simple form, it is a sort of symbiosis where two live groups share liberties which neither of them can fill without dying.
The Initiative		Sente	(선수/先手) Seonsu	The initiative. A move central to the major strategic and/or tactical motifs of the game, which therefore requires the opponent's response, and which cannot be ignored without significant penalty! Such stones typically have long term implications, and must therefore be watched and defended. The converse of Gote. Closely related to Kikashi (Bradley 2001)

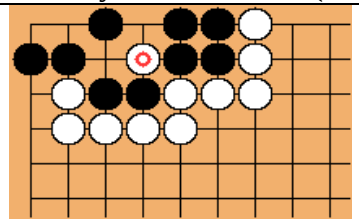
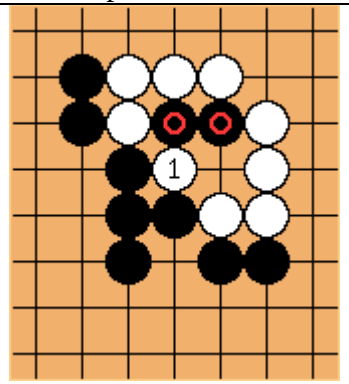
English	Chinese	Japanese	Korean	Description
Double sente		Sente-Sente		 A move which is sente for either player. It is always important to grab these moves as soon as possible, because whoever plays them gets points for free - no move is lost by playing a double sente play, but it does give one points (S).
		Shibori		A squeeze play which forces the opponent's response (Bradley 2001)
Ladder		Shicho	(축/逐) Chuk(Chook)	The ladder (Bradley 2001)
Ladder-block		Shicho-atari		The Ladder Block (Bradley 2001)
Ladder, reverse		グルグル回し (guru guru mawashi)		
Corner enclosure		Shimari	(굳힘) GutChim	Corner enclosure (Bradley 2001). A two-stone corner formation. The diagram shows a tyopical example. A shimari does not exactly secure the corner, but it does make a base around which it is hard for the opponent to gain a foothold (Kosugi 1973) (see Appendix M).
		Shinogi		A sequence of moves to give a group good eye-making shape (Bradley 2001)
Slide		Suberi		"Slide," a small knight's move toward the edge under opposing stones (Bradley 2001)
Style/skillfulness		Suji		"Style" or "skillfulness." Clever, artistic play (Bradley 2001)

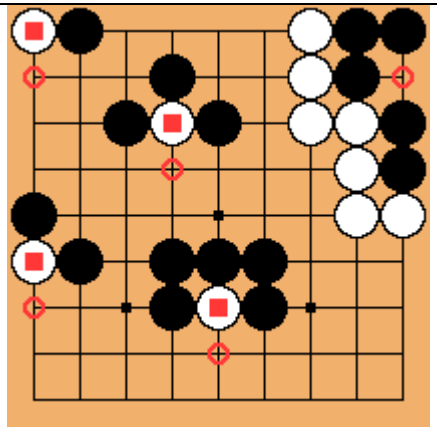
English	Chinese	Japanese	Korean	Description
Monkey Jump		Saru-suberi		 A *monkey jump* (Japanese: *saru-suberi*) is a large-knight jump from the second line to the first line into the opponent's would-be territory, reducing it by a considerable amount. The stone on the diagram cannot be cut off. If White has a large territory to the right, the move can't be ignored and has to be replied to. A monkey jump is proverbially worth 9 points in sente, although the exact amount depends on the position, and it may very well be gote. In some cases a small jump to *a* is reasonable as well. This is sometimes known as a small monkey jump
Foot sweep		Suso-barai		After the well-known martial arts technique (Masao 1989), in which a player answers a knight's move approach with his/her own knight's move
Stand		Tachi		"Stand." Extending one stone toward the center of the board (Bradley 2001)
		Taisha		The "Great Slant" Joseki (Bradley 2001)
High		Taka		A prefix meaning "high" (Bradley 2001)
Bamboo Joint		Take Fu	(쌍립/雙立) Ss'angNip	The **bamboo joint** is the name of the shape in the following diagram. The name, like the 'knuckle' on a stick of bamboo, comes from the strength of the connection. It is normally impossible to cut through it (S). 

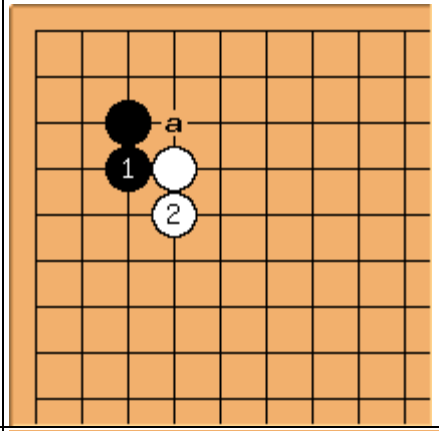
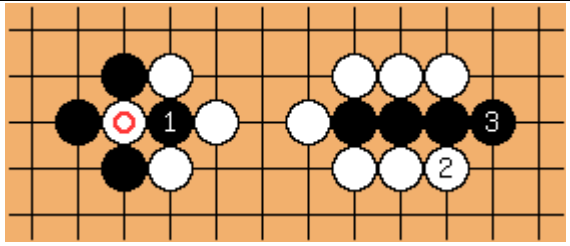
English	Chinese	Japanese	Korean	Description
4 - 5 point		高目 Takamoku	(고목/高目) Gohmok	As an opening play, the 4-5 point is more center-oriented than the 3-5 point, and less corner-oriented than the 4-4 point.
3 – 5 point		目外し Mokuhazushi	(외목/外目) Waemok	"The 5-3 point is an old-established move which was very popular in the Edo period (1600-1867), so a great deal of research has been done on it. Its chief characteristic is that it places its main emphasis on influence - territorially, it is inferior to the 3-4 point. Like the 3-4 point, it does not finish with the corner in one move, so one's objective is to secure the corner with an extra move if the opponent does not make an approach move. Consequently, an approach move is valuable and should be played without too much delay. The 5-3 point is a lively move which can lead to some complicated and troublesome joseki." *Ishida's Joseki Dictionary, Vol. II*
Cross hoshi		Tasukiboshi		When Black opens on the upper right 4-4 (hoshi) points and diagonally across at the lower left 4-4 (hoshi) point. (See Fuseki Patterns *Cross Hoshi* in Addendum to Lesson Plans).
Central star point	Tianyuan	Tengen	(천원/天元) Cheonweon	The central star point.
		Tenuki		To play somewhere, ignoring the opponent's last move (Bradley 2001)
Gambit	手筋 (shǒujīn)	Tesuji (手筋)	(맥/脈) Maek	A Suji which raises the overall efficiency of the player's local (and sometime global) stones to their highest possible level (Bradley 2001). A clever play, the best play in a local position, a skillful move, a special tactic.
Iron pillar		Tetchu	(철주/鐵柱 or 쌍점/雙點) CheolJu? or Ss'angJeom	"Steel post" or "Iron pillar," two stones connected (Bradley 2001)
		Tewari		A method of analyzing the efficiency of play by changing the order of moves (Bradley 2001)
Jump		Tobi		A jump (=skip)
Jump, two-space			(두칸뜀)	

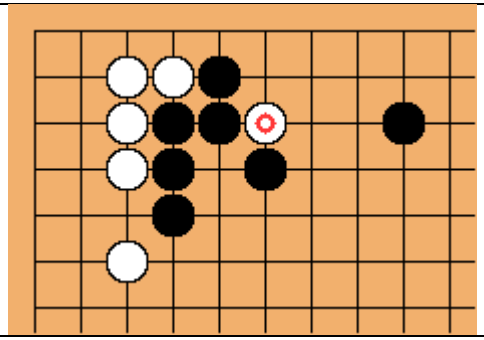
English	Chinese	Japanese	Korean	Description
			DuKanDd?'wim	
		Tsugi		A connection in between the opponent's two un-connected units (Bradley 2001)
Bump		Tsuke		 An attachment to an opposing stone (Bradley 2001). A play made in contact with one of the opponent's stones, but not in contact with any friendly stones (Kosugi 1973).
Checking Extension		Tsume		 Which prevents the opponent's extension (Bradley 2001). is an extension with 'added value'. This 'added value' may take a number of forms, for example an implied invasion or a threat to the base of a group
		Tsume Go		A life-or-death problem (Bradley 2001)
		Uchikomi	(침입/侵入)	An invasion into the opponent's prospective territory which, unlike

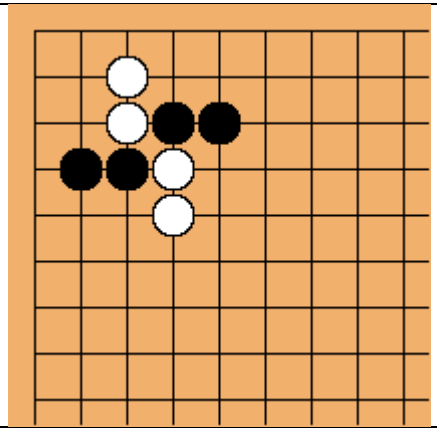
English	Chinese	Japanese	Korean	Description
			ChimIp	a wariuchi, doesn't have room for extension to either side (Bradley 2001)
		Warikomi		A move that thrusts in between opposing stones to set up cutting points. Similar to Sashikomi (Bradley 2001)
Wedge		Wariuchi	(갈라침) Gallachim	A wedge move, which has room for expansion on both sides (Bradley 2001)
		Watari		A connection at the edge of the board (Bradley 2001)
Endgame		Yose	(대국 종료) Daeguk Jongny (끝내기) Gg'eutNeGi	The Endgame (Bradley 2001)
		Zoku-Suji		False (or bad) style, which does more harm than good. More or less the opposite of Tesuji (Bradley 2001)
Heavy group				Groups of stones which lack eye-shape which are vulnerable to attack.
White			(백/白) Baek	
Illegal play			(반칙) Banchik	e.g. taking back a move, suicide, exceeding allotted time, etc.
Resignation			(불계승/不計勝) Bulgyeseung	Win by resignation
Play a game			(대국) Daeguk	
Base			(근거/根據) GeunGeo	
Go Player			(기사/棋士) Gisa	
5 – 4 Point			(고목/高目) Gomok	
Baseless group of stones			(곤마/困馬) GonMa	
Attack			(공격/攻擊) GongGyeok	

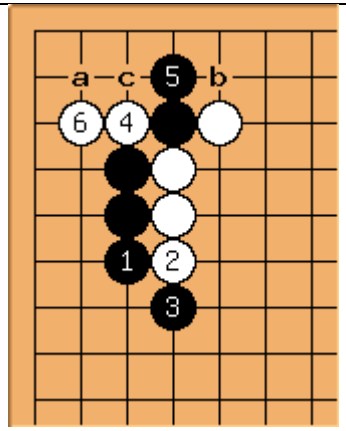
English	Chinese	Japanese	Korean	Description
Over play			(과수) Gwasu (무리수) Murisu	In a handicap game White must overplay to be able to catch up and overtake the handicap advantage Black enjoys. Thus, overplay is relative. A play that would be an overplay in one game might be appropriate in a different game against a different player. An **overplay** tries to gain too much.
Counting the score			(계가/計家) Gyega	
Black opponent			(흑/黑) Heuk	
Invasion			후빔수) HuBimSu	An invasion of an opponent's territory that makes the opponent's territory dead or a bihk (seki).
Under the stones			(후절수/後切手) Hujeolsu	 A play **under the stones** (Japanese: *ishi-no-shita*) is a play in a space which has become free because some of your own stones have been captured.
Snap back		Utte-gaeshi/utte-gae	환격/還擊) Hwan-Gyeok	 A **snapback** is a play which captures enemy stones using one or more sacrifice stones

English	Chinese	Japanese	Korean	Description
Self-atari			(자충/自充) JaChoong	 Adding a stone to one's stone or stones that are not in atari, to put them into atari.
Disconnect			(절단/切斷) JeolDan	
Handicap			(접바둑) JeopBaduk	If two players differ in strength (see rank), the weaker player gets a **handicap** to compensate for the difference. That way, both players have a chance to win. In general, the ideal handicap is equal to the difference in kyu or dan ranks. Traditionally, handicap stones are placed on the star points, but one can also play with free placement of the handicap stones.
Territory			(집 also 가/家, 호/戶) Jip (실리) Shilli	A part of the board that is surrounded by stones belonging to a living group, and in which the opponent cannot make a living group (presuming the player holding the territory answers correctly). Territory towards edge usually formed by 3rd or 4th line
Pierce			(찌르기) Jj'iReuGi	
End of the Game			(종국/終局) Jongguk	
Middle Game			(중반/中盤) JungBan	

English	Chinese	Japanese	Korean	Description
Even Game			(맞바둑) MahtBaduk	Non-handicap game of Go.
Group			(미생마/未生馬) MiSengMa	A group of stones that is not alive.
Threat		Nerai (狙い)	(날일자/날日字) NalIlJa	1. One of a group of interesting moves or sequences that a player is watching out for a favorable time to unleash (or his opponent looking for the chance to eliminate). Often, a move left as the result of a previous sequence; what kind of *nerai* is left, if any, is a common factor in evaluating sequences. 2. A tactical threat.
Push		Oshi	(누르다) NuReuDa	 ❶pushes White along, taking territory and also reducing the liberties on the white stone. This is a typical pushing play, of the kind that can lead to a pushing battle.
Ko threat		Ko-date	(팻감) Paetgam	 Here is the basic idea of what is a ko threat. Suppose ❶takes the ko. White cannot retake the ko immediately, but white can atari at ②. If ❸chooses not to sacrifice three stones, then because white has already played a move away from the ko, ④can retake the ko. Of course, ❸can choose to connect the ko, but black will have to pay the price of losing three stones. In this diagram, ②is the ko threat.

English	Chinese	Japanese	Korean	Description
				A move which threatens something. They are used in ko fights: when there is a ko which you are not allowed to immediately retake, you can play a ko threat. This should force your opponent to answer, after which you can retake the ko, and now it is your opponent's turn to find a ko threat.
Isolated stone			(폐석/廢石) PyeSeok	 Describing one or more stones that are usually hard to move, or has no purpose because it is isolated or disconnected.
Sacrifice stone/play			(사석작전/捨石作戰) SaSeokJakJeon	
Life and Death		Semeai	(사활) Sahwal	Life-or-death fight (-race to capture)
Reduction		Keshi (消し)	(삭감) SakGam	Reduction means playing a move outside or on the apparent boundary of the opponent's framework. In contrast with a deeper invasion, the idea is gently to reduce the size of the opponent's framework, limiting it to a manageable number of points, by playing near the edge of it.
Melt-down/All-or-nothing move	胜负手	Shobute (勝負手)	(승부수) SeungBuSu	(aggressive) movement to change the unfavorable situation. After the opening, when a player judges that straightforward continuations are insufficient to win, she may make a *shobute*, a play (*te*) that puts the whole game (*shobu*) in the balance. *Shobute* are typically
Mistake			실수/失手) ShilSu	
Self-damaging move			(속수/俗手) SokSu	1. A move that makes the previous bad move a benefit. 2. A move that the player have no good plan/action afterwards, basically self-hurting move.

English	Chinese	Japanese	Korean	Description
4 – 3 point		Komoku 小目	(소목/小目) Somok	
Capturing race		*semeai*	(수상전/手相戰) SuSangJeon	
Control (of a situation)			(수습/收拾) Suseup	To control a situation
Pivotal Stones			(요석/要石) YoSeok	 Pivotal stones at very important position and should not be given up. Taneishi. Describing one or more stones that are disconnected, however still useful.
		Me-ari-me-nashi	(유가무가/有家無家) YuGaMuGa	One group of stones not having an eye, while the opponent's has one eye. the situation where in a capturing race one of the players has an eye and the other does not. As is explained under eye versus no eye capturing race, such a fight is usually a win for the player who does have an eye.

English	Chinese	Japanese	Korean	Description
Large Avalanche Joseki			(대붕설형정석/大崩雪形定石 or 큰눈사태형정석/큰눈사태形定石) DaeBungSeolHyeongJeongSeok? or KeunNunSaTaeHyeongJeongSeok?- Large Avalanche Joseki	 The large avalanche After Black 3, the Large Avalanche pattern is complete (see Large Avalanche Simple Variations for the variations where White 2 or Black 3 is played elsewhere). White 4, Black 5 and White 6 next are forced, after which Black can choose amongst *a*, *b* and *c*. Here *a* is the oldest variation, *b* is newer and *c* is most modern, having been introduced by Go Seigen in a game against Takagawa Kaku in 1957. Nowadays, *c* is the most popular variation, while *b* is also still played often.
White	白 (bái)	白(shiro)	백(pek)	White
White stones	白子(bái zǐ)	白石 (shiro-ishi)	흰돌(hŭin dol)	White stones
White to play		白盤(shiroban)		White to play
Jaw		顎 (ago)		
Empty Corner	坏棋 (huài qī)	空き隅 (aki sumi)	빈귀	
Bad move		悪手 (akushu)	악수	
Slack		甘い (amai)	무르다	
Pressure		煽る (aoru)		
Fast development		足が早い (ashi ga hayai)	발빠른	
Match with set number of moves.		番碁 (bango)		Match with set number of moves.

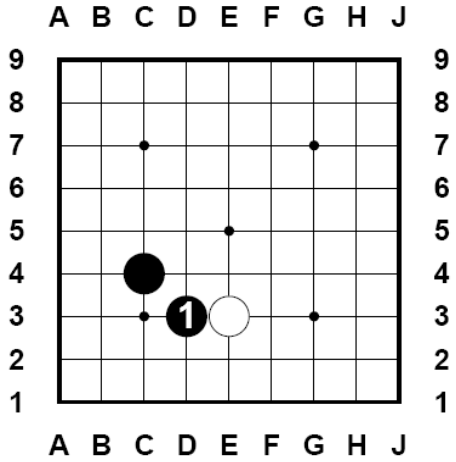
English	Chinese	Japanese	Korean	Description
Five stone win		盤面五目勝ち (banmen gomoku kachi)	반면오목승	A win by 5 pts on the board i.e. without komi.
Five shape vital point		五目中手 (gomoku nakade)		Playing at the vital point of the bulky five shape.
Five-in-a-row game	五子棋 (wǔ zǐ qí)	五目並べ (gomoku narabe)	오목 (omok)	Five-in-a-row; a game played on a go board, the first player to get five in a row wins.
		バタバタ (bata bata oiotoshi, ton-ton)		Capturing after a series of ataris.
Cap (move)	zhèng	帽子 (boshi)		hat, cap
		棒スギ (botsugi)	일자이음	three-stone column or row
Thrust		ブツカリ (butsukari)		same as tsukiatari (突き当たり)
		チギリ (chigiri)		Capturing the tail of a group.
		チキリトビ (chikiri tobi)		
	中国围棋协会	中国棋協会 (chuugoku ki kyōkai)		
Championship Match		挑戦試合 (chōsen shiai)	도전시합	
Challenger for title	tiǎo zhàn zhě	挑戦者 (chōsensha)	도전자	
Chinese opening		中国流 (chūgoku ryu)	중국류	Chinese fuseki

English	Chinese	Japanese	Korean	Description
Win		**中押** (chūoshi)	분계승	winning by resignation
Grand Knight's move	超大飛 (chāo dà fēi)	**大々桂馬** (daidai geima)	대대계마	A grand knight's move; four horizontal and one vertical or vice versa.
Pushing and Cutting	沖斷 (chōng duán)	**出切り** (de giri)	나기껀	
Gouging out		**エグリ** (eguri)		Gouging out ... robbing the opponent of a base/eye shape.
Swelling		**フクラミフクレ** (fukurami, fukure)		
Blockade		封 (fusa)		
	外勢 (wài shì)	**外勢** (gaisei)	외세	
	眼形 (yǎn xíng)	**眼形** (gankei)	안형	
Five match series		**碁盤勝負**(goban shōbu)		
Go saint		碁聖 (gosei)	기성	Go saint (one of the newspaper tournaments)
Width		幅 (haba)		
Crawl		**這い** (hai)		Crawl on first or second line.
Captured stones		ハマ (hama)		Captured stones.
Fall for a trick move		嵌まり (hamari)		A move that falls for a trick move.
Half point ko		**半劫** (han kō)		A ko which is worth half a point.
Half a point		**半目** (han moku)	반집	Half a point.

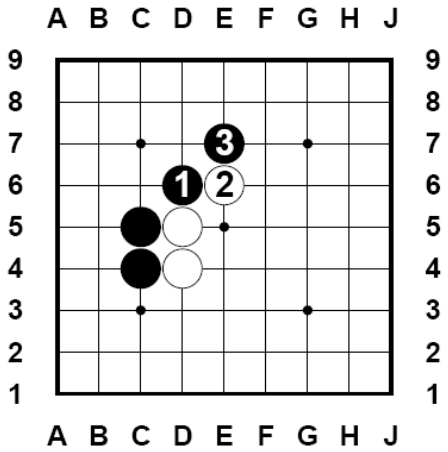
English	Chinese	Japanese	Korean	Description
Half point game		半目勝負(han moku shōbu)	반집승부	A game decided by half a point.

Appendix M

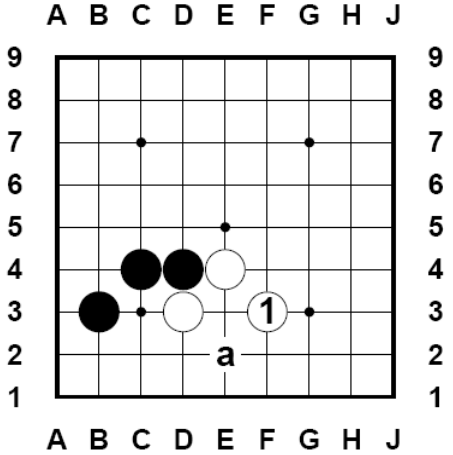
Diagrams of Go Terms



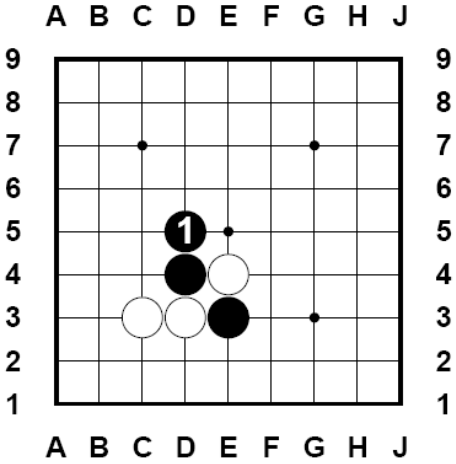
Diagonal tsuke



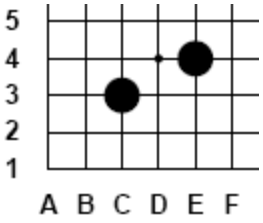
Double hane



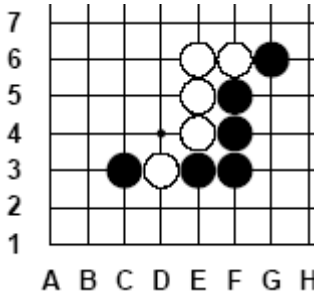
Hanging connection



Nobi



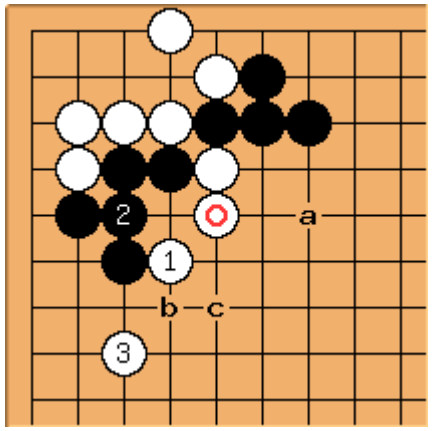
Shimari



Squeeze-tsuke

Example from joseki

Threatening to capture stones in a snapback is an effective tesuji, as in this joseki:



A common joseki

This diagram shows the result of a common joseki (for the 4473 enclosure) where White invaded at the 3-3 point under Black's 4-4 point. Usually this joseki ends with Black playing where White's marked stone is. But if taking sente has priority it is not uncommon to omit this move.[1]

So in this diagram White played at this point. If Black now plays around *a* or extends along the upper side Black is in for a nasty surprise: White plays ①. This threatens a snapback at 2 and is tesuji. In order to avoid losing stones to capture, Black plays ❷. But White follows with ❸and captures the whole group. There is no way out for Black (Black *b* is answered by White *c*).

-- Arno Hollosi

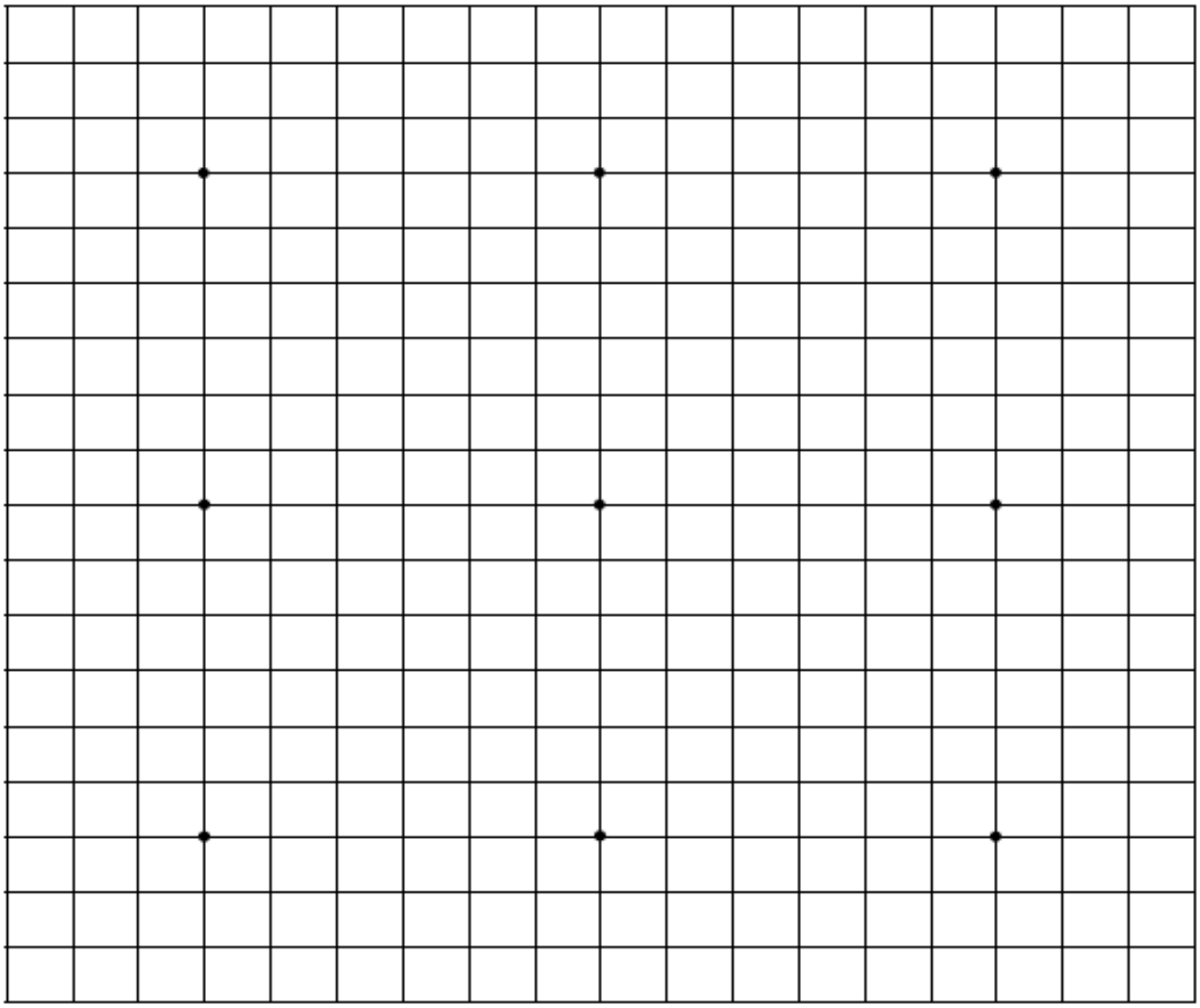
Appendix N

Game Recording Form

Black _____ **Round** ____

White _____ **Result** ____

Time _____ **Byo-yomi** _____ **Handicap** ____



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