

St. John-Endicott Cooperative Schools Science Curriculum Standards

with Performance Indicators

Program Standards

- Be able to think and problem-solve in a scientific manner.
- Possess a sound scientific knowledge base.
- Understand and apply scientific and technical process skills.
- Be able to apply scientific knowledge base to solve problems.
- Be able to access scientific and technical information.
- Possess and apply ethical standards in science.
- Treat the environment with responsibility and care.
- Understand the relationship between science and technology.

Please note: All standards for grades K-8, which relate to human body processes will be found in Health Standards.

Science Standards

Kindergarten

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

1. Develop abilities in science.

- A. Think clearly and solve problems about science (classify, decide, estimate, solve, compare).
- B. Talk and write clearly about science (present, persuade, collaborate, explain, recommend, demonstrate, describe).
- C. Make careful plans and use them (brainstorm, envision, research, plan, organize, persist).
- D. Use 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 (investigation, question, prediction, procedure, data conclusion, diagram, variable (changed, stays the same)).
- B. Be able to conduct research (field research, library research, investigation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately gram, centimeter).
- D. Measurement: know objects can have different lengths.
- E. Know how to preserve the earth (reuse, reduce, recycle, refuse).
- F. Possess technical skills:
 - Listen/dictate/write/present: instructions, chart, report, proposal, letter of request, summary
 - Technology: word processing, Internet, AV production

Course Content

3. Know the five senses and how they help us (observe, observations, describe, texture).

- A. Know about seeing.
- B. Know about smelling.
- C. Know about touching.
- D. Know about hearing.
- E. Know about tasting.
- F. Know about the visible parts of the body (head, arms, shoulders, legs, knees, trunk, toes, fingers).

4. Know about common plants.

- A. Know different common plants (trees, flowers, grass, local, and of special interest).
- B. Know where common plants grow.
- C. Know about care of common plants.

5. Know about common animals.

- A. Know different common animals (farm, pets, zoo, local, and of special interest).
- B. Know where common animals live.
- C. Know how different animals move.

6. Know our physical environment (air, land, and water, wind).

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

Science Standards

First Grade

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

1. Develop abilities in science.

- A. Think clearly and solve problems about science (classify, decide, estimate, solve, compare, design, cause/effect, identify).
- B. Talk and write clearly about science (present, persuade, collaborate, explain, recommend, demonstrate, describe).
- C. Make careful plans and use them (brainstorm, envision, research, plan, organize, persist).
- D. Use 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 (investigation, question, prediction, procedure, data conclusion, diagram, variable (changed, stays the same)).
- B. Be able to conduct research (field research, library research, investigation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately gram, centimeter).
- D. Know measurements: inch, foot.
- E. Know how to preserve the earth (reuse, reduce, recycle, refuse).
- F. Possess technical skills:
 - Listen/read/dictate/write/present: instructions, chart, report, proposal, letter of request, summary
 - Technology: word processing, Internet, AV production

Course Content

3. 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.

4. Be able to put animals in groups by size, shape, body covering, movement (bone, characteristic, muscle, skeleton).

- 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.

5. Be able to use some scientific instruments (magnets, magnifying hand lens glasses, thermometers, and rain gauges) (amount, precipitation, temperature).

- A. Be able to take care of magnets, magnifying glasses, and thermometers, hand lens.
- B. Know the types of magnets (horseshoe, U-shaped, bar, circle).
- C. Know that the magnetic field is stronger at the poles.
- D. Know what a magnifying glass is and some common uses.
- E. Know what a thermometer is and some common uses.
- F. Be able to read a Celsius or Fahrenheit thermometer.
- G. Be able to read a rain gauge.
- H. Know what a balance scale is and its use.
- I. Know what a spring scale is and its use.

6. Understand differences and similarities between living and nonliving things (characteristic).

- 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.

7. Be able to use knowledge of the earth (sun, moon, year, day, light/dark, surface) (system, axis).

- A. Know about the earth, sun, and the moon.
- B. Know the earth rotates every 24 hours.
- C. Know the difference between night and day.
- D. Know the earth revolves around the sun.
- E. Know the moon revolves around the earth.
- F. Know how the earth is made up of land and water.
- G. Know the types of land surfaces (top soil, sand, clay, rock).
- H. Be able to put different types of rocks and minerals in groups.

Science Standards

Second Grade

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

1. Develop abilities in science.

- A. Think clearly and solve problems about science (classify, decide, estimate, solve, compare, design, cause/effect, identify).
- B. Talk and write clearly about science (present, persuade, collaborate, explain, recommend, demonstrate, describe).
- C. Make careful plans and use them (brainstorm, envision, research, plan, organize, persist).
- D. Use 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 (investigation, question, prediction, procedure, data conclusion, diagram, variable (changed, stays the same)).
- B. Be able to conduct research (field research, library research, investigation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately, gram, centimeter).
- D. Know measurements: inch, foot, yard, mile, pound.
- E. Know how to preserve the earth (reuse, reduce, recycle, refuse waste).
- F. Possess technical skills:
 - Listen/read/write/present: instructions, chart, report, proposal, letter of request, summary
 - Technology: word processing, Internet, AV production

Course Content

3. Understand how plants grow (amount of time, seed, soil, sprout).

- A. Know the changes in a plant as it grows.
- B. Know the foods that are obtained from the parts of plants.
- C. Know ways to grow a new plant (bulb, seed, cutting).
- D. Know requirements for plant growth (light and water nutrients).

4. Be able to identify and classify the animals and animal groups (characteristic).

- 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. Be able to compare conditions when dinosaurs lived with the conditions in which animals of today live.
- D. Know about dinosaurs.
- E. Know theories about why dinosaurs became extinct.

5. Understand how sound, light, and force work.

- A. Be able to classify sounds by loud or soft and pleasant or unpleasant.
- B. Know that sound is caused by objects that vibrate.
- C. Know that sound travels through our ears.
- D. Know sources of light.
- E. Know that light helps us see.
- F. Know what force is (push and pull).
- G. Know about friction (rough, smooth, ease of movement over varied surfaces).

6. Understand the components and characteristics of various plant and animal habitats (system, ecosystem, grassland).

- A. Know the components of habitats (food, water, space, shelter).
- B. Know about desert environment.
- C. Know about woods environment.
- D. Know about pond environment.
- E. Know about ocean environment.
- F. Know how we can help our environment.

7. Understand how weather affects our lives (system, climate, wind).

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

Science Standards

Third Grade

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, design, cause/effect, fair test, identify, logic, problem, result).
- B. Communications (present, persuade, collaborate, explain, recommend, demonstrate, describe).
- 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 (investigation, question, prediction, procedure, data conclusion, diagram, variable (changed, stays the same)).
- B. Be able to conduct research (field research, library research, investigation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately, gram, centimeter).
- D. Know measurements: gram, kilogram, centimeter, meter, kilometer, milliliter, liter, inch, yard, foot, weight, ounce, mass, mile, pound, volume)
- E. Know how to preserve the earth (reuse, reduce, recycle, refuse waste).
- F. Possess technical skills:
 - Read/write/present: instructions, chart, thank you letter, letter of request, letter of response, proposal, lab report, research report, summary, graph
 - Technology: word processing, database, Internet, AV production

Course Content

3. Understand plants and their processes (function, germinate, inherited, reproduce, root, soil, sprout, structure).

- A. Be able to group plants as either seed or nonseed.
- B. Be able to tell different types of seed plants apart (flowers and cones).
- C. Know that flowering plants have two kinds of seeds (monocot, dicot).
- D. Know that seed plants with cover are identified by their needles and type of cone.
- E. Know the four types of nonseed plants and how they reproduce.
- F. Know examples of nonseed plants.
- G. Know what the plant needs to make food.
- H. Know the purpose of chlorophyll.

4. Understand ecosystems and how plants and animals adapt to survive (system, habitat).

- A. Know what animals need to survive (reproduction, food, shelter, water, survival techniques).
- B. Know what plants need to survive (water, sun, nutrients, pollination).
- C. Be able to describe an ecosystem.
- D. Know how communities affect each other.
- E. Know how communities depend on each other.
- F. Know how adaptations help animals and plants survive.
- G. Know and give examples of behavioral adaptations (migration and hibernation).

5. Be able to identify the basic types of force (magnetism, gravity, electrical) and energy (electrical, solar, wind, motion, light, heat).

- A. Know magnetism has poles.
- B. Be able to apply knowledge that magnetism is a force.
- C. Be able to apply knowledge that electricity is a force.
- D. Know the basic elements of magnetism, gravity, and friction.
- E. Know the basic elements of energy.

6. Be able to observe, classify, and explain the properties, states, and changes of matter (absorb, condensation, condense, dissolve, evaporation, evaporate, freeze, gas, liquid, solid, melt, thaw, vapor).

- A. Know the three states of matter.
- B. Know how matter can change.
- C. Know the properties of each state of matter.
- D. Know the movement of molecules in each state.

Science Standards

Fourth Grade

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, design, cause/effect, fair test, identify, logic, problem, result).
- B. Communications (present, persuade, collaborate, explain, recommend, demonstrate, describe).
- 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 (investigation, question, prediction, procedure, data conclusion, diagram, variable (changed, stays the same)).
- B. Be able to conduct research (field research, library research, investigation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately).
- D. Know measurements: gram, kilogram, centimeter, meter, kilometer, inch, mile, Newton, liter, milliliter, foot, yard, mass, ounce, pound, weight, volume)
- E. Know how to preserve the earth (reuse, reduce, recycle, refuse waste).
- F. Possess technical skills:
 - Read/write/present: instructions, table, chart, thank you letter, letter of request, letter of response, inquiry, proposal, lab report, research report, summary, demonstrate, graph
 - Technology: word processing, database, Internet, AV production

Course Content

3. Understand food chains and food webs (system, cycle, decomposer, nutrient).

- A. Be able to distinguish between producers and consumers.
- B. Know about an ocean food chain.
- C. Know about a land food chain.
- D. Know the interdependence of a food chain.
- E. Know how nature and people affect a food web.

4. Understand the characteristics and uses of the six simple machines (system, function, input/output, invention, pitch, pull/push).

- A. Know characteristics and uses of the inclined plane and wedge.
- B. Know characteristics and uses of the screw.
- C. Know characteristics and uses of the pulley.
- D. Know characteristics and uses of the lever.
- E. Know characteristics and uses of the wheel and axle.
- F. Know how simple machines make work easier.
- G. Be able to identify simple machines within a complex machine.
- H. Be able to combine simple machines to make complex machines.

5. Understand the characteristics of light and sound (color, echo).

- A. Be able to identify the sources of light.
- B. Know how the reflection, absorption, and transmission of light affects an object's appearance.
- C. Know how flat and curved mirrors affect light.
- D. Know how objects refract light.
- E. Know how light waves are different from sound waves.
- F. Know how light waves and sound waves travel.

6. Understand the causes of the weather (system, climate, ocean, sea).

- A. Know how regional situations affect weather.
- B. Know how elevation affects weather.
- C. Know how angle of the sun affects weather.
- D. Know how airflow affects weather.
- E. Know how latitude affects weather.
- F. Know how air pressure affects weather.

Science Standards

Fifth Grade

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, design, cause/effect, fair test, identify, logic, problem, result).
- B. Communications (present, persuade, collaborate, explain, recommend, demonstrate, describe).
- 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 (investigation, question, prediction, procedure, data, conclusion (diagram, variable) (manipulated (changed), controlled (same)).
- B. Be able to conduct research (field research, library research, investigation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately, gram, centimeter).
- D. Know measurements: gram, kilogram, centimeter, meter, kilometer, milliliter, liter, Newton, inch, yard, foot, weight, mile, mass, ounce, pound, volume.
- E. Know how to preserve the earth (reuse, reduce, recycle, refuse waste).
- F. Possess technical skills:
 - Read/write/present: instructions, table, chart, thank you letter, letter of request, letter of response, inquiry, proposal, lab report, research report, summary, graph, demonstrate
 - Technology: word processing, database, Internet, AV production

Course Content

3. Understand the processes that all living things share (inherited).

- A. Know the methods that plants and animals use to get food.
- B. Be able to apply knowledge that all living things grow and/or regenerate cells.
- C. Be able to apply knowledge that cells are the basic unit of all living things.
- D. Be able to apply knowledge that all living things need air, food, and water.
- E. Be able to apply knowledge that all living things reproduce.
- F. Be able to apply knowledge that all living things release energy.
- G. Know basic processes of plants (photosynthesis, respiration, transpiration).

4. Understand the basics of electricity (how generated, how conducted, uses, how transported, limitations, effects on environment).

- A. Know static electricity and current electricity.
- B. Know the difference between conductors and insulators.
- C. Know the difference between open and closed circuits and parallel and series circuits.
- D. Know about our use of electricity.

5. Understand the basics of magnetism.

- A. Know terms magnet and electromagnetism.
- B. Know how a magnet works.

6. Understand the concepts of force and motion (system, kinetic energy, input/output, spring scale).

- A. Know the terms motion, inertia, friction, buoyancy, and gravity.
- B. Know the difference between the types of motion.
- C. Know Newton's laws of motion.
- D. Know how friction may be useful and a problem.
- E. Know how everything is affected by gravity.

7. Understand the earth's surface and changes, which affect it (system, continent, diameter, earthquake, erode, erosion, eruption, fossil, glacier, mountain, radius, sediment, weathering, weather, volcano).

- A. Know the layers, which form the earth's crust.
- B. Know characteristics of each layer.
- C. Be able to identify examples of various layers of the earth's crust.
- D. Know how the various layers were formed.
- E. Know how wind, water, time, and geological shifts affect the earth's surface.
- F. Know how humans change the earth's surface.

Science Standards

Sixth Grade

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, design, cause/effect, fair test, identify, logic, problem, result).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend, describe).
- 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 investigation, question, prediction, procedure, data, conclusion (diagram, variable) (manipulated, controlled).
- B. Be able to conduct research (field research, library research, investigation).
- C. Be able to use scientific equipment appropriately (safely, effectively, efficiently, accurately, gram, centimeter).
- D. Know measurements: gram, kilogram, centimeter, meter, kilometer, milliliter, liter, Newton, inch, yard, foot, mile, mass, ounce, pound, weight, volume.
- E. Apply knowledge of the relationship between humans, the environment, and the earth's resources (pollution, conservation) to improve the environment.
- F. 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, graph, demonstrate
 - Technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

Course Content

3. Understand how plant and animal species interact with their environment (system, condensation, decomposer, ecosystem).

- A. Know how energy flows through food chains and food webs.
- B. Know the cycles (water, carbon dioxide, nitrogen).
- C. Know the factors that affect populations in a given environment (plant and animal responses and adaptations).
- D. Know how organisms become extinct.

4. Understand the building blocks of matter (atoms, elements, molecules, compounds) (structure).

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

5. Understand various forms of energy (fossil, wind, nuclear, geothermal, light, sound, electricity) (absorb, heat energy).

- A. Know sound energy (sound waves, behavior, uses).
- B. Know electrical energy (production and uses).
- C. Know light energy (spectrum, nature, behavior, uses).
- D. Know renewable and nonrenewable energy (fossil fuels, wind, nuclear, solar, geothermal).
- E. Know the efficiency and effects of each form of energy (fossil fuels, solar, wind, nuclear).

6. Understand the relationship between the various bodies in the universe (system, axis, orbit).

- A. Know the types of bodies in the solar system (sun, moons, planets, comets, asteroids, meteors).
- 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 quasars, pulsars, black holes, constellations, and galaxies.
- E. Know about the planets in our solar system (relationship to sun and characteristics).
- F. Know about space and human accomplishments (history of exploration, discoveries, help to humankind).

Science Standards

Seventh Grade (Life Science)

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

Course Content

3. Understand how life exists on earth.

- A. Know that living things need energy, food, water, oxygen, living space, and proper temperature.
- B. Know the relationship between the components of life.
- C. Be able to apply knowledge that the sun is the initial source of all energy.

4. 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.
- E. Know advantages and disadvantages of both sexual and asexual reproduction.
- F. Know process of sexual and asexual reproduction.
- G. Know stages of development in sexual and asexual reproduction.

5. 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, protocista (protista), monera, and fungi kingdoms.

6. Understand the interrelationship between living things and their environment.

- A. Know the needs to live in an environment.
- B. Know about producers, consumers, and decomposers.
- C. Know mutualism, competition, predation, parasitism, and commensalism.
- D. Know cyclic responses to the environment (hibernation, migration, adaptation, dormancy).
- E. Know habitat, niche, ecosystem, community, and population.
- F. Know about human effects on the environment.

7. Understand food chains and human effect on them.

- A. Know components and illustration of a basic food chain.
- B. Know difference between decomposer, producer, and consumer.
- C. Know how food chains relate to food webs and energy pyramids.
- D. Know how parts of food chains affect the energy flow.
- E. Know the effects of human interference on the food chain.

8. 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.

9. Be able to project scientific concepts into the future.

- A. Know principles of cryogenics (deep freezing).
- B. Know about the possibility of extra-terrestrial life.
- C. Be able to explain the necessity of ethical standards in future scientific discoveries.

Science Standards

Eighth Grade (Earth Science)

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

Course Content

3. **Understand terms relevant to earth science.**
 - A. Be able to define the terms in simple language.
 - B. Be able to relate terms to a concrete example.
4. **Be able to use the physical properties and chemical composition to classify rocks and minerals.**
 - A. Be able to identify common minerals.
 - B. Be able to identify the three rock groups.
 - C. Be able to use physical characteristics for identification purposes.
 - D. Be able to identify rocks and minerals by using reference materials.
 - E. Know uses of rocks and minerals.
5. **Understand the uniqueness of the earth and its ongoing processes of development.**
 - A. Be able to identify landforms.
 - B. Know about the forces that change the shape of the earth.
 - C. Know how humans change the shape of the earth.
 - D. Be able to predict future changes.
6. **Understand the factors of weather and the importance of weather to life.**
 - A. Know the components of air.
 - B. Know the effects of heat on weather.
 - C. Know factors that affect humidity.
 - D. Know causes and effect of air pressure.
 - E. Know types of air masses and results.
 - F. Be able to predict weather.
 - G. Know how weather impacts the earth, humans, and other life forms.
7. **Understand how the earth relates to the rest of the universe.**
 - A. Know composition of solar bodies.
 - B. Know motions of solar bodies.
 - C. Know the value (social and economic) of space exploration.
 - D. Know the position of celestial bodies.
8. **Understand the importance of oceans and water to our planet.**
 - A. Know composition of sea water.
 - B. Know economic values of minerals and food gathered from water.
 - C. Know movements of currents and their importance.
 - D. Know the effects of oceans on weather.
 - E. Know how oceans support life.
 - F. Know how our water supply is being used and misused.

Science Standards

Ninth Grade (Physical Science)

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

Course Content

- 3. 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.
- 4. 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.
- 5. 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.
- 6. 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. Know about kinetic and potential energy.
 - E. Be able to describe Newton's laws.
- 7. 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.
- 8. Understand the properties of and uses for light and sound.**
 - A. Know types of waves.
 - 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. Know new technologies in light and sound.
- 9. Understand composition and reactions of matter.**
 - A. Know the structure of the atom.
 - B. Know about interaction of atoms.
 - C. Know about acids, bases, and salts.
 - D. Know about elements, compounds, and mixtures.
 - E. Know types of reactions.

Science Standards

Biology

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

Course Content

3. Understand the mechanism of inheritance.

- A. Know basic Mendelian Inheritance (monohybrid, dihybrid, test crosses).
- B. Know related terminology (homozygous, heterozygous, dominant, recessive).
- C. Be able to analyze and predict results of various crosses.
- D. Know how genetic error occurs (mutations).
- E. Know how DNA relates to standard of inheritance.
- F. Know examples of applied genetics (human disorders).

4. 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 process related to biology (DNA replication, RNA transcription, protein synthesis, photosynthesis, respiration, cell transport, the stages of mitosis and meiosis).
- D. Be able to make microscopic observations.

5. Understand how living organisms are classified and organized.

- A. Know about species and the need for scientific naming.
- B. Know that classification is structurally oriented.
- C. Be able to differentiate between unicellular and multi-cellular and between levels of multi-cellular organisms.
- D. Be able to classify by an accepted taxonomic system.
- E. Know characteristics of the five major kingdoms.

6. 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.).

7. 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.

8. Understand the evolving nature of life.

- A. Know that the biochemical and physical nature of the earth determines how life evolves.
- 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 the controversy surrounding the origin of life.
- E. Know the current explanations of the theory of natural selection.

Science Standards

Chemistry

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

Course Content

3. 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.

4. 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.

5. 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.

6. 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 the history of the atomic theory.

7. 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.

8. 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 Standards

Physics

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

Course Content

3. 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.

4. 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.

5. 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.

6. 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.