

# **Mediapolis Community School**

## **Science/Health Standards (K-12)**

- A. Students will know about the diversity/unity that characterizes life, the processes of life, and how living things interact with their environment.
- B. Students will understand the features/processes of the Earth and the composition and structure of the universe.
- C. Students will understand basic concepts about the structure/properties of matter and the characteristics of energy, forces and motion.
- D. Students will use methods of scientific inquiry and be able to access/apply scientific knowledge and technical information to solve problems.
- E. Students will understand the relationships between science, technology, and society.
- F. Students will comprehend concepts related to health promotion and disease prevention to enhance health.
- G. Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.

# Science/Health

# Kindergarten

**Integrated Course Abilities** [Apply the following to each content standard.]

**1. Develop abilities in science.**

- A. Higher thinking (classify, predict, decide)
- B. Communication (discuss, draw, write, explain)
- C. Goal setting (brainstorm)

**2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to solve problems.
- B. Be able to conduct experiments.
- C. Be able to use scientific equipment appropriately.
- D. Know how to preserve the earth.

**3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

**4. Students will become aware of science-related career opportunities and the importance of science to society.**

**Grade Level Expectations/Benchmarks** (with critical objectives/performance indicators)

**1. Introduce the five senses and how they help us.**

**2. Introduce common plants (trees, flowers, grass, garden plants).**

- A. Introduce where common plants grow.
- B. Introduce how to care for common plants.

**3. Introduce animals (farm, pets, zoo).**

- A. Introduce where animals live.

**4. Introduce our physical environment (air, land, and water).**

- A. Introduce how air is all around us.
- B. Introduce how the earth is made up of land and water.
- C. Introduce how we need to care for the air, land, and water.
- D. Introduce the names and the order of the four seasons.
- E. Introduce the weather in each season in the area where you live.

**5. Health**

- A. Introduce body parts.
- B. Introduce good hygiene habits.
- C. Introduce the importance of exercise, rest and nutrition.

# Science/Health

## First Grade

**Integrated Course Abilities** [Apply the following to each content standard.]

**1. Develop abilities in science.**

- A. Higher thinking (classify, compare, decide)
- B. Communication (present)
- C. Goal setting/attainment (brainstorm, plan)

**2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to conduct experiments.
- B. Be able to use scientific equipment appropriately (safely).
- C. Know how to preserve the earth (reuse, reduce, recycle).

**3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

**4. Students will become aware of science-related career opportunities and the importance of science to society.**

**Grade Level Expectations/Benchmarks** (with critical objectives/performance indicators)

**1. Be able to use knowledge of plants.**

- A. Know the parts of plants (roots, stem, leaves, flower).
- B. Know that seeds produce plants.
- C. Be able to put plants in groups by what they have in common.

**2. Be able to put animals in groups by size, shape, body covering, movement.**

- A. Know that animals may have fur, feathers, skin, scales, or shells.
- B. Know that animals move in different ways (swim, fly, walk, run, crawl).
- C. Know that animals are different sizes.
- D. Know that animals have different shapes.
- E. Know how animals help people.

**3. Be able to use some scientific instruments (magnifying glasses, thermometers).**

- A. Be able to take care of magnifying glasses and thermometers.
- B. Know what a magnifying glass is and some common uses.
- C. Know what a thermometer is and some common uses.
- D. Be able to read a Fahrenheit thermometer.

**4. Understand differences and similarities between living and nonliving things.**

- A. Know that living things breathe, eat, move and grow.
- B. Know that nonliving things do not breathe, eat, move or grow.
- C. Be able to tell living and nonliving things apart.

**5. Understand healthy living and identify health behaviors that impact personal health.**

- A. Know the importance of physical activity.
- B. Know the basic food groups.
- C. Know why and how to eat nutritious food.
- D. Know people and places, which help keep you healthy.
- E. Know how communicable diseases are spread.
- F. Be able to prevent the spread of disease (hand washing)

**6. Know about the five senses.**

- A. Be able to identify the five senses.
- B. Know the body part associated with each sense.
- C. Use the five senses to find out about their environment.

# Science/Health

## Second Grade

**Integrated Course Abilities** [Apply the following to each content standard.]

**1. Develop abilities in science.**

- A. Higher thinking (classify, compare, decide)
- B. Communication (present)
- C. Goal setting/attainment (brainstorm)

**2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to do experiments.
- B. Be able to use scientific equipment appropriately (safely).
- C. Know how to preserve the earth.
- D. Possess technical skills:
  - 1) read/write/present: inquire, report

**3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

**4. Students will become aware of science-related career opportunities and the importance of science to society.**

**Grade Level Expectations/Benchmarks** (with critical objectives/performance indicators)

**1. Be able to classify the animals and animal groups.**

- A. Know animals that are mammals, birds, fish reptiles, amphibians, and insects.
- B. Be able to classify animals that are mammals, birds, fish, reptiles, amphibians, and insects.
- C. Know about dinosaurs.

**2. Understand how sound and light work.**

- A. Know that sound is caused by objects that vibrate.
- B. Know that sound travels through our ears.
- C. Know sources of light.
- D. Know that light helps us see.

**3. Understand the components and characteristics of various plant and animal habitats.**

- A. Know the components of habitats (food, water, space, and shelter).
- B. Know about desert, prairie, woods, pond, or ocean environment.
- C. Know that we can help the environment.
- D. Know the characteristics of plants.

**4. Understand how weather affects our lives.**

- A. Be able to use a thermometer to tell temperature.
- B. Know ways that weather can be harmful.
- C. Know ways that weather affects plants, animals, and people.
- D. Know the things that make up the weather and that it changes from day to day and season to season.

**5. Understand how the body works.**

- A. Understand how the body grows and changes.
- B. Understand how to keep healthy.
- C. Be able to take medicines safely.
- D. Know about good drugs and bad drugs.

# Science/Health

## Third Grade

### **Integrated Course Abilities** [Apply the following to each content standard.]

#### **1. Develop abilities in science.**

- A. Higher thinking (analyze, evaluate, classify, predict, decide, estimate, generalize, solve, compare, simplify)
- B. Communication (present, persuade, collaborate, explain, recommend)
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize)
- D. The quality process (plan, draft, analyze, and revise when producing products)

#### **2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to solve problems using the scientific method (research, hypothesis, experimentation, findings, conclusion).
- B. Be able to conduct research (field research, library research, experimentation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Know how to preserve the earth (reuse, reduce, recycle).
- E. Possess technical skills:
  - 1) read/write/present: instructions, chart, thank you letter, letter of request, letter of response, research report, summary
  - 2) technology: word processing, Internet

#### **3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

#### **4. Students will become aware of science-related career opportunities and the importance of science to society.**

### **Grade Level Expectations/Benchmarks** (with critical objectives/performance indicators)

#### **1. Understand living things.**

- A. Know the difference between living and nonliving things.
- B. Know that living things are grouped together by characteristics.
- C. Know how plants and animals grow, change, and reproduce.
- D. Know what plants and animals need to survive.
- E. Know that plants and animals have features that help them survive in different environments.
- F. Understand that living things are found in ecosystems.
- G. Know how populations and/or communities affect and depend on each other.
- H. Understand the difference between endangered and extinct animals.
- I. Understand cycling of matter and energy flow through the living environment. (Knows about extending resources through recycling, reusing, and reducing.)

#### **2. Understand the basic concepts of matter and energy.**

- A. Classify objects according to their properties.
- B. Know the properties, states and changes of matter.
- C. Know how matter can be measured.
- D. Understand the sources, forms, and changes of energy.
- E. Understand how energy is stored and moves.

#### **3. Understand the earth's composition.**

- A. Understand how natural forces change the land both slowly and rapidly.
- B. Understand the composition and importance of soil.
- C. Understand the earth's water cycle and the importance of water.
- D. Know what earth's resources are and how to conserve them.

#### **4. Understand a variety of healthy practices.**

- A. Understands the importance of healthy food choices.
- B. Understands the importance of exercise for maintaining or improving personal health.

# Science/Health

## Fourth Grade

**Integrated Course Abilities** [Apply the following to each content standard.]

### 1. Develop abilities in science.

- A. Higher thinking (analyze, evaluate, classify, predict, decide, estimate, generalize, solve, relate, interpret, simplify)
- B. Communication (present, persuade, collaborate, explain, recommend)
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize)
- D. The quality process (plan, draft, analyze, and revise when producing products)

### 2. Be able to apply science knowledge and skills to a variety of purposes.

- A. Be able to solve problems using the scientific method (research, hypothesis, experimentation, findings, conclusion).
- B. Be able to conduct research (field research, library research, experimentation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Know how to preserve the earth (reuse, reduce, recycle).
- E. Possess technical skills:
  - 1) read/write/present: instructions, table, chart, thank you letter, letter of request, letter of response, inquiry, research report, summary
  - 2) technology: word processing, Internet

### 3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.

### 4. Students will become aware of science-related career opportunities and the importance of science to society.

**Grade Level Expectations/Benchmarks** (with critical objectives/performance objectives)

### 1. Understand characteristics and processes of living organisms.

- A. Knows about how living things respond to changes in environment.
- B. Know kinds of plants.
- C. Know living things need certain resources for energy, growth and survival.
- D. Know relationships between living things and how animals depend on plants through food chain systems.
- E. Know that plants and animals have life cycles that differ for different organisms.
- F. Understand that many characteristics of an organism are inherited from their parents, but others result from interactions with the environment.
- G. Understand that differences exist among individuals of the same kind of plant or animal.
- H. Know how changes in the environment (natural or manmade) affect the health, survival, and activities of organisms.
- I. Know that humans can change environments in ways that can either be beneficial or detrimental for themselves and other populations.

### 2. Understand the properties and behavior of energy.

- A. Know about heat energy and the conduction of heat energy through different materials.
- B. Know that heat can be produced in many ways.
- C. Know that light travels in a straight line until it strikes an object.
- D. Know how electricity in circuits can produce light, heat, sound, and magnetic effect.

### 3. Understand the composition and structure of the earth.

- A. Know Earth materials consist of solid rocks and soils, water, and gases of the atmosphere.
- B. Know about and classify rocks and minerals by classification and composition.
- C. Understand sedimentary, igneous, and metamorphic rocks are formed by different Earth forces/processes.
- D. Know about earthquakes and volcanoes.
- E. Know fossils provide evidence about plants and animals that lived long ago.
- F. Know about the air around you.

### 4. Understand health science/body systems.

- A. Know about bones and muscles.
- B. Know about the digestive system.
- C. Girls' introduction to body changes in puberty, along with health and hygiene issues.

# Science/Health

## Fifth Grade

### Integrated Course Abilities [Apply the following to each content standard]

#### 1. Develop abilities in science.

- A. Higher thinking (analyze, evaluate, classify, predict, decide, estimate, generalize, solve, relate, interpret, simplify)
- B. Communications (present, persuade, collaborate, explain, recommend)
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize)
- D. The quality process (plan, draft, analyze, and revise when producing products).

#### 2. Be able to apply science knowledge and skills to a variety of purposes.

- A. Be able to solve problems using the scientific method (research, hypothesis, experimentation, findings, conclusion).
- B. Be able to conduct research (field research, library research, experimentation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Know how to preserve the earth.
- E. Possess technical skills:
  - 1) read/write/present: instructions, table, chart, inquiry, research report, summary, lab report
  - 2) technology: word processing, Internet

#### 3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.

#### 4. Students will become aware of science-related career opportunities and the importance of science to society.

### Grade Level Expectations/ Benchmarks (with critical objectives/performance indicators)

#### 1. Understand invertebrates and vertebrates and the environments that support them.

- A. Know how animals are mutually dependent.
- B. Know the characteristics of major biomes.
- C. Know cycles and changes in ecosystems.

#### 2. Understand the energy forms of sound and motion and their relationship to matter.

- A. Know the characteristics of different sounds.
- B. Know how sound travels and how it is received.
- C. Know the characteristics of gravity and friction.
- D. Know Newton's Laws of Motion.
- E. Understand motion in terms of speed and acceleration.

#### 3. Understand the characteristics and relationships among the atmosphere, the hydrosphere, and the lithosphere, including the earth's position and its movement in space.

- A. Know the features of the ocean bottom.
- B. Know ocean resources.
- C. Describe weather by its measurable quantities such as temperature, wind direction and speed, and precipitation.
- D. Know the causes of weather changes.
- E. Know the movements of the earth and the moon.
- F. Know the observable shape of the moon changes from day to day in a cycle that lasts about a month.

#### 4. Understand the structure, care and function of the human body.

- A. Know the components of the skeletal and muscular system.
- B. Know the components of the circulatory system.
- C. Know the components of the respiratory system.
- D. Know how drugs affect your health.
- E. Know the physical and emotional changes associated with puberty, along with health and hygiene issues.

# Science

## Sixth Grade

### **Integrated Course Abilities** [Apply the following to each content standard.]

#### **1. Develop abilities in science.**

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, collaborate, explain).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

#### **2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to solve problems using the scientific method (research, hypothesis, experimentation, findings, conclusion).
- B. Be able to conduct research (field research, library research, experimentation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Apply knowledge of the relationship between humans, the environment, and the earth's resources (pollution, conservation) to improve the environment.
- E. Possess technical skills:
  - read/write/present: instructions, table, chart, reports (progress, research, lab), proposal, letters (complaint, request, response), manual, checklist, pamphlet, technical research, bid, technical analysis, summary
  - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

#### **3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

#### **4. Students will become aware of science-related career opportunities and the importance of science to society.**

### **Grade Level Expectations/Benchmarks** (with critical objectives/performance objectives)

#### **1. Understand the interrelationship between living things and their environment.**

- A. Know how energy flows through food chains and food webs (recognize producers, consumers, and decomposers).
- B. Know the cycles (water, carbon dioxide, nitrogen).
- C. Know the factors that affect populations in a given environment (plant and animal responses, adaptations, mutualism, competition, predation, parasitism, commensalism, the human component, and conservation).
- D. Know the ecosystems of the world (habitat, niche, ecosystem, community) and their populations.
- E. Know how organisms become extinct.

#### **2. Understand the building blocks of matter (atoms, elements, molecules, compounds).**

- A. Know the parts of an atom (neutron, proton, electron).
- B. Know the terms atom, molecule, element, and compound.
- C. Know about the periodic chart of elements.
- D. Know what chemical formulas and symbols are.
- E. Know the difference between chemical and physical properties and change.
- F. Know about acids and bases.

#### **3. Understand various forms of energy (fossil, wind, nuclear, solar, geothermal, electrical).**

- A. Know electrical energy (production and uses).
- B. Know renewable and nonrenewable energy (fossil fuels, wind, nuclear, solar, geothermal).
- C. Know the efficiency and effects of each form of energy (fossil fuels, solar, wind, nuclear).
- D. Know the uses of energy by humans and the importance of conservation of resources and energy.

- 4. Understand the relationship between the various bodies in the universe.**
- A. Know the types of bodies in the solar system (sun/stars, moons, planets)
  - B. Know the instruments used by astronomers (reflecting, refracting, and radio telescopes and spectroscope).
  - C. Know the life cycle of a star.
  - D. Know the characteristics of black holes, constellations, and galaxies.
  - F. Know about space and human accomplishments (history of exploration, discoveries, help to humankind).
- 5. Understand the significance, characteristics, and locations of water on earth and the different types of water on earth.**
- A. Know the flow and properties of fresh water (systems, erosion, life cycles of rivers, deposition, ground water, water treatment, and pollution).
  - B. Know the properties and characteristics of the oceans (features, ocean ecology, ocean resources, and pollution).
  - C. Understand the movement of ocean water (types of currents, waves, tides).

# Science

## Seventh Grade

### **Integrated Course Abilities** [Apply the following to each content standard.]

#### **1. Develop abilities in science.**

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain).
- C. Goal setting/attainment (brainstorm, research, plan, organize).
- D. The quality process (plan, draft, analyze, revise when producing products).

#### **2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to solve problems using the scientific method (research, hypothesis, experimentation, findings, conclusion). (Science Fair Project)
- B. Be able to conduct research (across the curriculum science fair project using a variety of resources and experimentation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Apply knowledge of the relationship between humans, the environment, and the earth's resources (pollution, conservation) to improve the environment.
- E. Possess technical skills:
  - read/write/present: tables, charts, reports, instructions, checklists, summaries
  - technology: word processing, spreadsheet, database, desktop publishing, Internet, AV production

#### **3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

#### **4. Students will become aware of science-related career opportunities and the importance of science to society.**

### **Grade Level Expectations/Benchmarks** (with critical objectives/performance objectives)

#### **1. Understand that the cell is a basic unit of life.**

- A. Know the cell theory.
- B. Know parts and functions of plant and animal cells.
- C. Know cell division and reproduction.
- D. Know examples of organisms that reproduce sexually and asexually.

#### **2. Understand the principles of heredity, the role of genetics, and the evolution of organisms.**

- A. Know the difference between dominant and recessive traits and genes and alleles.
- B. Know how to use genotype, phenotype, and Punnett square to identify an organism's heredity.
- C. Know the structure of DNA and its role in heredity.
- D. Know the use of fossil evidence that supports evolution and Darwin's role in this study.

#### **3. Be able to classify and identify living organisms using their characteristics.**

- A. Know the seven levels of the classification system.
- B. Know characteristics of plant, animal, protista, monera, and fungi kingdoms.

#### **4. Be able to use a microscope.**

- A. Know parts and functions of a microscope.
- B. Be able to create a wet mount slide.
- C. Be able to focus the microscope and observe a slide.
- D. Be able to use the microscope to examine life forms.

#### **5. Understand the factors of weather and the importance of weather to life.**

- A. Know the structure of the atmosphere, the role of air pressure and heat in developing winds, and the affect of air pollution on the environment.
- B. Know the roles of the water cycle and humidity in formation of clouds and precipitation, and how air masses and fronts influence the weather.
- C. Know the processes involved in weather forecasting and producing weather maps.
- D. Know the components of an area's climate and be able to distinguish between weather and climate.
- E. Know the characteristics of the different climates of the world and what affects them throughout earth history.

- 6. Understand the roles of the human body systems and their relationships to individual health.**
- A. Know the body organization and structure.
  - B. Know the components, functions, and uses of the eleven systems of the body.
  - C. Know about body defenses and diseases.
  - D. Know how to stay healthy (through nutrition, stress release, avoidance of alcohol and drugs, hygiene, exercise, and first aid).
- 7. Understand the role of forces, motion and energy in the physical environment.**
- A. Know about matter in motion (speed, velocity, acceleration, force, friction, mass and weight).
  - B. Know about the role of gravity in motion and Newton's three laws.
  - C. Know the role of forces in fluid (pressure, buoyant force, Bernolli's principle).
  - D. Know the relationship between work and power and the types of machines and their uses.
  - E. Know the forms of energy and their resources and conservation.
  - F. Know the difference between temperature and heat and about the forms of heat transfer.
  - G. Know the role of heat in the states of matter and the types of heat technology.

# Science

## Eighth Grade

### **Integrated Course Abilities** [Apply the following to each content standard.]

**1. Develop abilities in science.**

- A. Higher thinking (analyze, evaluate, classify, estimate, solve, decide, relate, interpret, simplify).
- B. Communications (present, collaborate, explain, relate).
- C. Goal setting/attainment (brainstorm, research, plan, organize).
- D. The quality process (plan, write, analyze, and revise when producing products).

**2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to solve problems using methods of scientific inquiry.
- B. Be able to conduct research (library research, experimentations).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Apply knowledge of the relationship between humans, the environment, and the earth's resources.
- E. Possess technical skills:
  - read/write/present: instructions, tables, charts, reports ( research, lab), checklist
  - technology: word processing, Internet, mPower/Powerpoint

**3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

**4. Students will become aware of science-related career opportunities and the importance of science to society.**

### **Grade Level Expectations/Benchmarks** (with critical objectives/performance objectives)

**1. Understand terms relevant to earth and life sciences.**

- A. Be able to define the terms in simple language.
- B. Be able to relate terms to a concrete example.

**2. Be able to use the physical properties to classify rocks and minerals.**

- A. Be able to identify the three rock groups.
- B. Be able to identify rocks and minerals by using reference materials and samples.
- C. Know uses of rocks and minerals.

**3. Understand the uniqueness of the earth and its ongoing processes of development.**

- A. Know about the forces that change the shape of the earth.
- B. Be able to plot earthquake epicenters.
- C. Be able to identify volcano types.
- D. Be able to identify the eras of earth history and types of fossils.

**4. Understand how the earth relates to the rest of the universe.**

- A. Know the motions of solar bodies.
- B. Know the position of celestial bodies.
- C. Know facts about the individual planets of the solar system.
- D. Be able to research a planet for an astronomy project.

**5. Understand the building blocks of matter (atoms, elements, molecules, compounds).**

- A. Know the parts of an atom.
- B. Know the terms atom, molecule, element, and compounds.
- C. Know how elements are organized on a periodic chart.
- D. Know what chemical formulas and symbols are.
- E. Know the difference between chemical and physical changes.

- 6. Understand interactions of matter (chemical bond, chemical reaction, chemical compounds).**
- A. Know the types of chemical bonds.
  - B. Know the importance of valence electrons.
  - C. Know the types of chemical reactions and the difference between exo and endothermic.
  - D. Know the roles of activation energy, catalysts, and inhibitors.
  - E. Know the process of balancing chemical equations.
  - F. Know about acids, bases, salts, and pH.
- 7. Understand the forms of energy of sound and light.**
- A. Know sound energy (waves, behavior, uses).
  - B. Know light energy (visible spectrum, nature, uses).
- 8. Understand the various invertebrate and vertebrate animal phyla.**
- A. Know the phyla of invertebrate organisms (examples, characteristics).
  - B. Know the phyla of vertebrate organisms (warm-blooded, cold-blooded, examples, characteristics).
  - C. Know the progression from simple to complex.
- 9. Understand plant/microorganism/fungi classification from simple to complex.**
- A. Know the progression of plants from simple to complex.
  - B. Know about spore producing plants (examples, physical characteristics).
  - C. Know about angiosperms and gymnosperms (examples, physical characteristics).
  - D. Know about protozoans, bacteria, viruses and fungi (examples, physical characteristics).

# Science

## Eleventh Grade

### **Integrated Course Abilities** [Apply the following to each content standard.]

#### **1. Develop abilities in science.**

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

#### **2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to understand the nature of scientific inquiry.
- B. Be able to demonstrate abilities to use scientific inquiry.
- C. Be able to solve problems using the scientific method (research, hypothesis, experimentation, findings, conclusion).
- D. Be able to conduct research (field research, library research, experimentation).
- E. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- F. Apply knowledge of the relationship between humans, the environment, and the earth's resources (pollution, conservation) to improve the environment.
- G. Possess technical skills:
  - read/write/present: instructions, table, chart, reports (progress, research, lab), proposal, letters (complaint, request, response), manual, checklist, pamphlet, technical research, bid, technical analysis, summary
  - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

#### **3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

#### **4. Students will become aware of science-related career opportunities and the importance of science to society.**

#### **5. Students will develop an understanding of the relationships between science, technology, and society.**

### **Grade Level Expectations/Benchmarks** (with critical objectives/performance objectives)

#### *Life Science:*

#### **1. Know the behavior of organisms**

- A. Know an organism's behavior is based on its evolutionary history.
- B. Be able use the Darwinian Theory to explain how organisms must adapt to survive.

#### **2. Know the molecular basis of heredity.**

- A. Understand the principles of cell reproduction.
- B. Understand that in all organisms the instructions from specifying the characteristics of the organism are carried in DNA.
- C. Know mutations and new genes/combinations may have a positive, negative, or no affect on organisms.

#### **3. Know the structure and functions of cells in organisms.**

- A. Know the structure and function of different cell parts.
- B. Understand cell functions involve chemical reactions.
- C. Know genetic information stored in DNA provides instructions for cellular activity.

#### **4. Know how species depend on one another and on the environment for survival.**

- A. Know the transfer of energy is essential to all living organisms.
- B. Know environmental problems (pollution, global warming, ozone depletion, solid waste, hazardous waste.)

#### **5. Know matter, energy and organization of organisms.**

- A. Know the distribution and abundance of organisms and populations.

#### **6. Know the basic concepts of biological evolution.**

- A. Understand species evolve over time.
- B. Understand natural selection provide scientific explanation for the fossil record.

## *Earth Science:*

### **7. Know the origin and evolution of the Earth system.**

- A. Know the relationship of the Earth to the solar system.
- B. Know method used to estimate geologic time.
- C. Understands changes in the Earth's environment and life forms over time.

### **8. Know energy in the Earth system.**

- A. Know the major external and internal sources of energy on Earth and how these sources affect the earth's surface and climate.

## *Physical Science:*

### **9. Know chemical reactions.**

- A. Know complex, chemical reactions involving carbon based molecules take place constantly in every cell in our bodies.
- B. Know how to use the periodic chart to determine atomic structure – protons, neutrons, and electrons for each element and predict electron configurations.

### **10. Know the structure of atoms and properties of matter.**

- A. Classify properties as chemical or physical.
- B. Know the outer electrons govern the chemical properties of an element.
- C. Know the periodic table is based on the repeating pattern of the physical and chemical properties of the element and know what these properties are.
- D. Know the Law of Conservation of Matter and Energy.
- E. Know atoms interact with one another by transferring or sharing electrons forming new compounds with new properties.

### **11. Know structure of atoms.**

- A. Understands atoms are the building blocks from which all matter is made.
- B. Know the structure of the atom and its relationship to atomic properties.

### **12. Be able to analyze and draw conclusions from data (graphing, charting, and calculating).**

- A. Be able to graph data appropriately through line, bar, and pie graphs.
- B. Be able to interpret data from various graphs.
- C. Be able to use data to evaluate hypothesis.
- D. Be able to use modern technologies to sort and arrange data.

### **13. Be able to use the basic measurement of the physical sciences (length, mass, volume, temperature).**

- A. Be able to measure mass, volume, length, and temperature in standard and metric measures.
- B. Know units associated with mass, volume, length, and temperature.
- C. Be able to translate between standard and metric measures.

# Science (Physical Science)

## **Integrated Course Abilities** [Apply the following to each content standard.]

### **1. Develop abilities in science.**

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

### **2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to solve problems using the scientific method (research, hypothesis, experimentation, findings, conclusion).
- B. Be able to conduct research (field research, library research, experimentation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Apply knowledge of the relationship between humans, the environment, and the earth's resources (pollution, conservation) to improve the environment.
- E. Possess technical skills:
  - read/write/present: instructions, table, chart, reports (progress, research, lab), proposal, letters (complaint, request, response), manual, checklist, pamphlet, technical research, bid, technical analysis, summary
  - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

### **3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

### **4. Students will become aware of science-related career opportunities and the importance of science to society.**

## **Course Content** (with critical objectives/performance objectives)

### **1. Be able to analyze and draw conclusions from data graphing, charting, and calculating.**

- A. Be able to graph data appropriately through line, bar, and pie graphs.
- B. Be able to interpret data from various graphs.
- C. Be able to use data to evaluate hypothesis.
- D. Be able to use modern technologies to sort and arrange data.

### **2. Be able to use the basic measurement of the physical sciences (length, mass, volume, temperature).**

- A. Be able to measure mass, volume, length, and temperature in standard and metric measures.
- B. Know units associated with mass, volume, length, and temperature.
- C. Be able to translate between standard and metric measures.

### **3. Understand the relationship between work, machines, and power.**

- A. Be able to measure appropriate forces.
- B. Be able to identify six simple machines.
- C. Be able to calculate work and power.
- D. Be able to apply work/power to simple machines.

### **4. Understand the relationship between matter, energy, and motion.**

- A. Know about matter and its properties.
- B. Know about energy conversion.
- C. Know about motion and momentum.
- D. Understand the difference between velocity and acceleration.
- E. Know about kinetic and potential energy.
- F. Be able to describe Newton's laws.
- G. Know that energy can be transformed from one type to another, but not at 100% efficiency.
- H. Know objects change their motion only when a net force is applied.

### **5. Understand magnetism, electricity, and heat.**

- A. Know properties of magnetism.
- B. Know about static and current electricity.
- C. Be able to show interactions between magnetism and electricity.
- D. Know about temperature and heat.
- E. Know about heat flow.
- F. Know how heat and temperature are related to specific heat capacity.

**6. Understand the properties of and uses for light and sound.**

- A. Know types of waves and how they are related.
- B. Know properties of light and interaction with barriers.
- C. Know the light spectrum.
- D. Know properties of sound.
- E. Know the sound spectrum.
- F. Understand wave motion and how it transfers energy when it interacts with matter.
- G. Know new technologies in light and sound.
- H. Know about electromagnetic waves (including radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays, and gamma rays.)

**7. Understand composition and reactions of matter.**

- A. Know the structure of the atom.
- B. Know about interaction of atoms.
- C. Know types of reactions and that most chemical reactions release or add energy to the system in the form of heat, light, electrical, or mechanical energy.
- D. Know about acids, bases, and salts.
- E. Know about elements, compounds, and mixtures.

# Science (Biology)

## **Integrated Course Abilities** [Apply the following to each content standard.]

### **1. Develop abilities in science.**

A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).

B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).

C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).

D. The quality process (plan, draft, analyze, and revise when producing products).

### **2. Be able to apply science knowledge and skills to a variety of purposes.**

A. Be able to use the scientific method to solve problems and conduct experiments (approach a problem from many points of view, state hypothesis, use controls and variables properly in an experiment, maintain experimental standards, gather data and represent it in graphs and charts and other forms, interpret and draw conclusions from data, report results in a scientific manner).

B. Be able to conduct research (field research, library research, experimentation).

C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).

D. Apply knowledge of the relationship between humans, the environment, and the earth's resources (pollution, conservation) to improve the environment.

E. Possess technical skills:

-read/write/present: instructions, table, chart, reports (progress, research, lab), proposal, letters (complaint, request, response), manual, checklist, pamphlet, technical research, bid, technical analysis, summary

-technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV

production

### **3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

### **4. Students will become aware of science-related career opportunities and the importance of science to society.**

## **Course Content** (with critical objectives/performance objectives)

### **1. Understand the mechanism of inheritance.**

A. Know basic Mendelian Inheritance (monohybrid, dihybrid, test crosses).

D. Know how genetic error occurs (mutations).

E. Know how DNA relates to standard of inheritance.

B. Know related terminology (homozygous, heterozygous, dominant, recessive).

F. Know examples of applied genetics (human disorders).

C. Be able to analyze and predict results of various crosses.

### **2. Understand the structure and organization of cells and the process that occurs within them.**

A. Know cell theory.

B. Be able to identify and know the functions of cell organelles.

C. Know processes related to biology (DNA replication, RNA transcription, protein synthesis, photosynthesis, respiration, cell transport, the stages of mitosis and meiosis).

D. Know that mutations and new gene combinations may have a positive, negative, or no effects on organisms.

E. Be able to make microscopic observations.

### **3. Understand how living organisms are classified and organized.**

A. Know about species and the need for scientific naming system. D. Be able to classify by an accepted taxonomic system.

B. Know that classification is structurally oriented. E. Know characteristics of the five major kingdoms.

C. Be able to differentiate between unicellular and multi-cellular and between levels of multi-cellular organisms.

### **4. Understand and apply environmental principles.**

A. Know levels of ecological organization (species, populations, communities, ecosystems, etc.).

B. Know interactions within a community (food web, predator and prey, adaptations, symbiosis).

C. Be able to analyze population growth (population density, factors affecting, effects of, human populations).

D. Know environmental problems (pollution, global warming, ozone depletion, solid waste, hazardous waste, etc.).

E. Know the distribution and abundance of organisms and populations in ecosystems are limited by availability of matter and energy and the ability of ecosystem to recycle materials.

**5. Be able to apply biology to individual, social, and global issues.**

- A. Know value of medical ethics.
- B. Know effects of genetic engineering.
- C. Know practical applications of genetic screening.

**6. Understand the evolving nature of life.**

- A. Know that the biochemical and physical nature of the earth determines how life evolves and that species evolve over time.
- B. Be able to use the Darwinian theory to explain how organisms must adapt to survive.
- C. Know that life has evolved from simple to more complex forms and that evolution is an ongoing process.
- D. Know an organism's behavior is based on its evolutionary history.
- E. Know the controversy surrounding the origin of life.
- F. Understand natural selection provides scientific explanation for the fossil record.

# Science (Chemistry)

## **Integrated Course Abilities** [Apply the following to each content standard.]

### **1. Develop abilities in science.**

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

### **2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to use the scientific method to solve problems and conduct experiments (approach a problem from many points of view, state hypothesis, use controls and variables properly in an experiment, maintain experimental standards, gather data and represent it in graphs and charts and other forms, interpret and draw conclusions from data, report results in a scientific manner).
- B. Be able to conduct research (field research, library research, experimentation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Apply knowledge of the relationship between humans, the environment, and the earth's resources (pollution, conservation) to improve the environment.
- E. Possess technical skills:
  - read/write/present: instructions, table, chart, reports (progress, research, lab), proposal, letters (complaint, request, response), manual, checklist, pamphlet, technical research, bid, technical analysis, summary
  - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

### **3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

### **4. Students will become aware of science-related career opportunities and the importance of science to society.**

## **Course Content** (with critical objectives/performance objectives)

### **1. Understand inorganic/organic nomenclature.**

- A. Know prefixes (for 1 - 10, including Latin prefixes) and suffixes (for the three types of bonding).
- B. Know the functional groups and major characteristics.
- C. Know names of monatomic and polyatomic ions.
- D. Be able to write formulas of inorganic compounds.
- E. Be able to identify as ionic or covalent.

### **2. Be able to interpret periodic tables (atomic and chemical structures, physical properties).**

- A. Be able to describe the trends of the periodic table.
- B. Be able to determine oxidation number (charge) of an ion.
- C. Know the eight families or groups and transitions.
- D. Classify properties as chemical or physical.
- E. Know how to use the periodic chart to determine structure (protons, neutrons and electrons) and configurations.
- F. Know the periodic table is based on the repeating pattern of the physical and chemical properties of the element and know what those properties are.

### **3. Understand the relationships between quantities, their symbols, and their dimensions.**

- A. Be able to convert and reverse number of particles, grams, and liters of gas to moles.
- B. Be able to calculate the percent composition of an element in a compound in the laboratory.
- C. Be able to calculate empirical and molecular formulas.
- D. Be able to solve Stoichiometry problems.
- E. Be able to calculate solution concentrations.
- F. Be able to calculate percent yield in an experiment.

### **4. Understand the present model of the atom.**

- A. Be able to identify parts of the atom.
- B. Know the e-configuration for the first 20 elements by atomic number.
- C. Know atoms interact with one another by transferring or sharing electrons forming new compounds with new properties.
- D. Know the outer electrons govern the chemical properties of an element.
- E. Know the history of the atomic theory.

### **5. Understand the similarities and differences between bond types.**

- A. Be able to identify ionic bonding.
- B. Be able to identify metallic bonding.
- C. Be able to identify covalent bonding.
- D. Know the forces between molecules.

- 6. Understand types of chemical reactions/equations and their mechanisms.**
- A. Know the four basic types of reactions (de comp, comp, replacement, ionic).
  - B. Be able to balance a chemical reaction using conservation of atoms.
  - C. Be able to balance redox reactions.
  - D. Be able to calculate chemical reaction rates.
  - E. Be able to solve equilibrium problems.
  - F. Be able to measure and solve pH problems.

# Science (Physics)

## **Integrated Course Abilities** [Apply the following to each content standard.]

### **1. Develop abilities in science.**

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

### **2. Be able to apply science knowledge and skills to a variety of purposes.**

- A. Be able to use the scientific method to solve problems and conduct experiments (approach a problem from many points of view, state hypothesis, use controls and variables properly in an experiment, maintain experimental standards, gather data and represent it in graphs and charts and other forms, interpret and draw conclusions from data, report results in a scientific manner).
- B. Be able to conduct research (field research, library research, experimentation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Apply knowledge of the relationship between humans, the environment, and the earth's resources (pollution, conservation) to improve the environment.
- E. Possess technical skills:
  - read/write/present: instructions, table, chart, reports (progress, research, lab), proposal, letters (complaint, request, response), manual, checklist, pamphlet, technical research, bid, technical analysis, summary
  - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

### **3. Students will experience and develop an awareness of contributions of diverse societies and cultures as well as both men and women, and persons with disabilities, to the field of science.**

### **4. Students will become aware of science-related career opportunities and the importance of science to society.**

## **Course Content** (with critical objectives/performance objectives)

### **1. Understand the relationship between electricity and magnetism.**

- A. Know the forces involved in electricity and magnetism.
- B. Know the flow of electrons (circuits).
- C. Be able to apply electricity and magnetism to mechanics.
- D. Know electricity and magnetism are two aspects of a single electromagnetic force.

### **2. Understand the nature of motion under Newtonian physics.**

- A. Know Newton's three laws of motion.
- B. Be able to cite and create models which explain motion.
- C. Be able to use vectors in problem solving.
- D. Be able to describe the effects of external forces on systems in equilibrium.
- E. Know about the conservation of matter and energy.

### **3. Understand the relationship between quantities, their symbols, and their dimensions.**

- A. Know English and metric measurement units.
- B. Be able to work with scientific notation.
- C. Be able to use dimensional analysis.
- D. Know physics nomenclature.
- E. Be able to use formulas to solve problems.

### **4. Understand the relationship between matter and energy as described in quantum mechanics and Einsteinian relativity.**

- A. Be able to describe atomic models.
- B. Be able to cite current models of subatomic particles.
- C. Be familiar with the theory of Einsteinian relativity.
- D. Be familiar with application (fusion and fission) and consequences (environmental) of radioactivity and nuclear energy.

