

# ***ESSENTIAL CURRICULUM STANDARDS***

## ***7<sup>th</sup> Grade***

### ***English/Language Arts: Essential Standards***

#### **Reading**

- Clarify word meanings through the use of definition, example, restatement, contrast, or use of gradients of meanings (e.g., slight, small, tiny, miniscule), etc. (7R1.3)
- Use knowledge of Greek, Latin, and Anglo-Saxon roots and affixes to understand content-area vocabulary. (7R1.2)
- Identify idioms, analogies, metaphors, and similes in prose and poetry. (7R1.1)

#### **Reading Comprehension**

- **QUESTIONING:** Demonstrate comprehension by identifying answers in the text. (7RCV2.12)
- **CLARIFYING:** Clarify an understanding of texts by creating outlines, logical notes, summaries, or reports. (7RCV2.15)
- **INFERRING:** Draw inferences, conclusions, or generalizations about text and support them with textual evidence and prior knowledge. (7RCV2.16)
- **INFERRING:** Distinguish facts, supported inferences, and opinions in text. (7RCV2.17)
- Understand and analyze the differences in structure and purpose between various categories of informational materials (e.g., textbooks, newspapers, instructional manuals, signs). (7R2.1)
- Analyze text that uses the cause-and-effect organizational pattern. (7R2.3)
- Identify and trace the development of an author's argument, point of view, or perspective in text. (7R2.4)
- Assess the adequacy, accuracy, and appropriateness of the author's evidence to support claims and assertions, noting instances of bias and stereotyping. (7R2.6)

#### **Literary Response and Analysis**

- Articulate the expressed purposes and characteristics of different forms of prose (e.g., short story, novel, novella, essay). (7R3.1)
- Analyze characterization as delineated through a character's thoughts, words, speech patterns, and actions; the narrator's description; and the thoughts, words, and actions of other characters. (7R3.3)
- Identify events that advance the plot and determine how each event explains past or present action(s) or foreshadows future action(s). (7R3.2)
- Identify and analyze recurring themes across works (e.g., the value of bravery, loyalty, and friendship; the effects of loneliness). (7R3.4)
- Contrast points of view (e.g., first and third person, limited and omniscient, subjective and objective) in narrative text and explain how they affect the overall theme of the work. (7R3.5)

#### **Writing**

- Create an organizational structure that balances all aspects of the composition and uses effective transitions between sentences to unify important ideas. (7W1.1)
- Support all statements and claims with anecdotes, descriptions, facts and statistics, and specific examples. (7W1.2)
- Use strategies of note-taking, outlining, and summarizing to impose structure on composition drafts. (7W1.3)
- Demonstrate the mechanics of writing (e.g., quotation marks, commas at end of dependent clauses) and appropriate English usage (e.g., pronoun reference). (7E1.4)
- Place modifiers properly and use the active voice. (7E1.1)
- Identify all parts of speech and types and structure of sentences. (7E1.3)
- Write legibly. (7ECV1.8)
- Spell frequently misspelled words correctly (e.g., their, they're, there). (7ECV1.9)
- Spell derivatives correctly by applying the spellings of bases and affixes. (7E1.7)

- Spell roots, inflections, suffixes, prefixes, contractions, and syllable constructions correctly. (7ECV1.10)
- Identify semicolons and use them correctly. (7E1.5a)
- Use various reference materials (e.g., specialized dictionaries and encyclopedias) as an aid to writing. (7WCV1.8)
- Write fictional or autobiographical narratives: (7W2.1)
  - a. Relate a clear, coherent incident, event, or situation by using well-chosen details. (7WCV2.1d)
  - b. Develop a standard plot line (having a beginning, conflict, rising action, climax, and denouement) and point of view. (7W2.1a )
  - c. Include sensory details and concrete language to develop plot and character. (7WCV2.1e)
- Write summaries of reading materials: (7W2.5)
  - a. Include the main ideas and most significant details. (7W2.5a )
  - b. Use the student's own words, except for quotations. (7W2.5b)
  - c. Reflect underlying meaning, not just the superficial details. (7W2.5c)
- Write responses to literature: (7W2.2)
  - a. Develop interpretations exhibiting careful reading, understanding, and insight. (7W2.2a)
  - b. Organize interpretations around several clear ideas, premises, or images from the literary work. (7W2.2b)
  - c. Justify interpretations through sustained use of examples and textual evidence. (7W2.2c)
- Write research reports: (7W2.3)
  - a. Pose relevant and tightly drawn questions about the topic. (7W2.3a)
  - b. Convey clear and accurate perspectives on the subject. (7W2.3b)
  - c. Include evidence compiled through the formal research process (e.g., use of a card catalog, Reader's Guide to Periodical Literatures, a computer catalog, magazines, newspapers, dictionaries). (7W2.3c)
- Document reference sources by means of footnotes and a bibliography. (7W2.3d)
- Write persuasive compositions: (7W2.4)
  - a. State a clear position or perspective in support of a proposition or proposal. (7W2.4a)
  - b. Describe the points in support of the proposition, employing well-articulated evidence. (7W2.4b)
  - c. Anticipate and address reader concerns and counterarguments. (7W2.4c)
  - d. Justify interpretations through sustained use of examples and evidence. (7WCV2.4d)
- Present information clearly to meet the needs of the intended audience. (7WCV2.6)
- Use conventional format for personal/business letters. (7WCV2.7)

# ***Mathematics: Essential Standards (7 Standard)***

## **Number Sense**

- Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line. (6NS1.1)
- Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations (a/b, a to b, a:b). (6NS1.2)
- Use proportions to solve problems (e.g., determine the value of N if  $4/7 = N/21$ , find the length of a side of a polygon similar to a known polygon).
- Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse. (6NS1.3)
- Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips. (6NS1.4)
- Solve problems involving addition, subtraction, multiplication, and division of positive fractions and explain why a particular operation was used for a given situation. (6NS2.1)
- Explain the meaning of multiplication and division of positive fractions and perform the calculations (e.g.,  $5/8 \div 15/16 = 5/8 \times 16/15 = 2/3$ ). (6NS2.2)
- Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations. (6NS2.3)
- Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction). (6NS2.4)
- Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation. (7NS1.1)
- Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers. (7NS1.2)
- Convert fractions to decimals and percents and use these representations in estimations, computations, and applications. (7NS1.3)
- Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest. (7NS1.7)
- Add and subtract fractions by using factoring to find common denominators. (7NS2.2)
- Understand the meaning of the absolute value of a number; interpret the absolute value as the distance of the number from zero on a number line; and determine the absolute value of real numbers. (7NS2.5)

## **Algebra and Functions**

- Write and solve one-step linear equations in one variable. (6AF1.1)
- Write and evaluate an algebraic expression for a given situation, using up to three variables. (6AF1.2)
- Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions; and justify each step in the process. (6AF1.3)
- Solve problems manually by using the correct order of operations or by using a scientific calculator. (6AF1.4)
- Demonstrate an understanding that rate is a measure of one quantity per unit value of another quantity. (6AF2.2)
- Solve problems involving rates, average speed, distance, and time. (6AF2.3)
- Use variables in expressions describing geometric quantities (e.g.,  $P = 2w + 2l$ ,  $A = 1/2 bh$ ,  $C = \pi d$ —the formulas for the perimeter of a rectangle, the area of a triangle, and the circumference of a circle, respectively). (6AF3.1)
- Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A). (7AF1.1)

- Use the correct order of operations to evaluate algebraic expressions such as  $3(2x + 5)^2$ . (7AF1.2)

### **Measurement and Geometry**

- Understand the concept of a constant such as  $\pi$ ; know the formulas for the circumference and area of a circle. (6MG1.1)
- Know common estimates of  $\pi$  (3.14;  $22/7$ ) and use these values to estimate and calculate the circumference and the area of circles; compare with actual measurements. (6MG1.2)
- Know and use the formulas for the volume of triangular prisms and cylinders (area of base  $\times$  height); compare these formulas and explain the similarity between them and the formula for the volume of a rectangular solid. (6MG1.3)
- Identify angles as vertical, adjacent, complementary, or supplementary and provide descriptions of these terms. (6MG2.1)
- Use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle. (6MG2.2)
- Construct and read drawings and models made to scale. (7MG1.2)
- Know and understand the Pythagorean Theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean Theorem by direct measurement. (7MG3.3)
- Demonstrate an understanding of conditions that indicate two geometrical figures are congruent and what congruence means about the relationships between the sides and angles of the two figures. (7MG3.4)

### **Statistics, Data Analysis, and Probability**

- Compute the range, mean, median, and mode of data sets. (6SDP1.1)
- Understand how additional data added to data sets may affect these computations of measures of central tendency. (6SDP1.2)
- Understand how the inclusion or exclusion of outliers affects measures of central tendency. (6SDP1.3)
- Know why a specific measure of central tendency (mean, median, mode) provides the most useful information in a given text. (6SDP1.4)
- Analyze data displays and explain why the way in which the question was asked might have influenced the results obtained and why the way in which the results were displayed might have influenced the conclusions reached. (6SDP2.3)
- Identify data that represent sampling errors and explain why the sample (and the display) might be biased. (6SDP2.4)
- Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome. (6SDP3.1)
- Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if  $P$  is the probability of an event,  $1-P$  is the probability of an event not occurring. (6SDP3.3)
- Understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities. (6SDP3.4)
- Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data. (7SDP1.1)
- Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level). (7SDP1.2)

### **Mathematical Reasoning**

- Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns. (6MR1.1)
- Use estimation to verify the reasonableness of calculated results. (7MR2.1)

- Apply strategies and results from simpler problems to more complex problems. (7MR2.2)
- Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning. (7MR2.5)
- Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work. (7MR2.6)
- Make precise calculations and check the validity of the results from the context of the problem. (7MR2.8)
- Evaluate the reasonableness of the solution in the context of the original situation. (7MR3.1)

# ***Mathematics: Essential Standards (7CP)***

## **Number Sense**

- Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation. (7NS1.1)
- Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers. (7NS1.2)
- Convert fractions to decimals and percents and use these representations in estimations, computations, and applications. (7NS1.3)
- Calculate the percentage of increases and decreases of a quantity. (7NS1.6)
- Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest. (7NS1.7)
- Add and subtract fractions by using factoring to find common denominators. (7NS2.2)
- Understand the meaning of the absolute value of a number; interpret the absolute value as the distance of the number from zero on a number line; and determine the absolute value of real numbers. (7NS2.5)

## **Algebra and Functions**

- Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A). (7AF1.1)
- Use the correct order of operations to evaluate algebraic expressions such as  $3(2x + 5)^2$ . (7AF1.2)
- Simplify numerical expressions by applying properties of rational numbers (e.g., identity, inverse, distributive, associative, commutative) and justify the process used. (7AF1.3)
- Use algebraic terminology (e.g., variable, equation, term, coefficient, inequality, expression, constant) correctly. (7AF1.4)
- Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph. (7AF1.5)
- Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of the results. (7AF4.1)

## **Measurement and Geometry**

- Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters). (7MG1.1)
- Construct and read drawings and models made to scale. (7MG1.2)
- Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders. (7MG2.1)
- Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their image under translations and reflections. (7MG3.2)
- Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement. (7MG3.3)
- Demonstrate an understanding of conditions that indicate two geometrical figures are congruent and what congruence means about the relationships between the sides and angles of the two figures. (7MG3.4)

## **Statistics, Data Analysis, and Probability**

- Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data. (7SDP1.1)

- Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level). (7SDP1.2)

### **Mathematical Reasoning**

- Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns. (7MR1.1)
- Determine when and how to break a problem into simpler parts. (7MR1.3)
- Use estimation to verify the reasonableness of calculated results. (7MR2.1)
- Apply strategies and results from simpler problems to more complex problems. (7MR2.2)
- Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques. (7MR2.3)
- Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning. (7MR2.5)
- Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work. (7MR2.6)
- Make precise calculations and check the validity of the results from the context of the problem. (7MR2.8)
- Evaluate the reasonableness of the solution in the context of the original situation. (7MR3.1)
- Develop generalizations of the results obtained and the strategies used and apply them in new problem situations. (7MR3.3)

# ***Mathematics: Essential Standards (7H)***

## **Number Sense**

- Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation. (7NS1.1)
- Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers. (7NS1.2)
- Convert fractions to decimals and percents and use these representations in estimations, computations, and applications. (7NS1.3)
- Differentiate between rational and irrational numbers. (7NS1.4)
- Know that every rational number is either a terminating or repeating decimal and be able to convert terminating decimals into reduced fractions. (7NS1.5)
- Calculate the percentage of increases and decreases of a quantity. (7NS1.6)
- Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest. (7NS1.7)
- Understand negative whole-number exponents. Multiply and divide expressions involving exponents with a common base. (7NS2.1)
- Add and subtract fractions by using factoring to find common denominators. (7NS2.2)
- Understand the meaning of the absolute value of a number; interpret the absolute value as the distance of the number from zero on a number line; and determine the absolute value of real numbers. (7NS2.5)

## **Algebra and Functions**

- Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A). (7AF1.1)
- Use the correct order of operations to evaluate algebraic expressions such as  $3(2x + 5)^2$ . (7AF1.2)
- Simplify numerical expressions by applying properties of rational numbers (e.g., identity, inverse, distributive, associative, commutative) and justify the process used. (7AF1.3)
- Use algebraic terminology (e.g., variable, equation, term, coefficient, inequality, expression, constant) correctly. (7AF1.4)
- Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph. (7AF1.5)
- Interpret positive whole-number powers as repeated multiplication and negative whole-number powers as repeated division or multiplication by the multiplicative inverse. Simplify and evaluate expressions that include exponents. (7AF2.1)
- Multiply and divide monomials; extend the process of taking powers and extracting roots to monomials when the latter results in a monomial with an integer exponent. (7AF2.2)
- Graph linear functions, noting that the vertical change (change in y-value) per unit of horizontal change (change in x-value) is always the same and know that the ratio ("rise over run") is called the slope of a graph. (7AF3.3)
- Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of the results. (7AF4.1)

## **Measurement and Geometry**

- Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles/hour and feet/second, cubic inches to cubic centimeters). (7MG1.1)
- Construct and read drawings and models made to scale. (7MG1.2)
- Use measures expressed as rates (e.g., speed, density). (7MG1.3)

- Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders. (7MG2.1)
- Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking the figures down into more basic geometric objects. (7MG2.2)
- Relate the changes in measurement with a change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units ( $1 \text{ square foot} = 144 \text{ square inches}$  or  $[1 \text{ ft}^2] = [144 \text{ in}^2]$ ,  $1 \text{ cubic inch}$  is approximately  $16.38 \text{ cubic centimeters}$  or  $[1 \text{ in}^3] = [16.38 \text{ cm}^3]$ ). (7MG2.4)
- Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their image under translations and reflections. (7MG3.2)
- Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement. (7MG3.3)
- Demonstrate an understanding of conditions that indicate two geometrical figures are congruent and what congruence means about the relationships between the sides and angles of the two figures. (7MG3.4)

### **Statistics, Data Analysis, and Probability**

- Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data. (7SDP1.1)
- Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level). (7SDP1.2)
- Understand the meaning of, and be able to compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set. (7SDP1.3)

### **Mathematical Reasoning**

- Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns. (7MR1.1)
- Determine when and how to break a problem into simpler parts. (7MR1.3)
- Use estimation to verify the reasonableness of calculated results. (7MR2.1)
- Apply strategies and results from simpler problems to more complex problems. (7MR2.2)
- Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques. (7MR2.3)
- Make and test conjectures by using both inductive and deductive reasoning. (7MR2.4)
- Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning. (7MR2.5)
- Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work. (7MR2.6)
- Make precise calculations and check the validity of the results from the context of the problem. (7MR2.8)
- Evaluate the reasonableness of the solution in the context of the original situation. (7MR3.1)
- Develop generalizations of the results obtained and the strategies used and apply them in new problem situations. (7MR3.3)

# ***Science: Essential Standards***

## **Life Science: Cell Biology**

All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope. As a basis for understanding this concept: (7L1)

- a. Students know cells function similarly in all living organisms. (7L1a)
- b. Students know the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls. (7L1b)
- c. Students know the nucleus is the repository for genetic information in plant and animal cells. (7L1c)
- d. Students know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis. (7L1d)
- e. Students know cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes. (7L1.e)
- f. Students know that as multicellular organisms develop, their cells differentiate. (7L1f)

## **Life Science: Genetics**

A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept: (7L2)

- a. Students know the differences between the life cycles and reproduction methods of sexual and asexual organisms. (7L2a)
- b. Students know sexual reproduction produces offspring that inherit half their genes from each parent. (7L2b)
- c. Students know an inherited trait can be determined by one or more genes. (7L2c)
- d. Students know plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive. (7L2d)
- e. Students know DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell. (7L2e)

## **Life Science: Evolution**

Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept: (7L3)

- a. Students know the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution. (7L3b)
- b. Students know how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution. (7L3c)
- c. Students know how to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and how to expand the diagram to include fossil organisms. (7L3d)
- d. Students know that extinction of a species occurs when the environment changes and that the adaptive characteristics of a species are insufficient for its survival. (7L3e)

## **Earth Science**

Evidence from rocks allows us to understand the evolution of life on Earth. As a basis for understanding this concept: (7E4)

- a. Students know Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time. (7E4a)
- b. Students know the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids. (7E4b)
- c. Students know that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom. (7E4c)
- d. Students know that evidence from geologic layers and radioactive dating indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years. (7E4d)
- e. Students know fossils provide evidence of how life and environmental conditions have changed. (7E4e)

f. Students know how movements of Earth's continental and oceanic plates through time, with associated changes in climate and geographic connections, have affected the past and present distribution of organisms. (7E4f)

### **Living Systems**

The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. As a basis for understanding this concept: (7L5)

- a. Students know plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism. (7L5a)
- b. Students know organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system. (7L5b)
- c. Students know how bones and muscles work together to provide a structural framework for movement. (7L5c)
- d. Students know how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy. (7L5d)
- e. Students know the function of the umbilicus and placenta during pregnancy. (7L5e)
- f. Students know how to relate the structures of the eye and ear to their functions. (7L5 g)

### **Physical Science**

Physical principles underlie biological structures and functions. As a basis for understanding this concept: (7P6)

- a. Students know visible light is a small band within a very broad electromagnetic spectrum. (7P6a)
- b. Students know that for an object to be seen, light emitted by or scattered from it must be detected by the eye. (7P6b)
- c. Students know light travels in straight lines if the medium it travels through does not change. (7P6c)
- d. Students know how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope. (7P6d)
- e. Students know that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths. (7P6e)
- f. Students know light can be reflected, refracted, transmitted, and absorbed by matter. (7P6f)
- g. Students know how to compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints). (7P6h)
- h. Students know how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system. (7P6i)

### **Investigation and Experimentation**

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. (7I7)

- a. Students select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data. (7I7a)
- b. Students use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project. (7I7b)
- c. Students communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence. (7I7c)
- d. Students construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure). (7I7d)
- e. Students communicate the steps and results from an investigation in written reports and oral presentations. (7I7e)