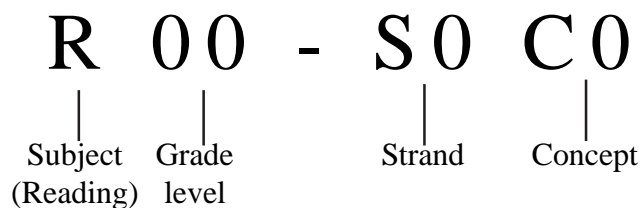


# Arizona Academic Standards Crosswalk

## Coding for Articulated Standards

R00-S0C0



### Examples of standards' codes:

**Reading:** R09-S2C2 (Grade 9, Strand 2, Concept 2)

**Mathematics:** MHS-S5C1 (High School, Strand 5, Concept 1)

**Science:** SCHS-S1C1 (High School, Strand 1, Concept 1)

**Writing:** W9-S1C3 (Grade 9, Strand 1, Concept 3)

### Grade level codes:

Mathematics: High School (one level) HS

Science: High School (one level) HS

Reading and Writing: Grade 9 09

Grade 10 10

Grade 11 11

Grade 12 12

(use lowest grade in code when multiple grades are identified)

### **Performance Objective: PO**

This may be included in the code by adding the Performance Objective number.

Example: R09-S1C1-01. Performance Objectives (PO) may be identified for one or more grade levels. They will have the same number but represent different grade levels. CTE addresses all grade level Performance Objectives 9-12. See the ADE web site for grade level identification.

### Additional Standards:

Listening and Speaking: High School (proficiency level)

Viewing and Presenting: High School (proficiency level)

**For additional information:**  
**Arizona Department of Education**  
**Arizona Academic Standards**  
<http://www.ade.az.gov/standards/contentstandards.asp>

# Arizona Academic Standards Crosswalk

## Reading Standard

### INTRODUCTION

Reading is a complex skill that involves learning language and using it effectively in the active process of constructing meaning embedded in text. It requires students to fluently decode the words on a page, understand the vocabulary of the writer, and use strategies to build comprehension of the text. It is a vital form of communication in the 21<sup>st</sup> century and a critical skill for students of this “information age” as they learn to synthesize a vast array of texts.

The Reading Standard Articulated by Grade Level will provide a clear delineation of what students need to know and be able to do at each grade level. This allows teachers to better plan instructional goals for students at any grade.

### RATIONALE

Requirements in the *No Child Left Behind Act of 2001* (NCLB) and the standard practice of conducting periodic review of the state academic standards prompted the decision by the Arizona Department of Education to refine and articulate the academic standards for mathematics and reading by grade level. This refinement and articulation project was started in July 2002, and was completed in March 2003.

For complete information on the Reading Standard:

<http://www.ade.az.gov/standards/language-arts/articulated.asp>

# Arizona Academic Standards Crosswalk

## Reading Standard Definitions of Strands/Concepts

### Strand One: Reading Process

Recent research has established the major components of effective reading instruction. They are identified in the six concepts of this strand, each supported with specific performance objectives. While different skills will be emphasized at different stages of a student's reading development, all components are needed and used by fluent readers as they interact with text.

#### **Concept 4: Vocabulary**

Readers who develop a rich and varied repertoire of word meanings have a greater capacity for understanding the text they read. Reading vocabulary refers specifically to words readers recognize or use in print. Students learn vocabulary by direct instruction, and also indirectly through experiences in listening to read alouds and in reading on their own.

#### **Concept 5: Fluency**

Fluency is the ability to read a text with automaticity, accuracy, and expression to support comprehension. Fluency is a critical bridge between decoding and comprehension. Once a reader is able to access the printed words with confidence, he or she can better concentrate on reading for understanding.

#### **Concept 6: Comprehension**

Understanding the meaning embedded in text is the fundamental reason for reading. Good readers establish a purpose for reading and actively monitor their comprehension to accomplish their goal. They adjust the speed of their reading to accommodate challenging text, resolve comprehension problems while they're reading, and check for understanding when they are finished. Good readers consciously use comprehension strategies to make sense of what they have read.

# Arizona Academic Standards Crosswalk

## Reading Standard Definitions of Strands/Concepts

### Strand 2: Comprehending Literary Text

This strand focuses on comprehension of fiction, including literature, poetry, and drama, and their historical and cultural contexts.

#### **Concept 1: Elements of Literature**

Comprehension elements in this concept address higher level thinking skills. This concept addresses the structure and elements of text such as plot, characters and theme, but also analyze, interpret, conclude and draw inferences. In this strand, students are expected to identify, analyze and interpret a variety of genres, relating them to their own experience and knowledge.

#### **Concept 2: Historical and Cultural Aspects of Literature**

This concept recognizes that comprehension of literary text is enhanced by an informed awareness of global issues and cultures. Literature that crosses cultural and national boundaries offers an excellent experience for students to broaden their horizons and understanding. Learning about the historical impact of an issue or incident allows today's students to make connections to the past and understand the present.

# Arizona Academic Standards Crosswalk

## Reading Standard Definitions of Strands/Concepts

### **Stand 3: Comprehending Informational Text**

The comprehension skills particular to informational text can be taught across all content areas. Students need the opportunity to learn and practice these skills with the reading material they are required to read in various subject areas. It is important that students have the opportunity to read and understand real-world text in order to apply these skills to their personal or workplace tasks.

#### **Concept 1: Expository Text**

Expository text, such as encyclopedias, articles, textbooks and reference sources, provides organized information and explanations. Students need to be able to use, interpret, and analyze expository text to locate information for school or personal use.

#### **Concept 2: Functional Text.**

Functional text, such as maps, schedules, forms and workplace manuals conveys information. Students need to be able to use, interpret, and analyze functional text in order to perform everyday practical tasks.

#### **Concept 3: Persuasive Text**

Persuasive text, such as in editorial essays, reviews or critiques is written to sway or impress the reader. Students need to carefully read and analyze persuasive text in order to determine that the information in the text is accurate and unbiased.

### Glossary

The purpose of this glossary is to help the user better understand and implement the Reading Standard. It is not intended to be a study guide for the AIMS and is not a comprehensive list of all literacy terms.

**adage**

a saying that conveys a common experience or general truth and has gained credit through extended use (e.g., a stitch in time saves nine)

**affix**

a non-word letter or group of letters attached to a root or stem to change its meaning or function, as the prefix ad- and the suffix -ing in adjoining

**allegory**

a literary work with two or more levels of meaning: one literal level and one or more symbolic or figurative levels; events, settings, objects, or characters that stand for ideas or qualities beyond themselves

**alliteration**

the repetition of consonant sounds, usually at the beginning of words

**allusion**

a reference to a well-known work of literature, famous person, or historical event with which the reader is assumed to be familiar

**analogy**

a partial similarity between two things that are otherwise dissimilar; a pairing of words designed to elicit associations between concepts and background knowledge

**anecdotal evidence**

evidence based on a brief story told to make a point or to entertain

**antonym**

a word opposite in meaning to another (e.g., wet and dry)

**argument**

a type of writing that develops a topic in a logical and persuasive manner

**aside**

a statement delivered by an actor to an audience in such a way that other characters on stage are presumed not to hear what is said; the character reveals his or her private thoughts, reactions, or motivations

**assonance**

the repetition of vowel sounds in stressed syllables or words without repeating consonant sounds

**automaticity**

the ability to read silently or orally without stopping to use decoding strategies on unknown words

**ballad**

a narrative poem, often of folk origin and intended to be sung; consists of simple stanzas, usually with a refrain

**bandwagon**

a persuasive technique that attempts to get people to follow the crowd using the logical fallacy that, since “everyone else likes it”, it must be good

**base word**

a word to which affixes may be added to change its meaning, tense, or part of speech

**bias**

the writer’s outlook or prejudice; the writer’s leaning or belief about a topic

**cause and effect**

a strategy for analyzing a subject by examining the reasons for specific actions or events (cause) and the consequences or results of certain causes (effect)

**central argument**

the main point or purpose of a piece of writing, often stated in a thesis statement or topic sentence

**character foil**

a character that provides a contrast to another character, thus intensifying the impact of that other character

**characterization**

the manner in which an author presents a character by using the character’s actions, dialogue, description, or how other characters react to that character

**cinquain**

a five line stanza with successive lines of two, four, six, eight, and two syllables

**circular reasoning**

supporting a position by merely restating it

**compare**

to use examples to show how things are similar and different, with the greater emphasis on similarities

**compare (contrast)**

a strategy for thinking or writing that involves explaining, defining, or evaluating subjects by showing how they resemble and differ from each other or from some standard for evaluation

**conceit**

an elaborate and extended metaphor, especially in poetic images

**conflict**

the problem(s) or struggle(s) between or among opposing forces that trigger(s) the action in literature (e.g., person vs. person, person vs. self, person vs. nature, person vs. society)

**connotation/connotative**

an association that a word calls to mind in addition to its dictionary or literal meaning

**consonance**

the repetition of consonant sounds within and at the end of words (e.g., stroke of luck)

**consumer publications**

publications for the use of the general public (e.g., periodicals, pamphlets, advertisements)

**contrast**

to use examples to show how things are different in one or more important ways

**credibility**

quality or power of inspiring belief; capacity for believability

**denotation/denotative**

the literal or standard dictionary meaning of a word

**digraph**

two letters representing a single speech sound (e.g., ph in phone)

**diphthong**

a speech sound beginning with one vowel sound and moving to another vowel sound within the same syllable (e.g., oi in oil)

**e.g.**

(abbreviation for for example) precedes a non-exhaustive list of examples provided as options; other examples may be appropriate but not included[compare to i.e.]

**elegy**

a song or poem written as a lament for the dead

**epic**

a narrative poem, usually about the adventures and heroic deeds of a folk hero (e.g., Homer's Iliad)

**equivocation**

language that is open to interpretation; often deliberately misleading

**etymology**

the history of words; the study of the history of words

**euphemism**

A mild or indirect term that is used in place of one considered harsh or blunt (e.g., passed away instead of died)

**evidence**

statements or information that help in making a conclusion or judgment:

- logical evidence - based on earlier known or well-known information presented in a clear organized pattern
- empirical evidence- information or facts gained by observation or experiment based on scientific analysis
- anecdotal evidence - information gained from casual observation, usually presented in a narrative style

**expository text**

writing that explains or informs through the use of facts, reasons, or examples

**fable**

a short narrative that teaches a moral or lesson; main characters are usually animals that speak and act like humans

**fact**

a statement that can be verified as true

**fairy tale**

a fanciful tale about real life problems, usually with imaginary characters such as fairies, trolls, or leprechauns

**fallacious reasoning**

reasoning that is deceptive or liable to mislead

**false causality**

the error of concluding that an event is caused by another event simply because it follows it

**fantasy**

a highly imaginative story characterized by fanciful or supernatural elements

**figurative language**

the use of words to create vivid pictures and ideas in the mind of the reader; not meant to be literally true (e.g., similes, metaphors, idioms, personification)

**flashback**

an account of a conversation, episode, or event that happened before the beginning of a story, told for the purpose of clarifying something in the present; often interrupts the chronological flow of the story

**fluency**

read with ease, expression, and automaticity to support comprehension

**folktale**

a narrative piece (e.g., epic, legend, myth, fable) that is part of the oral or written tradition of a culture passed from generation to generation

**footnotes**

the numbered notes or comments at the bottom or side of a page that comments on a designated part of the text

**foreshadowing**

writer's use of hints or clues to indicate events that will occur later in a text

**free verse**

a style of poetry that has an irregular rhyme or line pattern; verse that is developed according to author's own style

**functional text**

printed material that is specifically intended to convey information (e.g., instructions, technical manuals, labels, signs, recipes)

**genre**

a category or type of literature based on its style, form, and content (e.g., mystery, adventure, romance, science fiction)

**grapheme**

written representation of a phoneme (e.g., b for /b/, ck for /k/)

**graphic features**

features within or accompanying text, that help to clarify or explain the text (e.g., labels, illustrations, captions, headings, diagrams, charts, tables, titles)

**graphic organizer**

a visual representation of information in an organized manner that is intended to enhance understanding (e.g., Venn diagram, T-graph, word web, KWL chart)

**haiku**

a style of Japanese poetry consisting of three unrhymed lines of five, seven, and five syllables, traditionally about nature or the seasons

**historical fiction**

a long narrative that recreates an historical period or event based on fact, but embellished with imagined conversation and details

**homographs**

words with the same spelling but with different pronunciations and meanings (e.g., wind, read, bow)

**homonyms/homophones**

words with the same pronunciation but with different meanings, different parts of speech, and usually different spelling

**hyperbole**

figure of speech in which the truth is exaggerated for emphasis or humor

**i.e.**

(abbreviation for that is) precedes a specific list of items in which all of the items should be used [compare to e.g.]

**idiom**

phrase or expression that means something different from what the words actually say; usually understandable to a particular culture, language, or group of people (e.g., let the cat out of the bag)

**imagery**

descriptive language used in literature to recreate sensory experiences, enrich writing, and to make the writing more vivid; sensory details

**incongruities**

text or portions of text having inconsistent or inharmonious parts or elements

**inflectional endings**

see suffix

**inference**

a conclusion derived from facts or premises

**intonation**

the distinctive patterns of rising and falling pitch that enhances the meaning of spoken words

**irony**

using a word or phrase to mean the exact opposite of its literal meaning:· dramatic irony - where the reader or the audience sees a character's mistakes, but the character does not· verbal irony - where the writer says one thing and means another· irony of situation - where there is a great difference between the purpose of an action and the result

**learning log**

a student's record of his/her own learning activities, intended to help evaluate his/her own learning and to plan future learning

**legend**

a traditional, historical story of a culture passed from generation to generation

**limerick**

a light, humorous, five-line verse with an aabba rhyme pattern

**linguistic roots**

the origin of a word based on the nature, structure, and history of the word

**literal language**

language that is true to fact, avoiding exaggeration or metaphor

**literal meaning**

the actual or dictionary meaning of a word or phrase; language that means exactly what it appears to mean

**loaded words**

words that are slanted for or against a topic; words with strong positive or negative connotations

**logic/logical evidence**

the science of correct reasoning; correctly using facts, examples, and reasons to support one's view

**lyric**

a short poem that expresses personal feelings or emotions, often in a songlike style or form

**main idea**

the concept, thought, notion, or impression that is of greatest importance or influence:

- literal – adhering to fact or to the primary meaning or intent
- implied – a suggested meaning or intent (as opposed to explicit)
- explicit – fully revealed or expressed without vagueness, implication, or ambiguity; leaving no question as to the meaning or intent

**main character**

a character that plays a prominent role in a literary work

**metacognitive strategy**

the technique or strategy of examining one's own thinking process; awareness of one's own thinking process in order to monitor and direct the process to a desired end

**metaphor**

a figure of speech that compares two unlike things in which no word of comparison is used

**meter**

the arrangement of words in a rhythmical pattern, with stressed and unstressed syllables

**minor character**

a character that plays a role of lesser importance to the plot than the main character(s)

**mood**

the feeling(s) the text arouses in the reader (e.g., happiness, sadness, sorrow, peacefulness)

**moral**

the particular value or lesson the author attempts to convey to the reader

**myth**

a traditional or legendary story that deals with supernatural beings, ancestors, or heroes; intended to explain the mysteries of the natural world, or the customs or ideals of a society

**narrative/narration**

a type of fiction or nonfiction that tells a story or series of events

**onomatopoeia**

the use of a word whose pronunciation suggests its meaning (e.g., meow, buzz)

**onsets**

consonant(s) before the vowel(s) in a syllable, including consonant blends and digraphs (e.g., /s/ in sit, /spl/ in split)

**opinion**

a belief or conclusion not supported by evidence or facts

**organization of text**

format or structure; often varies with type of text, but common patterns exist:

- chronological order - details are arranged in the order in which they happen
- order of importance - details are arranged in order of importance: least important to most important or most important to least important
- cause-effect - details are arranged to show connections between a result and the events that preceded it
- comparison-contrast - details are arranged to show similarities and differences between two or more subjects
  - listing: details are arranged in a simple list
  - classification : details are placed into categories
- problem-solution - details are arranged to show a problem and then a way to solve the problem
- spatial - details are arranged geographically from left to right, right to left, top to bottom, and so on
- mixed - some details are arranged one way, and other details are arranged in another way

**overgeneralization**

an assumption that all members of a group, nationality, race, or gender have the characteristics observed in some members

**oversimplification**

the use of language which makes something far simpler than it is, to the point of distorting the meaning (e.g., “It’s not so bad...” )

**overstatement**

a statement that represents something as more than it actually is (e.g., “I have a million things to do today.”)

**pacing**

the reading speed or rate at which text is read

**paradox**

a statement that seems to be contradictory but that actually presents a truth

**parody**

a form of literature that intentionally uses a comic effect to mock a literary work or style

**peer pressure**

a persuasive technique in which the reader is pressured to think or act a particular way so as to be accepted by one's peers

**personification**

a figure of speech in which something non-human is given human characteristics or powers

**persuasive techniques**

devices of persuasion used for the purpose of changing one's mind, making one take action, or both; usually accomplished by a combination of emotional appeals and logical reasoning (see bandwagon, peer pressure, circular reasoning, oversimplification, transfer, loaded words, testimonial, false causality, overgeneralization, oversimplification)

**phoneme**

the smallest unit of sound within a word that distinguishes one word from another (e.g., cat = /c/ /a/ /t/)

**phonemic awareness**

the awareness of and the ability to manipulate sounds in the spoken word

**phonogram**

a spelling pattern, word family, or rime (e.g., -ame, -ack, -ay, -in)

**plot**

the action or sequence of related events that make up a story, consisting of five basic elements:

- exposition – the opening of a short story up to the point that the conflict is introduced to the reader
- rising action – the chain of events in which the conflicts intensify
- climax – the point of highest interest; point at which the reader makes his greatest emotional response; the point in the story in which rising action is about to turn into falling action
- falling action – takes place after the climax when the action begins to wind down or conflicts begin to lessen
- resolution – tells how the story conflict is resolved and ties up loose ends from the story

**poetry**

the expression of traditionally rhythmic compositions (sometimes rhymed, expressing ideas, experiences, or emotions) in a style more concentrated, imaginative, and powerful than that of ordinary speech or prose; generally categorized into specific forms based on purpose (e.g., elegies, ballads, parodies) and/or meter or rhyme scheme (e.g., sonnets, limericks, cinquains, free verse, haikus)

**point of view**

the perspective from which the story is told:

- first person – the narrator is a character who tells the story as he or she experienced, saw, heard, and understood it; identified by the first person pronouns I or we

- third person omniscient – the narrator is all-knowing, with the ability to see into the minds of more than one character
- third person limited - the narrator has the ability to see into the mind of only one character

**prefix**

a linguistic unit added to the beginning of a word which changes its meaning (i.e., re-, mis-, un-)

**primary source**

an original source that informs directly, not through another person’s explanation or interpretation (e.g., firsthand reports, diaries, letters, journals, original documents)

**print concepts**

the prerequisite skills students need about print as they learn how to read:

- book handling ( e.g., front of book, print contains meaning, left page before right)
- directional behavior (e.g., where to start, left to right, return sweep)
- visual scanning and analysis
- language concepts (e.g., meaning of punctuation marks, capital letters)
- hierarchal concepts (e.g., word by word matching, difference between letter and word)

**prior knowledge**

knowledge gained from previous experience(s)

**prose**

written or spoken language that is not poetry (verse)

**prosody**

the rhythmic and inflectional aspect of language; expression

**r-controlled vowels**

a vowel whose sound is influenced by an r that directly follows it (e.g., farm, her, first, torn, nurse)

**redundancy**

repetition that is needless or distracting

**repetition**

repeating a word, phrase, sentence, or the like for impact and effect

**rhetorical device**

literary device that is intended to emphasize a point, not to obtain a response

**rhyme**

identical or very similar recurring final sounds in words within, or more frequently, at the ends of lines of verse

**rhythm**

a pattern of repeated cadence or accent in speech or text

**rimes**

the vowel(s) and any following consonant(s) in a syllable (e.g., /it/ in sit, /oat in float)

**root**

in a complex word, the meaningful base form after all affixes are removed

**root word**

meaningful base form after all affixes are removed

**satire**

a literary technique that combines a critical attitude with humor, often with the intent of correcting or changing the subject of the satire

**search engine**

computer software used to search data for specified information

**secondary source**

a source that contains information others have gathered and interpreted; indirect or secondhand information (e.g., newspaper and magazine accounts, encyclopedia articles, research studies, web sites, documentaries)

**sequencing**

the arrangement or ordering of subject matter to aid understanding:

- developmental
- chronological
- easy to difficult (difficult to easy)
- part to whole (whole to part)

**setting**

the time of day or year; historical period, place, situation

**simile**

figure of speech comparing two things that are unlike; uses the words like and as (e.g., as strong as an ox, flies like an eagle)

**soliloquy**

lines in a drama in which a character reveals his or her thoughts to the audience, but not to the other characters, by speaking as if to himself or herself

**sonnet**

a poem consisting of 14 lines with a formal rhyme scheme, which expresses a thought or feeling in a unified way

**stylistic elements**

components of a distinctive manner of expression; elements that comprise a literary style

**suffix**

a linguistic unit added to the end of a base word which changes the word's meaning or grammatical function (e.g., -ed, -ly, -ness)

**symbol**

person, place, or thing that represents something beyond itself (e.g., sword can stand for war, a

desert might represent loneliness or solitude, a dove as a symbol of peace)

**symbolism**

a literary technique in which an author uses symbols to represent concrete ideas, events, or relationships

**synonym**

one of two or more words that have a highly similar meaning (e.g., grip and grasp)

**syntax**

the study of sentence structure with emphasis on the grammatical relationships of the words and other elements

**testimonial**

a persuasive technique in which a personal success story is used to influence others

**text features**

components that support and clarify text (e.g., illustrations, titles, topic sentences, key words)

**theme**

the underlying idea or statement that the author is trying to convey

**tone**

the overall feeling or effect created by a writer's use of words (e.g., playful, serious, bitter, angry, sarcastic)

**transfer**

a persuasive technique that attempts to transfer positive feelings associated with images not necessarily related to the issue (e.g., a fabric softener advertisement set in beautiful, clear mountain scenery, implying freshness)

**understatement**

a statement that represents something as less than it actually is (e.g., The hurricane was a little windy.)

**workplace documents**

text, forms, or documents specifically used in the workplace or for business purposes (e.g., memos, business letters, applications, resumes, e-mails)

# Arizona Academic Standards Crosswalk

## Mathematics Standard

### INTRODUCTION

Mathematics is a highly interconnected discipline. The need to understand and use a variety of mathematical strategies in multiple contextual situations has never been greater. Utilization of mathematics continues to increase in all aspects of everyday life, as a part of cultural heritage, the workplace, and in the scientific and technical communities. Today's changing world will offer enhanced opportunities and options for those who thoroughly understand mathematics.

The Mathematics Standard Articulated By Grade Level describes a connected body of mathematical understandings and competencies that provide a foundation for all students. They define the understanding, conceptual knowledge, and skills that students are to acquire.

Communication, problem solving, reasoning and proof, connections and representation are the process standards as described in the *Principles and Standards for School Mathematics* from the National Council of Teachers of Mathematics (NCTM). These process standards are interwoven within all the content strands of the Arizona Mathematics Standard. The process standards emphasize ways to acquire and use the content knowledge.

Mathematics education should enable students to fulfill personal ambitions and career goals in an informational age. In the NCTM *Principles and Standards* document it asks us to “*Imagine a classroom, a school, or a school district where all students have access to high-quality, engaging mathematics instruction. There are ambitious expectations for all, with accommodations for those who need it*”.<sup>1</sup> The Arizona Mathematics Standard Articulated by Grade Level is intended to facilitate this vision.

### RATIONALE

Requirements in the *No Child Left Behind Act of 2001* (NCLB) and the need to do a periodic review of the state academic standards prompted the decision by the Arizona Department of Education to refine and articulate the academic standards for mathematics and reading by grade level. This refinement and articulation project was started in July 2002, and was completed in March 2003.

Due to the nature of the content, some performance objectives are repeated in subsequent grade levels. However, the intent is that the complexity, depth, and difficulty of the performance objective content must increase from one grade level to the next.

For more information on the Mathematic Standard:  
<http://www.ade.az.gov/standards/math/articulated.asp>

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Mathematics Standard

### Strand One: Number Sense and Operations

Number Sense is the understanding of numbers and how they relate to each other and how they are used in specific context or real-world application. It includes an awareness of the different ways in which numbers are used, such as, counting, measuring, labeling, and locating. It includes an awareness of the different types of numbers, such as, whole numbers, integers, fractions, and decimals and the relationships between them, and when each is most useful. Number sense includes an understanding of the size of numbers, so that students should be able to recognize that the volume of their room is closer to 1,000 than 10,000 cubic feet.

Students develop a sense of what numbers are: to use numbers and number relationships, to acquire basic facts, to solve a wide variety of real-world problems, and to estimate to determine the reasonableness of results.

#### **Concept 1: Number Sense**

Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.

#### **Concept 2: Numerical Operations**

Understand and apply numerical operations and their relationship to one another.

#### **Concept 3: Estimation**

Use estimation strategies reasonably and fluently.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Mathematics Standard

### Strand 2: Data Analysis, Probability, and Discrete Math

This strand requires students to use data collection, data analysis, statistics, probability, systematic listing and counting, and the study of graphs. This prepares the student for the study of discrete functions, fractals and chaos, and to make valid inferences, decisions, and arguments.

Discrete mathematics is a branch of mathematics that is widely used in business and industry. Combinatorics is the mathematics of systematic counting. Vertex-edge graphs are used to model and solve problems involving paths, networks, and relationships among a finite number of objects.

#### **Concept 1: Data Analysis (Statistics)**

Understand and apply data collection, organization, and representation to analyze and sort data. This is considered to be the analysis and interpretation of numerical data in terms of samples and populations.

#### **Concept 2: Probability**

Understand and apply the basic concepts of probability. This is the field of mathematics that deals with the likelihood that an event will occur expressed as the ratio of the number of favorable outcomes in the set of outcomes divided by the total number of possible outcomes.

#### **Concept 3: Discrete Mathematics (Systematic Listing & Counting)**

Understand and demonstrate the systematic listing and counting of possible outcomes. This field of mathematics is generally referred to as Combinatorics.

#### **Concept 4: Discrete Mathematics (Vertex-Edge Graphs)**

Understand and apply the concepts vertex-edge graphs and networks. This field ties in graph theory with practical problems.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts

### Mathematics Standard

#### Strand 3: Patterns, Algebra, and Functions

Patterns occur everywhere in nature. Algebraic methods are used to explore, model and describe patterns, relationships, and functions involving numbers, shapes, iteration, recursion, and graphs within a variety of real-world problem solving situations. Iteration and recursion are used to model sequential, step-by-step change.

Algebra emphasizes relationships among quantities, including functions, ways of representing mathematical relationships, and the analysis of change.

##### **Concept 1: Patterns**

Identify patterns and apply pattern recognition to reason mathematically. Students begin with simple repetitive patterns of many iterations. This is the beginning of recursive thinking. Later, students can study sequences that can best be defined and computed using recursion

##### **Concept 2: Functions & Relationships**

Describe and model functions and their relationships. For example, distribution and communication networks, laws of physics, population models, and statistical results can all be represented in the symbolic language of algebra.

##### **Concept 3: Algebraic Representations**

Represent and analyze mathematical situations and structures using algebraic representations. Algebraic representation is about abstract structures and about using the principles of those structures in solving problems expressed with symbols.

##### **Concept 4: Analysis of Change**

Analyze change in a variable over time and in various contexts such as, qualitative change, quantitative change, and the idea that slope represents the constant rate of change in linear functions, and functions that have non-constant rates of change.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Mathematics Standard

### Strand 4: Geometry and Measurement

Geometry is a natural place for the development of students' reasoning, higher thinking, and justification skills, culminating in work with proofs. Geometric modeling and spatial reasoning offer ways to interpret and describe physical environments and can be important tools in problem solving. Students use geometric methods, properties and relationships, transformations, and coordinate geometry as a means to recognize, draw, describe, connect, analyze, and measure shapes and representations in the physical world.

Measurement is the assignment of a numerical value to an attribute of an object, such as the length of a pencil. At more-sophisticated levels, measurement involves assigning a number to a characteristic of a situation, as is done by the consumer price index. Understanding what a measurable attribute is and becoming familiar with the units and processes that are used in measuring attributes, is a major emphasis in this strand.

#### **Concept 1: Geometric Properties**

Analyze the attributes and properties of two- and three-dimensional shapes and develop mathematical arguments about their relationships (in conjunction with strand 5, concept 2).

#### **Concept 2: Transformation of Shapes**

Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.

#### **Concept 3: Coordinate Geometry**

Specify and describe spatial relationships using coordinate geometry and other representational systems.

#### **Concept 4: Measurement - Units of Measure - Geometric Objects**

Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Mathematics Standard

### Strand 5: Structure and Logic

This strand is unique to the Arizona Mathematics Standard and might be considered an extension of problem solving. Students draw from the content of the other four strands to devise algorithms and analyze algorithmic thinking. Strand One and Strand Three provide the conceptual and computational basis for these algorithms. Logical reasoning and proof draws its substance from the study of geometry, patterns, and analysis to connect remaining strands. Students use algorithms, algorithmic thinking, and logical reasoning, both inductive and deductive, as they make conjectures and test the validity of arguments and proofs. They evaluate situations, select problem solving strategies, draw logical conclusions, develop and describe solutions and recognize their applications.

#### **Concept 1: Algorithms and Algorithmic Thinking**

Use reasoning to solve mathematical problems in contextual situations. Determine step-by-step series of instructions to explain mathematical processes.

#### **Concept 2: Logic, Reasoning, Arguments, and Mathematical Proof**

Evaluate situations, select problem solving strategies, draw logical conclusions, develop and describe solutions, and recognize and describe their applications. Develop mathematical arguments based on induction and deduction, and distinguish between valid and invalid arguments.

# Arizona Academic Standards Crosswalk

## Mathematics Standard

### Glossary

**absolute value**

a number's distance from zero on a number line; the absolute value of -4 is 4; the absolute value of 4 is 4 symbolically,  $|-4| = 4$  and  $|4| = 4$

**actual measure**

the exact measurement of an object

**acute angle**

an angle whose measure is between 0 and  $90^\circ$

**addends**

numbers used in the mathematical operation of addition

**addition**

a mathematical operation based on “putting things together”

**additive inverses**

two numbers whose sum is zero (opposites)

**adjacent angles**

two coplanar angles that share a common side and a common vertex but do not share common interior points

**algebraic expression**

a group of numbers, symbols, and variables that express a single or series of operations; mathematical phrase with one or more terms, one or more variables

**algebraic sentence**

an equation or inequality that represents a relationship between two expressions

**algorithm**

a set of step-by-step instructions for completing a task

**alternate exteriorangles**

angles formed by a transversal intersecting two lines; angles on opposite sides of the transversal, having two different vertices, and outside the lines

**alternate interiorangles**

angles formed by a transversal intersecting two lines; angles on opposite sides of the transversal, having two different vertices, and between the lines

**analog clock**

a device, with an hour, minute and second hand which shows a continuous sweep of time passing rather than in “jumps”(digital)

**angle**

a geometric figure consisting of two rays with a common endpoint (vertex)

**angle bisector**

a line or ray that divides an angle into two congruent angles

**appropriate math terminology**

vocabulary that accurately defines mathematical, concepts, operations and content at a given grade level

**appropriate measure of accuracy**

the degree of accuracy required for a given mathematical task ( i.e., approximating the number of cubic inches needed in determining the volume of space for packing would have a need for less accuracy than say, the measurement of a piece of molding to fit precisely on a door frame)

**approximation**

a value that is sufficiently exact for a specified purpose

**arc**

a part of a circle that consists of two points, called endpoints, and all points of the circle between them

**area**

The two dimensional space enclosed by the perimeter is called the area.

**arithmetic fact**

any of the basic addition and multiplication numerical statements and the corresponding subtraction and division relationships

**arithmetic sequence**

a set of ordered terms in which the difference between consecutive terms is constant

**array**

a rectangular arrangement of objects in rows and columns (no gaps and no overlaps)

**ascending order**

a listing in which numbers or terms are organized in increasing value.

**associative property**

the property that states for real numbers  $a$ ,  $b$ , and  $c$ ,  $(a + b) + c = a + (b + c)$  and  $(ab)c = a(bc)$ . Essentially this property is a grouping of three terms where the sum and product of the first two with the third is the same as the sum or product of the last two and the first

**attribute**

a common feature of a set of objects or numbers

**average**

See mean

**axiom**

a self-evident truth; a truth without proof and from which further statements, or theorems, can be derived

**axis**

either of two perpendicular number lines used to form a coordinate plane

**bar graph**

a graph in which horizontal or vertical bars represent data

**base**

a term used as a factor for repeated multiplication (i.e., in  $4^7$ , 4 is the base)

**base of a polygon**

the side(s) that is perpendicular to the height

**base of a polyhedron**

either of the two congruent parallel faces of a prism; the face of a pyramid that does not have to be a triangle

**biased sample**

a sample that is not representative of a population

**bi-conditional**

a logical statement containing the phrase “if and only if” (iff) ; both the statement and its converse are true

**binomial**

an expression consisting of two terms connected by a plus or minus sign (i.e.,  $4a+6$ )

**bisect**

to divide into two congruent parts

**box and whisker plot**

a graph that uses a rectangle to represent the middle 50% of a set of data and line segments (or whiskers) where each represents 25% of the data; A line segment representing the median value divides the rectangle so that each section represents 25% of the data

**calculation**

action, process, or result of a mathematical computation

**capacity**

a measure of how much (volume) a container can hold

**causation**

an action that produces an effect

**Celsius**

metric measurement of temperature (i.e., 32 degrees Celsius,  $32^{\circ}\text{c}$ )

**census**

data collected from every member of the identified population

**centimeter**

a metric unit of length equivalent to 1/100 of a meter

**chord of a circle**

a segment joining any two points on the circle

**circle**

a set of points in a plane equidistant from a given point called the center

**circle graph**

a graph in which a circle is divided into sectors in order to compare different parts of a data set to the entire set (i.e., pie graph)

**circumference**

the perimeter of a circle

**closureproperty**

a set is closed under an operation if the application of the operation on any members in the set always results in a member of that set

**co-efficient**

the numerical factor in an algebraic term (i.e., in  $7x$ , 7 is the co-efficient)

**combinations**

a group of unordered items or events taken from a larger group (i.e., the number of three-person committees that can be chosen from a group of 21)

**common denominator**

any nonzero number that is a multiple of the denominators of two or more fractions

**common factor**

any number that is a factor of two or more numbers (i.e., 4 is a common factor of 8 and 12)

**common multiple**

a term that contains two or more terms as factors

**commutative property**

the property in addition and multiplication that states the order in which two terms are added or multiplied does not change the results. For real numbers  $a$  and  $b$ ,  $a + b = b + a$  and  $ab = ba$

**complementary angles**

two angles, the sum of whose measures is  $90^\circ$

**complex fraction**

a fraction that contains one or more fractions in the numerator or denominator

**complex number**

a number that can be written in the form  $a + bi$ , where  $a$  and  $b$  are real numbers and  $i$  is the imaginary number

**composite number**

a number that has more than two numerical factors

**concave polygon**

a polygon with one or more diagonals that have points outside the polygon

**conclusion**

the *then* clause of a conditional statement

**conditional statement**

a statement in “if-then” form where the “if” clause is called the hypothesis and the “then” clause is called the conclusion

**cone** a three-dimensional figure generated by rotating a right triangle about one of its legs

**concrete objects**

physical objects used to represent mathematical situations

**conjecture**

an unproven statement based on observations

**consecutive**

in order, with nothing missing

**consecutive exterior angles**

angles formed by a transversal intersecting two lines; angles on the same side of the transversal, having two different vertices, and outside the two lines; if the two lines are parallel, the same side exterior angles are supplementary

**consecutive interior angles**

angles formed by a transversal intersecting two lines: angles on the same side of the transversal, having two different vertices, and inside the two lines; if the two lines are parallel, the same side interior angles are supplementary

**constant**

a quantity that always stays the same

**construct**

a conclusion or result built or put together systematically

**contextual situation**

relating a mathematical problem to a real modeled or illustrated circumstance

**continuous data**

data in which there are no gaps, jumps or holes; data that can be measured and broken down into smaller parts and still have meaning; temperature and time are continuous

**contra-positive of a statement**

a new statement obtained by exchanging the negation of the conclusion with the negation of the hypothesis of a conditional statement

**converse of a statement**

a new statement obtained by exchanging the hypothesis and the conclusion of a conditional statement

**convex polygon**

a polygon with each interior angle measuring less than  $180^\circ$ ; all diagonals of a convex polygon lie inside the polygon

**coordinate system (Cartesian)**

a two dimensional system in which the coordinates of a point are its distances from the origin, the intersection of the x and y axes

**coordinates of a point**

an ordered pair of real numbers that locates a point in a plane

**co-planar**

in the same plane

**correlation**

an association between two variables

**corresponding angles**

angles formed by a transversal intersecting two lines; angles on the same side of the transversal, having two different vertices, and in the same relative position; if the two lines are parallel, the corresponding angles are congruent

**cosine**

in a right triangle, the ratio of the length of the leg adjacent to an acute angle to the length of the hypotenuse

**counter-example**

an example that shows that a conjecture is not always true

**counting numbers**

the set of numbers consisting of 1, 2, 3, 4, 5, 6, ... (natural numbers)

**cube**

the third power of a number; a regular three-dimensional figure having six congruent square faces

**customary system of measurement**

the measuring system used most often in the united states (i.e., inches, pounds, gallon)

**cylinder**

a three dimensional figure composed of two congruent and parallel circular regions joined by a curved surface

**data**

information gathered by observation, questioning or measurement, usually expressed with numbers

**data sets**

a defined group of information, especially numerical

**decimal number system**

a place value number system based on groupings by powers of ten

**decimal point**

the point used to write values less than one in the base ten number system

**deductive reasoning**

a series of logical steps in which a conclusion is drawn directly from a set of statements (premises) that are assumed to be true

**degree**

a unit of measure for angles based on dividing a circle into 360 equal parts; or a unit of measure for temperature

**denominator**

the number of equal parts into which a whole is divided (i.e., in the fraction  $\frac{3}{4}$ , 4 is the denominator)

**density property**

between any pair of rational numbers there is another number

**dependent events**

two events in which the outcome of the second event is affected by the outcome of the first event

**dependent variable**

in a function, the variable that is determined by the value of the related independent variable

**descending**

an order in which numbers or terms are organized in decreasing value

**diagonal**

a line segment joining two non-adjacent vertices of a polygon

**diameter**

a chord that contains the center of the circle

**difference**

the result of a subtraction

**digit**

in the base ten numeration system, one of the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

**digital clock**

a device for telling time, makes jumps from number to number ( digital clocks usually use numbers with a colon separating the hour from the minutes, 6:30)

**dilation**

a transformation that either enlarges or reduces a geometric figure proportionately

**dimension**

a measure in one direction (i.e., length or width)

**discrete data**

involves a count of data items that can't be broken down into smaller units, such as number of defects, people, or items

**discrete mathematics**

the study of mathematics dealing with objects that can assume only certain "discrete" values; discrete objects can be characterized by integers whereas continuous objects require real numbers

**dissection**

to separate into parts, usually equal

**distance**

the length of the shortest line segment joining two points

**distance formula**

a formula used to find the distance between two points identified by their ordered pairs:

**distortions of sets of data**

the use of incorrect proportion, design variation in comparing to sets of data, lack of context or insignificant data used in direct comparison with meaningful data

**distributive property**

the distributive property of multiplication over addition or subtraction is a multiplication of a group of terms such that the multiplier is multiplied by each and every term in the group  $a$ ,  $b$ , and  $c$ ,  $a(b + c) = ab + ac$  and  $a(b - c) = ab - ac$

**dividend**

in a division problem, the quantity to be divided

**divisibility**

one whole number is divisible by another whole number if the result of the division is a whole number without a remainder

**division**

a mathematical operation based on separating into equal parts

**divisor**

in a division problem, the quantity by which another quantity is divided

**domain**

the set of values for the independent variable of a function (i.e., usually, the  $x$  values of a function)

**edge of a polyhedron**

a line segment where two faces of a polyhedron meet

**edge (vertex-edge graph)**

the path that joins two vertices

**elapsed time**

time between two events

**ellipsis**

the mark “...” to indicate the continuance of a pattern

**empty set**

a set that contains no elements

**endpoint**

the point at either end of a line segment; also, the initial point of a ray

**equation**

a mathematical sentence in which equivalent values are separated by an equal sign

**equivalent**

equal in value, but in a different form

**equilateral triangle**

a triangle with three congruent sides

**estimate**

a close rather than exact answer

**evaluate**

to find the numerical value of a mathematical expression

**even number**

an integer that is divisible by two without a remainder

**event**

one of the many occurrences that can take place during a probability activity

**expanded notation**

a way to write numbers that shows the place value of each digit. (i.e.,  $343 = 300+40+3$ )

**experimental (empirical) probability**

relating to the outcomes of an actual performance of a probability activity

**exponent**

a number placed to the right of and above a non-zero base that indicates how many times the base is used as a factor; a base with a zero exponent is equal to 1 (i.e.,  $5^0 = 1$ ,  $5^3 = 5 \cdot 5 \cdot 5$  and

$$5^{-3} = \frac{1}{5^3} = \frac{1}{5 \cdot 5 \cdot 5}$$

**exponential function**

a function commonly used to study growth and decay; it has a form  $y = a^x$

**expression**

a mathematical phrase containing one or more terms linked by operation symbols

**face of a polyhedron**

a flat surface on a three-dimensional object

**fact family**

a collection of related addition and subtraction facts, or multiplication and division facts, made from the same numbers

**factor (noun)**

a number or expression that evenly divides another quantity (i.e., 4 is a factor of 12; and  $(x + 1)$  is a factor of  $x^2 + 3x + 2$ )

**factor (verb)**

to represent a number as a product of factors

**Fahrenheit**

the customary scale system for temperature measurement ( $32^\circ\text{F}$ )

**finite set**

a set that contains a countable number of elements

**formula**

a general mathematical rule using variables

**fractal**

an algebraically generated complex geometric shape having the property of being endlessly self-similar under magnification

**fraction**

a number in the form  $\frac{a}{b}$ , where  $b$  is not zero

**fractional part**

part of a whole or part of a group that is less than a whole

**frequency table**

a collection of data that specifies the number of occurrences in each of several categories

**function**

(input – output) a dependent relationship between two sets of numbers in which a value in the first set determines one and only one element in the second set

**geometric model**

a model of mathematical concepts using geometric representations

**geometric sequence**

a set of ordered terms in which the ratio between consecutive terms is constant

**geometric solid**

a three dimensional shape bounded by surfaces (i.e., rectangular prism, pyramid, cylinder, cone, and sphere)

**graph**

a pictorial device that shows a relationship between variables or sets of data

**greatest common factor**

largest factor that two or more numbers have in common (GFC) (i.e., the GFC of 8 and 12 is 4)

**grouping symbols**

symbols of inclusion; parentheses, brackets, braces or bars (i.e., ( ) , [ ] , { } , "\$ %)

**height**

the perpendicular distance to a base from a vertex or between bases

**hexagon**

a polygon with six sides

**histogram**

a vertical bar graph with each bar representing a certain interval of data

**horizontal**

parallel to or in the plane of the horizon; in a coordinate grid, the x-axis is a horizontal line

**hypotenuse**

the side opposite the right angle in a right triangle

**hypothesis**

the *if* clause of a conditional statement

**identity element**

a number when used in an operation with a given number leaves the given number unchanged; the identity element for addition is zero; the identity element for multiplication is 1

**image**

a figure created as the result of a transformation

**imaginary numbers**

the square root of a negative number expressed using  $i$  ( $\sqrt{-1} = i$ )

**improper fraction**

a fraction in which the numerator is greater than the denominator

**independent events**

two events in which the outcome of the second event does not related to the outcome of the first event

**indirect proof**

a deductive proof using contradiction or elimination to rule out all possible conclusions except the desired one

**inductive reasoning**

making a generalization based on observation of specific cases or patterns (i.e., formulating a rule after considering several parts of a pattern)

**inequality**

a statement indicating that two quantities are not equal

**inference**

a conclusion drawn from data

**infinite set**

the set in which the number of elements cannot be counted or determined (never ending)

**inscribed angles**

an angle with its vertex on the circle and with sides that are chords of the circle

**integers**

the set of numbers consisting of the whole numbers and their opposites  $\frac{1}{4}$  -2, -1, 0, 1,  $2\frac{1}{4}$

**interval**

the set of numbers between two numbers a and b; the interval may include a or b

**inverse operation**

a related but opposite process (i.e., multiplication is the inverse of division)

**inverse of a statement**

a new statement obtained by negating both the hypothesis and the conclusion of a conditional statement

**irrational numbers**

a set of numbers that cannot be expressed as a ratio of two integers (i.e.,  $\pi, \sqrt{2}$ )

**isosceles triangle**

a triangle that has at least two congruent sides

**iterative pattern**

a pattern generated by using an initial value and repeatedly applying an operation (i.e., 4,7,10,13, is adding 3 each time)

**kite**

a quadrilateral with two distinct pairs of adjacent, congruent sides

**lateral surface**

in a prism or a pyramid, it is the face that is not a base

**least common multiple**

the smallest number for which two or more numbers are factors (i.e., the LCM of 3, 4, and 6 is 12)

**line**

an undefined geometric term; a straight path that extends infinitely in opposite directions; a line that has no thickness

**line graph**

a graph in which points are connected by line segments to represent data

**line of best fit**

a line drawn on a scatter plot to estimate the relationship between two sets variables in a set of data

**line of symmetry**

a line that divides a figure into two congruent parts that are mirror images of each other

**line plots**

a sketch of data in which check marks, x's, or other marks above a number line shows the frequency of each value

**line segment**

a part of a line that consists of two points, called endpoints, and all the points between them

**linear equation**

a polynomial equation containing one or more terms in which the variable is raised to the power of one but no higher

**linear function**

a function that has a constant rate of change and can be modeled by a straight line

**liter**

a metric unit of capacity, equal to the volume of a cube that measures ten centimeters on a side

**logic**

a system of reasoning used to validate arguments

**lowest common denominator**

the least common multiple of the denominators of every fraction in a given collection of fractions

**magnitude**

size or quantity

**manipulatives**

a wide variety of physical materials, objects, and supplies that students use to foster the learning of abstract ideas in mathematics

**matrix**



a number into which the given number may be divided with no remainder

**multiplication**

the operation of repeated addition (i.e.,  $4 \times 3$  is the same as  $4+4+4$ )

**natural numbers**

the set of counting numbers consisting of 1, 2, 3, 4, 5, 6...

**negative number**

a number less than zero

**net of a polyhedron**

a two-dimensional representation of the surface of a three-dimensional figure that has been unfolded

**normal curve**

in statistics, the distribution of data along a bell-shaped curve that reaches its maximum height at the mean

**normal distribution**

a “bell-shaped” probability distribution; there are as many values that are less than the mean as there are values that are greater than the mean

**number line**

a diagram that represents numbers as points on a line with a uniform scale

**number sentence**

an equation or inequality with numbers

**numerator**

the number or expression written above the line in a fraction; it tells how many equal parts of a total number of parts are described by a fraction

**obtuse angle**

an angle whose measure is greater than  $90^\circ$  and less than  $180^\circ$

**octagon**

a polygon with eight sides

**odd number**

an integer that is not divisible by two

**open sentence**

a statement that contains at least one unknown (i.e.,  $6 + x = 14$ )

**operation**

an action performed on some set of quantities (i.e., addition, raising to a power)

**order of operations**

the sequence in which operations are performed when evaluating an expression

**ordered pair**

a pair of numbers used to locate points in the coordinate plane

**ordinal number**

a whole number that names the position of an object in a sequence

**origin**

the intersection of the  $x$ - and  $y$ -axes in a coordinate plane; the origin is described by the ordered pair  $(0,0)$

**outcome**

one of the possible events in a probability situation

**outcome set**

set of all outcomes of a given situation

**outliers/extreme values**

numerical data piece that are significantly larger or smaller than the rest of the data in a set

**parallel lines**

lines in the same plane that never intersect and are always the same distance apart

**parallelogram**

a quadrilateral with opposite sides parallel and congruent

**pattern**

a set or sequence of shapes or numbers that are repeated in a predictable manner

**pentagon**

a polygon with five sides

**percent**

a ratio that compares a number to 100 ( % )

**perfect square**

a whole number whose square root is a whole number

**perimeter**

the distance around a shape or figure

**permutation**

an ordered arrangement of a set of events or items ( if you put the items or events into a different order, you have a different permutation)

**perpendicular lines**

two lines that intersect to form right angles

**pi**

the ratio of the circumference of a circle to its diameter. Pi is an irrational number and approximately equal to 3.14 or  $\frac{22}{7}$

**pictograph**

a graph that uses pictures or symbols to represent data

**place value**

the value of the position of a digit in a numeral

**plane**

an undefined geometric term; a flat surface that extends infinitely in all directions

**point**

an undefined geometric term; denotes an exact location in space; a point has no size

**polygon**

a closed two-dimensional figure made up of segments, called sides, which intersect only at their endpoints, called vertices

**polyhedron**

a closed three-dimensional figure in which all the surfaces are polygons

**polynomial**

an expression consisting of two or more terms

**population**

in statistics, an entire set of objects, observations, or scores that have something in common

**postulate**

a mathematical statement that is accepted as true without proof

**power**

a number with a base and an exponent

**predictions**

use of base information to produce an approximation of change or result

**pre-image**

a picture or object before it undergoes a transformation

**premise**

a statement that is given to be true

**prime number**

a positive integer that has exactly two different positive factors, itself and one; one is not a prime number

**prime factorization**

a composite number expressed as the product of factors that are prime numbers

**prism**

three-dimensional figures that have two congruent and parallel face that are polygons; the remaining faces are parallelograms

**probability**

the measure of the likelihood of an event occurring

**product**

the result of multiplication

**proof**

a logical argument that shows why a statement must be true

**proper fraction**

a fraction whose numerator is an integer smaller than its integral denominator

**properties of operations**

mathematical principals that are always true (i.e., commutative, associative, distributive and inverses)

**proportion**

the statement of equality between two ratios

**proportionality**

the concept of having equivalent ratios

**pyramid**

a three-dimensional figure whose base is a polygon and who's other faces are triangles that share a common vertex

**Pythagorean theorem**

in a right triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse ( $a^2+b^2= c^2$ )

**quadrant**

one of the four sections into which the coordinate plane is divided by the  $x$ - and  $y$ -axes

**quadratic equation**

a polynomial equation containing one or more terms in which the variable is raised to the second power but no higher

**quadratic formula**

the formula used to find the roots of quadratic equations

**quadratic function**

a function that has an equation of the form:  $y = ax^2 + bx + c$ ,  $a \neq 0$ ; a function of degree two

**quadrilateral**

a polygon with four sides

**quartiles**

the quartiles divide an ordered set of data into four groups of the same size

**quotient**

the result of division of one quantity by another (dividend  $\div$  divisor = quotient)

**radius of a circle**

a segment whose endpoints are the center of the circle and a point on the circle (radii)

**random sample**

each item or element of the population has an equal chance of being chosen as part of a sample of the population

**range**

the set of output values for a function

**range (of data set)**

the difference between the greatest and least number in a set of numbers

**rate**

a ratio comparing two different units (i.e., miles per hour or cents per pound)

**ratio**

a comparison of two values by division; a ratio can be expressed as *a to b* or *a:b*

**rational number**

a number that can be expressed as a ratio of two integers

**ray**

a geometric figure that extends infinitely along a straight path from a point, called its endpoint

**real numbers**

the set of numbers combining rational and irrational numbers

**reasonable estimations**

approximations based on mathematical reasoning that are within the desired degree of accuracy (i.e.,  $35+43=$  reasonable estimation would be 75 or 80 not 100 or 700)

**reciprocals**

two numbers whose product is equal to one (multiplicative inverses)

**rectangle**

a quadrilateral with two pairs of congruent, parallel sides and four right angles (square, parallelogram, quadrilateral, polygon)

**recursive pattern**

a pattern that uses the solution from previous steps to generate the solution to the next step. (i.e., 2,2,4,6,10,16...)

**reflection**

a transformation creating a mirror image of a figure on the opposite side of a line

**reflex angle**

an angle that is greater than  $180^\circ$  and less than  $360^\circ$

**reflexive property**

the property that states a quantity is equal to itself; the property that states an object is congruent to itself

**regular polygon**

a convex polygon in which the angles are equiangular and sides are equilateral

**repeating decimal**

a decimal in which one or more digit(s) repeats without termination

**rhombus**

a parallelogram with four congruent sides. (plural: rhombi)

**right angle**

an angle whose measure is  $90^\circ$

**right triangle**

a triangle that contains a right angle

**root**

the inverse of a power

**rotation**

a transformation in which a figure is turned a given angle and direction around a point

**rounding**

approximating a number by analyzing a specific place value

**sample**

a part of the total population; used in statistics to make predictions about the characteristics of the entire group

**sample space**

a list of all possible outcomes of an activity

**scale**

(1) an instrument used for weighing; (2) a system of marks at fixed intervals used in measurement or graphing

**scale factor**

the ratio between the lengths of corresponding sides of two similar figures

**scalene triangle**

a triangle with no sides the same length and no congruent angles

**scatter plot**

a graph of the points representing a collection of data

**scientific notation**

a form of writing a number expressed as a power of 10 and a decimal number greater than or equal to one and less than ten

**secant**

a line that intersects a circle at exactly two points; a line that contains a chord of a circle

**sector**

a region defined by a central angle and an arc

**signed number**

a positive or negative number

**similar figures**

figures that are the same shape but not necessarily the same size

**sine**

in a right triangle, the ratio of the length of the leg opposite the given angle to the hypotenuse

**skip counting**

counting by equal intervals (i.e., 2,4,6... or 4,8,12...)

**slope of a line**

the measure of steepness of a line; the ratio of rise over run; or change in  $y$  over change in  $x$

**solid**

a three-dimensional figure

**solution**

a value for a variable that makes an equation or inequality true

**solution set**

a set consisting of all values that make an equation or inequality true

**space**

the set of all possible points

**sphere**

a three-dimensional figure made up of all points in space equidistant from a given point called the center

**square**

a parallelogram with four congruent sides and four right angles

**square root**

one of the two equal factors of a number

**standard notation**

a number written with one digit for each place value in base ten; the most familiar way of representing whole numbers, integers, and decimals is standard notation (i.e., three hundred fifty six is 356)

**statistics**

the collection, organization, description and analysis of data; statistics are quantitative data

**stem-and-leaf plot**

a display of data in which digits with larger place values (10's) are "stems" and digits with smaller place values (1's) are "leaves"

**straight angle**

an angle whose measure is  $180^\circ$ ; it is formed by two opposite rays

**subscript**

a number written to the right of and slightly below a term; usually used for indexing

**substitution property**

the property that allows equal values to replace each other

**subtraction**

a mathematical operation that gives the difference between two numbers; subtraction also is used to compare two numbers or sets

**subtrahend**

in subtraction, the subtrahend is the number being subtracted

750 minuend  
- 84 subtrahend  
666 difference

**sum**

the result of an addition

**supplementary angles**

two angles the sum of whose measures is  $180^\circ$

**surface area**

the total area of the faces (including the bases) and curved surfaces of a three-dimensional figure

**symbol**

a sign or token used to represent something, such as an operation, quantity, or relation

**symmetric property**

the property that states for real numbers  $a$  and  $b$ , if  $a = b$ , then  $b = a$

**symmetry**

a correspondence in size, form, and arrangement of parts, related to a plane, line, or point; for example, a figure that has line symmetry has two halves that coincide if folded along a line of symmetry

**system of equations**

a set of two or more equations with the same number of unknowns

**tangent**

in a right triangle, the ratio of the length of the leg opposite an acute angle to the leg adjacent to the acute angle

**tangent to a circle**

a line in the plane of a circle that touches a circle in exactly one point (tangent line)

**t-chart**

a mathematical organizer to display and record data, patterns, or functions/rules in an organized way

**term**

a product or quotient of numerals or variables or both; terms are separated by plus or minus signs in an expression

**terminating decimal**

a decimal that contains a finite number of digits

**tessellation**

a covering of a plane without overlaps or gaps using combinations of congruent figures

**theorem**

a mathematical statement or proposition derived from previously accepted results

**theoretical probability**

the probability of an event without doing an experiment or analyzing data

**transformation**

an operation that creates an image from an original figure or pre-image

**transitive property**

the property that states for real numbers  $a$ ,  $b$ , and  $c$ , if  $a = b$  and  $b = c$ , then  $a = c$  or if  $a > b$  and  $b > c$  then,  $a > c$  or if  $a < b$  and  $b < c$ , then  $a < c$

**translation**

a transformation that moves every point on a figure a given distance in a given direction

**transversal**

a line that intersects two or more lines in a plane at different points

**trapezoid**

a quadrilateral that has exactly one pair of parallel sides

**tree-diagram**

a tree diagram used to find all the possible permutations for a set of items or the prime factorization of a number of a number

**trend**

the general drift, tendency, or direction of a data

**trend line**

a line that represents a general pattern for a set of data

**triangle**

a polygon with three sides

**trigonometric ratios**

the ratios of the lengths of pairs of sides in a right triangle (i.e., sine, cosine and tangent)

**unit fraction**

a fraction with a numerator of one

**unit price**

the price of something for one unit of measure

**valid argument**

an argument that is correctly inferred or deduced from a premise

**variability**

numbers that describe how spread out a set of data is (i.e., range and quartile)

**variable**

a symbol that represents a quantity

**venn diagram**

a representation that uses circles to show relationships between sets

**vertex-edge graph**

a structure consisting of vertices and edges, where the edges indicate a mapping among the vertices (i.e., the vertices may represent players in a tournament, and the edges indicate who plays whom)

**vertex**

the point at which the rays of an angle, two sides of a polygon, or the edges of a polyhedron meet (vertices)

**vertical**

at right angles to the horizon

**vertical angles**

the opposite angles formed when two lines intersect

**volume**

the measure of the capacity of a three-dimensional figure, measured in cubic units

**whole**

the entire object, collection of objects, or quantity being considered

**whole numbers**

the set of numbers consisting of the counting numbers and zero (i.e., 0, 1, 2, 3 . . . )

**x-intercept**

the coordinate at which the graph of a line intersects the x-axis

**y-intercept**

the coordinate at which the graph of a line intersects the y-axis

# Arizona Academic Standards Crosswalk

## Writing Standard

### INTRODUCTION

The purpose of the Writing Standard Articulated by Grade Level is to equip students with the skills and knowledge needed to participate in society as literate citizens. The ability to communicate effectively in writing will be essential to their success in their communities and careers. Students may realize personal fulfillment and enjoyment as they learn to become proficient writers and continue as writers throughout their lives.

Writing is a complex skill that involves learning language and using it effectively to convey meaning through text. This standard recognizes that students' abilities in writing develop from their earliest stages with phonetic spelling; to limited understanding of a certain genre; to the ability to produce conventional, coherent, unified documents. Their ideas are expressed in various forms, such as notes, lists, letters, journal writing, stories, web postings, instant messaging, essays, and reports. Effective writing may be evaluated by examining the use of ideas, organization, voice, word choice, sentence fluency, and conventions.

### RATIONALE

Requirements in the No Child Left Behind Act of 2001 (NCLB) and the standard practice of conducting periodic review of the state academic standards prompted the decision by the Arizona Department of Education to refine and articulate the academic standards for mathematics, reading, writing, and science by grade level. This refinement and articulation project was started in December 2003, and was completed in June 2004.

For more information on the Writing Standard:

<http://www.ade.az.gov/standards/language-arts/writing/articulated.asp>

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Writing Standard

### Strand One: Writing Process

Research has established the major steps of the writing process. These steps are identified in the five concepts of this strand, each supported with specific performance objectives. While all steps are needed and used by effective writers as they compose text, different skills may be emphasized in individual assignments. These steps may be used recursively as a piece moves toward completion. Throughout the process, students should reflect on their own writing skills, set goals, and evaluate their own progress.

#### **Concept 1: Prewriting**

Prewriting includes using strategies to generate, plan, and organize ideas for specific purposes.

#### **Concept 2: Drafting**

Drafting incorporates prewriting activities to create a first draft containing necessary elements for a specific purpose.

#### **Concept 3: Revising**

Revising includes evaluating and refining the rough draft for clarity and effectiveness. (Ask: Does this draft say what you want it to say?)

#### **Concept 4: Editing**

Editing includes proofreading and correcting the draft for conventions.

#### **Concept 5: Publishing**

Publishing includes formatting and presenting a final product for the intended audience.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Writing Standard

### Strand 2: Writing Elements

This strand focuses on the elements of effective writing. Good writing instruction incorporates multiple performance objectives into an integrated experience of learning for the student. Throughout the process, students should reflect on their own writing skills, set goals, and evaluate their own progress. The order of the concepts and performance objectives is not intended to indicate a progression or hierarchy for writing instruction. Instructional activities may focus on just one concept or many.

#### **Concept 1: Ideas and Content**

Writing is clear and focused, holding the reader's attention throughout. Main ideas stand out and are developed by strong support and rich details. Purpose is accomplished.

#### **Concept 2: Organization**

Organization addresses the structure of the writing and integrates the central meaning and patterns that hold the piece together.

#### **Concept 3: Voice**

Voice will vary according to the type of writing, but should be appropriately formal or casual, distant or personal, depending on the audience and purpose.

#### **Concept 4: Word Choice**

Word choice reflects the writer's use of specific words and phrases to convey the intended message and employs a variety of words that are functional and appropriate to the audience and purpose.

#### **Concept 5: Sentence Fluency**

Fluency addresses the rhythm and flow of language. Sentences are strong and varied in structure and length.

#### **Concept 6: Conventions**

Conventions addresses the mechanics of writing, including capitalization, punctuation, spelling, grammar and usage, and paragraph breaks.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Writing Standard

### **Strand 3: Writing Applications**

Writing skills particular to the applications listed here may be taught across the curriculum, although some applications may lend themselves more readily to specific content areas. It is imperative that students write in all content areas in order to increase their communication skills, and ultimately to improve their understanding of content area concepts. When appropriate, other content standards are referenced to show interdisciplinary connections.

#### **Concept 1: Expressive**

Expressive writing includes **personal narratives**, stories, poetry, songs, and dramatic pieces. Writing may be based on real or imagined events.

#### **Concept 2: Expository**

Expository writing includes nonfiction writing that describes, explains, informs, or summarizes ideas and content. The writing supports a **thesis** based on research, observation, and/or experience.

#### **Concept 3: Functional**

Functional writing provides specific directions or information related to real-world tasks. This includes letters, memos, schedules, directories, signs, manuals, forms, recipes, and technical pieces for specific content areas.

#### **Concept 4: Persuasive**

Persuasive writing is used for the purpose of influencing the reader. The author presents an issue and expresses an opinion in order to convince an audience to agree with the opinion or to take a particular action.

#### **Concept 5: Literary Response**

Literary response is the writer's reaction to a literary selection. The response includes the writer's interpretation, analysis, opinion, and/or feelings about the piece of literature and selected elements within it.

#### **Concept 6: Research**

Research writing is a process in which the writer identifies a topic or question to be answered. The writer locates and evaluates information about the topic or question, and then organizes, summarizes, and synthesizes the information into a finished product

### Glossary

**academic discourse**

primarily expository writing with the intent to demonstrate knowledge within an academic setting [Grade 7]

**affix**

a non-word letter or group of letters attached to a root or stem to change its meaning or function, as the prefix *ad-* and the suffix *-ing* in *adjoining* [Grade 3]

**allegory**

a literary work with two or more levels of meaning: one literal level and one or more symbolic or figurative levels; events, settings, objects, or characters that stand for ideas or qualities beyond themselves [Grade 12]

**alliteration**

the repetition of initial sounds, usually at the beginning of words [Grade 11]

**allusion**

a reference to a well-known work of literature, famous person, or historical event with which the reader is assumed to be familiar [Grade 9]

**ambiguity**

words that are unclear in meaning [Grade 11]

**appositive**

a phrase which renames or describes a noun, set off by commas (e.g., My friend, Melissa, is here., Mr. Martinez, our neighbor, is at the door.) [Grade 7]

**aside**

a statement delivered by an actor to an audience in such a way that other characters on stage are presumed not to hear what is said; the character reveals his or her private thoughts, reactions, or motivations [Grade 12]

**assonance**

the repetition of vowel sounds in stressed syllables or words without repeating consonant sounds [Grade 11]

**author study**

the study of different stories written by one author [Grade 3]

**CCVC words**

words following a consonant-consonant-vowel-consonant pattern [Grade 3]

**character foil**

a character that provides a contrast to another character, thus intensifying the impact of that other character [Grade 12]

**characterization**

the manner in which an author presents a character by using the character's actions, dialogue, description, or how other characters react to that character [Grade 3]

**cliché**

an overused word or phrase that lacks originality and weakens the thought [Grade 9]

**compare**

to use examples to show how things are similar and different, with the greater emphasis on similarities [Kindergarten]

**complex sentence**

a sentence that contains an independent clause and one or more subordinate clause(s)[Grade 7]

**compound sentence**

a sentence with two or more independent clauses joined by a coordinating conjunction (for, and, nor, but, or, yet, so) or a semicolon [Grade 3]

**compound-complex sentence**

a sentence made up of a compound sentence (two or more independent clauses) and one or more subordinate clauses [Grade 9]

**conceit**

an elaborate and extended metaphor, especially in poetic images [Grade 11]

**conflict**

the problem(s) or struggle(s) between or among opposing forces that trigger(s) the action in literature (e.g., person vs. person, person vs. self, person vs. nature, person vs. society)[Grade 4]

**consonance**

the repetition of the final consonant sound within words with different vowel sounds(e.g., stroke of luck) [Grade 11]

**consonant digraph**

two or more consonant letters representing a single sound (e.g., gn /n/) [Grade 3]

**contradictions**

words or ideas that oppose one another [Grade 11]

**contrast**

to use examples to show how things are different in one or more important ways [Grade 12]

**controlling idea**

the main point or purpose of a piece of writing, often stated in a thesis statement or topic sentence [Grade 6]

**dialogue**

the portion of text in which the character(s) speak aloud, usually indicated by quotation marks [Grade 4]

**diphthong**

a speech sound beginning with one vowel sound and gliding to another vowel sound within the same syllable (e.g., oi in oil) [Grade 3]

**direct address**

the use of commas to offset one person speaking directly to another (e.g., Jesse, I like your story., I think, Sue, that you are right.) [Grade 5]

**e.g.**

(abbreviation for *for example*) precedes a non-exhaustive list of examples provided as options; other examples may be appropriate but not included (compare to i.e.)

**environmental print**

print and symbols that are found in one's physical environment (e.g., street and building signs) [Kindergarten]

**evidence**

statements or information that help in making a conclusion or judgment:

- logical evidence - based on earlier known or well-known information presented in a clear organized pattern
- empirical evidence- information or facts gained by observation or experiment based on scientific analysis
- anecdotal evidence - information gained from casual observation, usually presented in a narrative style [Grade 9]

**explanatory essay**

an essay that describes the reasons and/or factors for a particular situation [Grade 8]

**extended metaphor**

a metaphor that continues throughout a series of sentences with the purpose of expanding or clarifying an idea [Grade 11]

**figurative language**

the use of words to create vivid pictures and ideas in the mind of the reader; not meant to be literally true (e.g., similes, metaphors, idioms, personification) [Grade 3]

**flashback**

an account of a conversation, episode, or event that happened before the beginning of a story, told for the purpose of clarifying something in the present; often interrupts the chronological flow of the story [Grade 11]

**foreshadowing**

writer's use of hints or clues to indicate events that will occur later in a text [Grade 11]

**formal letter**

a letter that follows a standard business format (e.g., block, semi-block) [Grade 3]

**friendly letter**

an informal letter written to a friend or relative [Kindergarten]

**graphic organizer**

a visual representation of information in an organized manner that is intended to enhance understanding (e.g., Venn diagram, T-graph, word web, KWL chart) [Grade 3]

**high-frequency words**

words often used in spoken and written language [Grade 1]

**homonyms**

words with the same pronunciation but with different meanings, different parts of speech, and usually different spelling [Grade 3]

**hyperbole**

figure of speech in which the truth is exaggerated for emphasis or humor [Grade 9]

**hypothesis**

proposed relationship among observable phenomena or an inferred explanation for those phenomena [Grade 9] (from Science Standard Articulated by Grade Level Glossary)

**i.e.**

(abbreviation for *that is*) precedes a specific list of items in which all of the items should be used (compare to e.g.)

**imagery**

descriptive language used in literature to recreate sensory experiences, enrich writing, and to make the writing more vivid; sensory details [Grade 9]

**imitative text**

writing that mimics another piece [Kindergarten]

**genre**

a category or type of literature based on its style, form, and content (e.g., mystery, adventure, romance, science fiction) [Grade 9]

**incongruity**

lack of agreement, harmony, or conformity [Grade 11]

**inference**

a conclusion derived from facts or premises [Grade 6]

**interior monologue**

writing that indicates the writer's or a character's unspoken thoughts [Grade 9]

**internal citations**

information documentation within text [Grade 10]

**interrupter**

parenthetical or nonessential information set off by commas (e.g., We will, however, have to talk later) [Grade 6]

**irony**

using a word or phrase to mean the exact opposite of its literal meaning:

dramatic irony - where the reader or the audience sees a character's mistakes, but the character does not

verbal irony - where the writer says one thing and means another

irony of situation - where there is a great difference between the purpose of an action and the result [Grade 11]

**irregular plural**

a plural formed in a manner other than adding -s or -es (e.g., child-children, party-parties, goose-geese) [Grade 4]

**KWL chart**

a chart that shows what the writer knows, wants to learn and has learned [Grade 3]

**literal language**

language that is true to fact, avoiding exaggeration or metaphor [Grade 3]

**literary elements**

elements of literature including plot, setting, theme and characterization [Grade 9]

**literature circle**

a student discussion of a book or story they have read [Grade 3]

**main idea**

the concept, thought, notion, or impression that is of greatest importance or influence:

literal – adhering to fact or to the primary meaning or intent

implied – a suggested meaning or intent (as opposed to explicit)

explicit – fully revealed or expressed without vagueness, implication, or ambiguity;

leaving no question as to the meaning or intent [Grade 1]

**metaphor**

a figure of speech that compares two unlike things in which no word of comparison is used [Grade 9]

**meter**

the arrangement of words in a rhythmical pattern, with stressed and unstressed syllables [Grade 11]

**mood**

the feeling(s) the text arouses in the reader (e.g., happiness, sadness, sorrow, peacefulness)

**narrative**

a type of fiction or nonfiction that tells a story or series of events [Kindergarten]

**onset**

consonant(s) before the vowel(s) in a syllable, including consonant blends and digraphs (e.g., /s/ in sit, /spl/ in split) [Grade 1]

**paradox**

a statement that seems to be contradictory but that actually presents a truth [Grade 11]

**parody**

a form of literature that intentionally uses a comic effect to mock a literary work or style [Grade 12]

**peer review**

an opportunity for one student to read, review, and comment on another student’s writing[ Grade 3]

**personal narrative**

an expressive piece of writing that relates an event in the writer’s life; it may contain personal comments and observations as well as a description of the event [Grade 9]

**personification**

a figure of speech in which something non-human is given human characteristics or powers [Grade 9]

**persuasive techniques**

devices of persuasion used for the purpose of changing one’s mind, making one take action, or both; usually accomplished by a combination of emotional appeals and logical reasoning (e.g., bandwagon, peer pressure, circular reasoning, transfer, loaded words, testimonial, false causality, oversimplification, overgeneralization) [Grade 6]

**phonetic spelling**

incorrect spelling of a word as though it were phonetically regular (e.g., *fone* instead of *phone*) [Grade 2]

**plot**

the action or sequence of related events that make up a story, consisting of five basic elements:  
exposition – the opening of a short story up to the point that the conflict is introduced to the reader  
rising action – the chain of events in which the conflicts intensify  
climax – the point of highest interest; point at which the reader makes his greatest emotional response; the point in the story in which rising action is about to turn into falling action  
falling action – takes place after the climax when the action begins to wind down or conflicts begin to lessen  
resolution – tells how the story conflict is resolved and ties up loose ends from the story[Grade 3]

**plot pyramid**

a graphic organizer establishing a story’s sequence: introduction, body and conclusion [Grade 6]

**point of view**

the perspective from which the text is written:

first person – the narrator is a character who tells the story as he or she experienced, saw, heard, and understood it; identified by the first person pronouns *I* or *we*.

third person omniscient – the narrator is all-knowing, with the ability to see into the minds of more than one character.

third person limited - the narrator has the ability to see into the mind of only one character [Grade 9]

**prefix**

a linguistic unit added to the beginning of a word which changes its meaning (i.e., re-, mis-, un-) [Grade 2]

**prewriting plan**

brainstorming ideas to create a writing plan [Grade 3]

**primary source**

an original source that informs directly, not through another person's explanation or interpretation (e.g., firsthand reports, diaries, letters, journals, original documents) [Grade 9]

**prior knowledge**

knowledge gained from previous experience(s) [Grade 6]

**process essay**

an essay that describes the method by which an event, task, or goal is completed [Grade 6]

**proofreading marks**

marks used when editing a writer's work [Grade 3]

**proper adjective**

a word, derived from a proper noun, that describes a noun or pronoun and is always capitalized (e.g., Canadian bacon, Irish setter) [Grade 6]

**proper noun**

a noun that names a specific person, place or thing [Grade 2]

**r-controlled**

a vowel whose sound is influenced by an r that directly follows it (e.g., farm, her, first, torn, nurse); the vowel sound is neither long nor short [Grade 3]

**reflective personal narrative**

an expressive piece of writing that relates the writer's search for meaning through an event in his/her life; it contains personal comments and observations as well as a description of the event [Grade 10]

**regular plural**

a noun that forms its plural by adding -s or -es (e.g., dog-dogs, box-boxes) [Grade 2]

**repetition**

repeating a word, phrase, sentence, or the like for impact and effect [Grade 11]

**resolution**

the part of a literary piece in which the conflict is resolved [Grade 4]

**rhetorical device**

literary device that is intended to emphasize a point, not to obtain a response [Grade 10]

**rhyme**

identical or very similar recurring final sounds in words within, or more frequently, at the ends of lines of verse [Kindergarten]

**rhyme scheme**

the pattern of rhyme occurring at the end of the lines of poetry within a stanza/poem [Grade 11]

**rhythm**

a pattern of repeated cadence or accent in speech or text [Grade 3]

**rime**

the vowel(s) and any following consonant(s) in a syllable (e.g., /it/ in sit, /oat in float) [Grade 1]

**rubric**

a written descriptor of performance containing criteria, guidelines, or standards used to measure or assess a product [Grade 3]

**satire**

a literary technique that combines a critical attitude with humor, often with the intent of correcting or changing the subject of the satire [Grade 12]

**secondary source**

a source that contains information others have gathered and interpreted; indirect or secondhand information (e.g., newspaper and magazine accounts, encyclopedia articles, research studies, web sites, documentaries) [Grade 9]

**setting**

the time of day or year; historical period, place, situation [Grade 3]

**silent e**

the letter e in a word that is not heard when the word is spoken and often signals a long vowel sound in the preceding vowel [Grade 4]

**simile**

figure of speech comparing two things that are unlike; uses the words *like* and *as* (e.g., *as strong as an ox*, *flies like an eagle*) [Grade 9]

**simple sentence**

a sentence containing a subject and verb that may also include prepositional phrases  
[Kindergarten]

**soliloquy**

discourse in which a character speaks his/her thoughts aloud without addressing an audience  
(Grade 12)

**stand-alone text**

text whose meaning is derived without the benefit of additional support of pictures or graphics  
[Grade 1]

**story map**

a graphic organizer that establishes a story's order: beginning, middle and end [Grade 3]

**style manual**

a recognized resource for expository and research writing such as MLA, APA, or Chicago [Grade 9]

**suffix**

a linguistic unit added to the end of a base word which changes the word's meaning or grammatical function (e.g., -ed, -ly, -ness) [Grade 2]

**syllabication**

the division of words into syllables [Grade 2]

**symbol**

person, place, or thing that represents something beyond itself (e.g., sword can stand for war, a desert might represent loneliness or solitude, a dove as a symbol of peace)

**symbolism**

a literary technique in which an author uses symbols to represent concrete ideas, events, or relationships [Grade 9]

**theme**

the underlying idea or statement that the author is trying to convey [Grade 9]

**thesis (or thesis statement)**

a focus statement that identifies the purpose, intent, or main idea of a piece of expository or research writing [Grade 6]

**time-management strategies**

methods to determine the effort a writer devotes to specific components of the writing process; strategies to effectively use time in order to meet a deadline [Grade 3]

**tone**

the overall feeling or effect created by a writer's use of words (e.g., playful, serious, bitter, angry, sarcastic) [Grade 6]

**transitional words**

words and phrases that bridge sentences and paragraphs by showing location, time, comparisons, emphases, summaries/conclusions, additions, or clarifications [Grade 2]

**Venn diagram**

a graphic organizer used to help a writer organize ideas to compare and contrast, composed of two or more overlapping circles [Grade 6]

**vowel digraph**

a spelling pattern using two or more letters to represent a single vowel sound [Grade 4]

**web (webbing)**

a type of graphic organizer used to record ideas [Grade 1]

**word family (-ies)**

words that may have the same root or base sound [Grade 1]

**word wall**

classroom display of high frequency and/or grade level specific words available for student reference [Kindergarten]

# Arizona Academic Standards Crosswalk

## Science Standard

### INTRODUCTION

Students are naturally curious about the world and their place in it. Sustaining this curiosity and giving it a scientific foundation must be a high priority in Arizona schools. Application of scientific thinking enables Arizona students to strengthen skills that people use every day: solving problems creatively, thinking critically, working cooperatively in teams, using technology effectively, and valuing lifelong learning.

Science education is much more than merely learning content. It is the active process of investigation and the critical review of evidence related to the world around us, both visible and invisible. Science is a dynamic process of gathering and evaluating information, looking for patterns, and then devising and testing possible explanations. Active engagement in scientific investigation leads students to think critically and to develop reasoning skills that allow them to become independent, lifelong learners. Science methods and thought processes have application well beyond the bounds of science and support learning goals in all subject areas.

The Arizona Science Standard Articulated by Grade Level has been written for ALL students. The science standard is set with the expectation that science instruction occurs at all grade levels – beginning in early grades with simple exploration, progressing to increasingly organized and sophisticated science investigations in higher grades.

Underlying all of the science standard strands are the five unifying concepts as identified in the National Science Education Standards (1995):

- Systems, Order, and Organization
- Evidence, Models, and Explanation
- Constancy, Change, and Measurement
- Evolution and Equilibrium
- Form and Function

This conceptual framework provides students with productive and insightful ways of considering and integrating a range of basic ideas that explain the natural world. Because the understanding and abilities associated with major conceptual and procedural schemes need to be developed over an entire education, the unifying concepts and processes transcend disciplinary boundaries.

These unifying concepts can be introduced in early grades and developed appropriately through the elementary grades and high school. Students should be explicitly shown how each of these unifying concepts apply to and connect life, physical, and earth and space sciences. These science content areas can be taught in conjunction with each other, as well as with other subject areas in an interdisciplinary approach. The unifying concepts in science education help focus instruction and provide a link to other disciplines.

# Arizona Academic Standards Crosswalk

## Science Standard

### RATIONALE

Requirements in the *No Child Left Behind Act of 2001* (NCLB) and the need for periodic review of the state academic standards prompted the decision by the Arizona Department of Education (ADE) to refine and articulate the academic standard for science by grade level. This refinement and articulation project was started in April 2003, and was completed in May 2004.

For more information:

<http://www.ade.az.gov/standards/science/articulated.asp>

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Science Standard

### Strand 1: Inquiry Process

*“Science as inquiry is basic to science education and a controlling principle in the continuing organization and selection of students’ activities. Students at all grade levels and in every domain of science should have the opportunity to use scientific inquiry and develop the ability to think and act in ways associated with inquiry...”* (National Science Education Standards, 1995).

Inquiry Process establishes the basis for students’ learning in science. Students use scientific processes: questioning, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, and communicating results.

- Concept 1: HS Observations, Questions, and Hypotheses**  
Formulate predictions, questions, or hypotheses based on observations. Evaluate appropriate resources.
- Concept 2: HS Scientific Testing (Investigating and Modeling)**  
Design and conduct controlled investigations.
- Concept 3: HS Analysis, Conclusions, and Refinements**  
Evaluate experimental design, analyze data to explain results and to propose further investigations. Design models.
- Concept 4: HS Communication**  
Communicate results of investigations.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Science Standard

### Strand 2: History and Nature of Science

*“Knowledge of the nature of science is central to the understanding of the scientific enterprise.”*  
(National Assessment of Educational Progress, 2000)

Scientific investigation grows from the contributions of many people. History and Nature of Science emphasizes the importance of the inclusion of historical perspectives and the advances that each new development brings to technology and human knowledge. This strand focuses on the human aspects of science and the role that scientists play in the development of various cultures.

- Concept 1: HS History of Science as a Human Endeavor**  
Identify individual, cultural, and technological contributions to scientific knowledge.
- Concept 2: HS Nature of Scientific Knowledge**  
Understand how scientists evaluate and extend scientific knowledge.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Science Standard

### **Strand 3: Science in Personal and Social Perspectives**

Science in Personal and Social Perspectives emphasizes developing the ability to design a solution to a problem, to understand the relationship between science and technology, and the ways people are involved in both. Students understand the impact of science and technology on human activity and the environment. This strand affords students the opportunity to understand their place in the world – as living creatures, consumers, decision makers, problem solvers, managers, and planners.

**Concept 1: HS**

**Changes in Environments**

Describe the interactions between human populations, natural hazards, and the environment.

**Concept 2: HS**

**Science and Technology in Society**

Develop viable solutions to a need or problem.

**Concept 3: HS**

**Human Population Characteristics**

Analyze factors that affect human populations.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Science Standard

### Strand 4: Life Science

*“The fundamental goal of life sciences is to attempt to understand and explain the nature of life.” (NAEP 2000)*

Life Science expands students’ biological understanding of life by focusing on the characteristics of living things, the diversity of life, and how organisms and populations change over time in terms of biological adaptation and genetics. This understanding includes the relationship of structures to their functions and life cycles, interrelationships of matter and energy in living organisms, and the interactions of living organisms with their environment.

- Concept 1: HS The Cell**  
Understand the role of the cell and cellular processes.
- Concept 2: HS Molecular Basis of Heredity**  
Understand the molecular basis of heredity and resulting genetic diversity.
- Concept 3: HS Interdependence of Organisms**  
Analyze the relationships among various organisms and their environment.
- Concept 4: HS Biological Evolution**  
Understand the scientific principles and processes involved in biological evolution.
- Concept 5: HS Matter, Energy, and Organization in Living Systems (Including Human Systems)**  
Understand the organization of living systems, and the role of energy within those systems.

# Arizona Academic Standards Crosswalk

## Definitions of Strands/Concepts Science Standard

### Strand 5: Physical Science

*“The physical science component ... should probe the following major topics: matter and its transformations, energy and its transformations, and the motion of things.” (NAEP 2000)*

Physical Science affords students the opportunity to increase their understanding of the characteristics of objects and materials they encounter daily. Students gain an understanding of the nature of matter and energy including their forms, the changes they undergo, and their interactions. By studying objects and the forces that act upon them, students develop an understanding of the fundamental laws of motion, knowledge of the various ways energy is stored in a system, and the processes by which energy is transferred between systems and surroundings.

- Concept 1: HS      Structure and Properties of Matter**  
Understand physical, chemical, and atomic properties of matter.
- Concept 2: HS      Motions and Forces**  
Analyze relationships between forces and motion.
- Concept 3: HS      Conservation of Energy and Increase in Disorder**  
Understand ways that energy is conserved, stored, and transferred.
- Concept 4: HS      Chemical Reactions**  
Investigate relationships between reactants and products in chemical reactions.
- Concept 5: HS      Interactions of Energy and Matter**  
Understand the interactions of energy and matter.

### Strand 6: Earth and Space Science (not Identified within the CTE crosswalk )

# Arizona Academic Standards Crosswalk

## Science Standard

### Glossary

**abiotic**

nonliving

**absorb**

to take up (e.g., plant roots absorb water)

**adaptation**

hereditary features of organisms that allow them to live in a particular environment

**affect**

to have an influence on

**affluence**

plentiful supply of material goods; wealth

**applied science**

research aimed at answering questions that have practical applications, e.g., determining the causes of diseases so that cures might be found

**asteroid**

small rocky body orbiting the Sun

**atmosphere**

gaseous envelope surrounding the Earth

**atom**

smallest particle of an element that retains the chemical nature of the element

**barometric pressure**

atmospheric pressure as indicated by a barometer, used especially in weather forecasting

**basic science**

research designed to describe or explain nature to satisfy one's curiosity

**bias**

statistical sampling or testing error caused by systematically favoring some outcomes over others  
biodiversity

1.number and variety of organisms found within a specified geographic region

2.variability among organisms, including the variability within and between species and within and between ecosystems

**biome**

broad area of the Earth's surface characterized by distinctive vegetation and associated animal life; e.g., broad-leaf forest biome, grassland biome, desert biome

**biotic**

relating to life or living organisms

**calorimetric**

relating to the measurement of heat energy by means of temperature measurements

**camouflage**

concealment by disguise or protective coloring

**carrying capacity**

maximum number of individuals that a given environment can support for a sustained period of time

**catalyst**

substance, usually used in small amounts relative to the reactants, that modifies and increases the rate of a reaction without being consumed in the process

**cellular respiration**

metabolic processes which break down nutrients into usable energy

**Chemistry**

having to do with carbon compounds

**circuit**

1. closed path followed or capable of being followed by an electric current
2. configuration of electrically or electromagnetically connected components or devices

**cirrus**

high-altitude cloud composed of narrow bands or patches of thin, generally white, fleecy parts

**characteristic**

distinguishing trait, feature, quality, or property

**cladistics**

system of classification that constructs evolutionary trees, showing how shared derived characters can be used to reveal degrees of evolutionary relationships between existing and extinct species

**classification system**

method of organization of objects or organisms using distinct characteristics or features

**climate**

average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity and precipitation

**comet**

body of dust, ice, and gas, which orbits the Sun; the orbit is usually highly elliptical or even parabolic

**community**

group of plants and animals living and interacting with one another in a specific region under relatively similar environmental conditions

**compound**

substance formed from two or more elements chemically united in fixed proportions

**conduction**

process by which heat or electrical energy is transmitted through a material or body without gross motion of the medium itself

**conifer**

any of various mostly needle-leaved or scale-leaved, chiefly evergreen, cone-bearing gymnosperm trees or shrubs such as pines, spruces, and firs

**conservation**

**Life science:** the protection, preservation, management, or restoration of wildlife and of natural resources such as forests, soil, and water, to prevent exploitation, destruction or neglect

**Physical science:** a unifying principle of constancy of a quantity under specified conditions

**constellation**

formation of stars perceived as a figure or design, especially one of 88 recognized groups named after characters from classical mythology and various common animals and objects

**consumer**

organisms requiring complex organic compounds for food, which is obtained by preying on other organisms or by eating particles of organic matter

**contrail**

artificial cloud created by an aircraft, caused either by condensation due to the reduction in air pressure above the wing surface, or by water vapor in the engine exhaust

**controlled investigation**

investigation in which all but one variable remain constant

**convection**

transfer of heat energy in a gas or liquid by the circulation of currents of matter from one region to another

**cumulus**

dense, white, fluffy, flat-based cloud with a multiple rounded top and a well-defined outline, usually formed by the ascent of thermally unstable air masses

**data**

factual information, from observations, organized for analysis

**decomposer**

organisms such as bacteria and fungi that feed and break down dead organisms, returning constituents of organic substances to the environment

**deformation**

alteration of shape, as by pressure or stress

**deposition**

- 1.act of depositing, especially the laying down of matter by a natural process
- 2.something deposited; a deposit

**distinguish**

to perceive or indicate differences; discriminate

**dominant**

of, relating to, or being an allele that produces the same phenotypic effect whether inherited with a homozygous or heterozygous allele

**DNA**

(Deoxyribonucleic acid) double strand of nucleotides that is a self-replicating molecule present in living organisms as the main constituent of chromosomes; contains the genetic code and transmits the heredity pattern

**ecology**

study of the interactions and relationships between and among organisms and their environment

**ecosystem**

all the organisms in a given area and the abiotic factors with which they interact

**eclipse**

partial or complete obscuring, relative to a designated observer, of one celestial body by another

**electron**

negatively charged fundamental particle in an atom

**element**

any of more than 100 fundamental substances that consist of atoms of only one atomic number and that singly or in combination constitute all matter

**environment**

sum of all external conditions affecting the life, development and survival of an organism,

including the biotic (living) and abiotic (non-living) elements

**erosion**

group of natural processes, including weathering, dissolution, abrasion, corrosion, and transportation, by which material is worn away from the Earth's surface

**eukaryotic**

referring to a cell with a nucleus and other internal structure

**experimentation**

act of conducting a controlled test or investigation

**extinct**

no longer in existence

**fertilization**

- 1.act or process of initiating biological reproduction by insemination or pollination
- 2.union of male and female gametes to form a zygote

**food chain**

arrangement of the organisms of an ecological community according to the order of predation in which each uses the next as a food source

**food web**

totality of interacting food chains in an ecological community

**force (K-6)**

push or pull that changes the motion or shape of an object

**force (7-HS)**

vector quantity that tends to produce an acceleration of a body in the direction of its application

**formulate**

to devise or invent

**frequency**

ratio of the number of times an event occurs in a series of trials of a chance experiment to the number of trials of the experiment performed; the number of cycles an oscillating system executes in one second

**friction**

force that resists relative motion between two bodies in contact

**front (weather)**

interface between air masses of different temperatures or densities

**gas**

state of matter that does not have a definite shape or volume and is much less dense than a liquid because its molecules are far apart compared to their diameters

**genotype**

particular combination of genes in an organism

**gravitation**

universal force by which every body in the universe attracts every other body

**gravity**

attraction of the mass of the Earth, the Moon or a planet for bodies at or near its surface

**greenhouse gas**

atmospheric gas such as carbon dioxide, water vapor, and methane that allows incoming sunlight to pass through but absorbs infrared radiation radiated back from the Earth's surface, leading to the phenomenon whereby the Earth's atmosphere traps solar radiation

**guided investigation**

teacher-directed investigation

**habitat**

place or environment where a plant or animal naturally or normally lives and grows

**hazardous waste**

substance, such as nuclear waste or an industrial byproduct, that is potentially damaging to the environment and harmful to humans and other organisms

**heredity**

genetic transmission of characteristics from parent to offspring

**heterogeneous**

consisting of dissimilar elements or parts

**homogeneous**

uniform in structure or composition throughout

**hydrosphere**

aqueous envelope of the Earth, including the oceans, all lakes, streams, and underground waters, ice, and the aqueous vapor in the atmosphere

**hypothesis (K-5)**

statement of an anticipated result of an investigation

**hypothesis (6-HS)**

proposed relationship among observable phenomena or an inferred explanation for those phenomena

**igneous**

relating to, resulting from, or suggestive of the intrusion or extrusion of magma or volcanic activity; rock formed from molten magma

**inorganic**

involving neither organic life nor the products of organic life  
**Chemistry:** of or relating to compounds not containing carbon

**interdependence**

state of organisms depending on each other and the environment for survival

**interpretation**

explanation

**interrelationships**

interactions between two or more objects or organisms

**invertebrate**

animal, such as an insect or mollusk, that lacks a backbone or spinal column

**investigation**

inquiry, research, or systematic examination

**involuntary**

not under the influence or control of the will; not voluntary; as, the involuntary movements of the body (involuntary muscle fibers)

**isotope**

any of two or more species of atoms of a chemical element with the same atomic number and nearly identical chemical behavior, but with differing atomic mass and mass number and different physical properties

**law**

statement that summarizes, identifies, or describes a relationship among observable phenomena

**lever**

simple machine consisting of a rigid bar pivoted on a fixed point and used to transmit force, as in raising or moving a weight at one end by pushing down on the other  
limiting factor conditions or resources that control the size of a population

**liquid**

state of matter that does not hold a definite shape but occupies a definite volume because its molecules are in close contact

**lithosphere**

outer part of the Earth, consisting of the crust and upper mantle, approximately 100 km (62 mi.) thick

**living**

state of being alive

**lunar**

of, involving, caused by, or affecting the Moon

**macroscopic**

large enough to be perceived or examined by the unaided eye; large compared to a microscopic object

**mass**

property of a body that is a measure of its inertia and causes it to have weight in a gravitational field, that is commonly taken as a measure of the amount of material it contains

**matter**

anything that possesses mass and occupies volume

**mean**

average value of a set of numbers

**meiosis**

type of cell division that occurs during the reproduction of diploid organisms to produce the gametes. The double set of genes and chromosomes of the normal diploid cells is reduced during meiosis to a single haploid set in the gametes. Crossing-over and, therefore, recombination occur during a phase of meiosis

**metamorphic**

change in the constitution of rock; specifically, a pronounced change affected by pressure, heat and water that results in a more compact and more highly crystalline condition; a rock produced by these processes

**meteor**

bright trail or streak that appears in the sky when a meteoroid is heated to incandescence by friction with the Earth's atmosphere; also called falling star, meteor burst, shooting star

**microscopic**

too small to be seen by the unaided eye but large enough to be studied under a microscope; small compared to a macroscopic object

**mimicry**

resemblance of one organism to another or to an object in its surroundings for concealment and protection from predators

**mitosis**

cell division; cell division in multicellular organisms occurs by mitosis except for the special division called meiosis that generates the gametes

**mixture**

portion of matter consisting of two or more components in varying proportions that retain their own properties

**model**

schematic description or representation of a system, theory, or phenomenon that accounts for at least some of its known or inferred properties and may be used for further study of its characteristics

**molecule**

smallest particle of a chemical substance that retains all the properties of the substance and is composed of one or more atoms

**mutation**

change of the DNA sequence within a gene or chromosome of an organism

**mutualism**

close, prolonged association between organisms of two different species in which each member benefits; type of symbiotic relationship

**natural selection**

process by which, in a given environment, individuals having characteristics that aid survival will produce more offspring, so the proportion of individuals having such characteristics will increase with each succeeding generation. Two mechanisms of natural selection include:  
gradualism - slow genetic modification (evolution) of a population over **long periods of time**  
punctuated equilibrium - relatively rapid evolution at a speciation event

**neutron**

uncharged elementary particle that has a mass a little greater than that of the proton and is present in most atomic nuclei

**nonliving**

objects that don't reproduce, grow, react, or use food  
nonstandard units of measure units of measurement based on everyday items (e.g., hands, feet, pace, candy, potato, paper clip) used as a precursor to learning and using standard units of measurement

**mutualism**

close, prolonged association between organisms of two different species in which each member benefits

**nucleus**

**Physical science:** central region of an atom, which contains more than 99% of the atom's mass  
**Life science:** cellular organelle in eukaryotes that contains most of the genetic material

**observation**

event that is experienced personally or enhanced through measurement or instruments

**openness**

mind set that allows a person to consider explanations of a phenomena

**organic**

of, relating to, or derived from living organisms

**organism**

living individual, such as a plant, animal, bacterium, protist, or fungus; a body made up of organs, organelles, or other parts that work together to carry on the various processes of life

**population density**

number of organisms per unit area

**periodic table**

arrangement of the chemical elements by atomic number, starting with hydrogen in the upper left-hand corner and continuing in ascending order from left to right, arranged in columns according to similar chemical properties

**PH**

numerical measure of the acidity or alkalinity of a chemical solution; the negative of the logarithm of the hydrogen ion concentration

**phenotype**

physical or visible characteristics of an organism that are determined by its genotype

**photosynthesis**

chemical process by which chlorophyll-containing plants use light to convert carbon dioxide and water into carbohydrates, releasing oxygen as a byproduct

**pitch**

aurally perceived property of a sound, especially a musical tone, that is determined by the frequency of the waves producing it; highness or lowness of sound

**plane**

flat or level surface

**plate tectonics**

theory that explains the global distribution of geological phenomena such as seismicity, volcanism, continental drift, and mountain building in terms of the formation, destruction, movement, and interaction of the Earth's lithospheric plates; the theory that the earth's crust is broken into fragments (plates) which move in relation to one another, shifting continents, forming new crust, and causing volcanic eruptions

**population**

group of organisms of the same species living and reproducing in a particular habitat or geographic region

**precipitation**

any form of water, such as rain, snow, sleet, or hail, which falls to the Earth's surface

**predict**

to forecast a future occurrence based on past observations or the extension of an idea

**prediction**

statement of an expected (future) outcome of a planned test assuming that the hypothesis being tested is correct; to be compared with observed result to test the hypothesis  
preservation to keep in perfect or unaltered condition; maintain unchanged

**probability**

measure of the likelihood of an event occurring

**procedures**

series of steps taken to accomplish an end

**producer**

organisms (e.g., green plants) that produce their own organic compounds from simple precursors (such as carbon dioxide and inorganic nitrogen), many of which are food sources for other organisms

**prokaryotic**

referring to a cell with no nucleus (e.g., a bacterium)

**property**

characteristic attribute possessed by all members of a class

**propose**

to put forward for consideration, discussion, or adoption

**proton**

stable subatomic particle occurring in all atomic nuclei, with a positive electric charge equal in magnitude to that of an electron

**pulley**

simple machine consisting of a wheel with a grooved rim in which a pulled rope or chain can run to change the direction of the pull and thereby lift a load

**pure science**

science for the pursuit of scientific knowledge

**qualitative**

involving quality or kind

**quantitative**

involving the measurement of quantity or amount

**radiation**

**Physical science:** transfer of energy by electromagnetic radiation; process of emitting energy in the form of waves or particles (e.g., visible light, X-rays, alpha and beta radiation). **Life science:** the geographic spreading of a species

**recessive**

of, relating to, or designating an allele that does not produce a characteristic effect when present with a dominant allele

**reflect**

to throw or bend back (light, for example) from a surface

**refract**

to deflect from a straight path undergone by light or other wave in passing obliquely from one medium (e.g., air) into another (e.g., glass) in which its speed is different

**reliability**

to yield the same or compatible results in different clinical experiments or statistical trials

**respiration**

physical and chemical processes by which an organism supplies its cells and tissues with the oxygen needed for metabolism and relieves them of the carbon dioxide formed in energy-producing reactions

**revolution**

orbital motion about a point, especially as distinguished from axial rotation

**RNA**

(Ribonucleic acid) nucleic acids that contains ribose and uracil as structural components and is associated with the control of cellular chemical activities

**rotation**

act or process of turning around a center or an axis; the turning of a body part about its long axis as if on a pivot

**sedimentary**

of or relating to rocks formed by the deposition of sediment

**sexual**

relating to, produced by, or involving reproduction characterized by the union of male and female gametes

**simple investigation**

investigation involving a single variable

**solid**

body of definite shape and volume; not liquid or gaseous

**species**

class of individuals or objects grouped by virtue of their common attributes and their ability to mate and produce fertile offspring, and assigned a common name; a division subordinate to a genus

**spectrophotometer**

instrument used to determine the intensity of various wavelengths in a spectrum of light

**stimulus**

object or event that causes a response

**stratus**

low-altitude cloud formation consisting of a horizontal layer of clouds

**structures**

way in which parts are arranged or put together to form a whole; makeup **Life science:** arrangement or formation of the tissues, organs, or other parts of an organism; an organ or other part of an organism

**subsystem**

component of a system (e.g., a solar system is a subsystem of a galaxy)

**symbiotic relationship**

lose, prolonged association between organisms of two different species that may, but does not necessarily, benefit each member; includes mutualism, commensalisms, and parasitism

**system**

- 1.group of body organs that together perform one or more vital functions
- 2.organized group of devices, parts or factors that together perform a function or drive a process (e.g., weather system, mechanical system)

**technology**

application of science, especially to industrial or commercial objectives; tools and techniques

**temperature**

degree of hotness or coldness of a body or environment

**theory**

collection of statements (conditions, components, claims, postulates, propositions) that when taken together attempt to explain a broad class of related phenomena; inferred explanations for observable phenomena

**transient**

not regular or permanent

**U.S. customary units**

measuring system used most often in the United States (e.g., inches, pounds, gallons)

**valid**

correctly inferred or deduced from a premise

**variable**

characteristic with values (e.g., numbers, colors, sizes) that differ from one object, event, or situation in a group to the others; e.g., in a group of students, their heights differ, thus “height” is a variable.

independent: manipulated variable in an experiment or study whose presence or quantity determines the change in the dependent variable.

dependent: observed variable in an experiment or study whose changes are determined by the presence or quantity of one or more independent variables

**vector**

representation of a quantity having both magnitude and direction, such as velocity or force

**velocity**

rate of change of position and direction with respect to time

**Venn Diagram**

representation that uses circles to show relationships between sets

**vertebrate**

having a backbone or spinal column

**viable**

capable of living, developing, or germinating under favorable conditions

**volume**

measure of the capacity of a three-dimensional figure or object, measured in cubic units

**voluntary**

normally controlled by or subject to individual volition, such as *voluntary muscle contractions*

**weathering**

effect of exposure to the action of the elements

**wedge**

piece of material, such as metal or wood, thick at one edge and tapered to a thin edge at the other for insertion in a narrow crevice, used for splitting, tightening, securing, or levering

**wheel and axle**

simple machine made up of two coaxial cylindrical objects of different size in which the axle (a small wheel) is attached to the center of a larger wheel; the wheel and axle must move together to be a simple machine; a wheel and axle lifts or moves loads

## Processes

<b>analyze:</b>	to examine methodically by separating into parts and studying their interrelations
<b>classify:</b>	to arrange or organize according to category
<b>compare:</b>	to examine in order to note the similarities or differences of
<b>communicate:</b>	to convey information about; make known; express oneself in such a way that one is readily and clearly understood
<b>conclusion:</b>	statement, or statements, that summarize the extent to which hypotheses have been supported or not supported
<b>evaluate:</b>	to examine and judge carefully; appraise
<b>infer:</b>	to conclude from evidence or premises
<b>interpret:</b>	to explain the meaning of
<b>justify:</b>	to demonstrate or prove to be just, right, or valid
<b>measure:</b>	to ascertain the dimensions, quantity, or capacity of
<b>observe:</b>	to be or become aware of, through one's senses, and may include qualitative or quantitative data
<b>predict:</b>	to forecast a future occurrence based on past observation or the extension of an idea
<b>question:</b>	to ask
<b>result:</b>	quantity or expression obtained by calculation