



Science Curriculum Guide

Philosophy of Science

The Lord reveals himself in nature and works through his creation; we teach science so our students gain an understanding of the world God created and the awesomeness of our creator. God's creation has been affected by sin; frustration, death, and decay are the result. God's Word teaches us to be stewards of the world the Lord has given us and to appreciate his creation. Therefore, through science we learn how we can improve our management of God's creation as well as marvel at God's design.

We believe there is a base of science fundamentals and principles that our students need to learn. All areas of learning in the many science fields reveal the all-powerful hand of a loving God. The Bible is not our science textbook, but at St. John's Lutheran School all science content is presented in light of God's Word. Although the world may promote its philosophies – such as humanism and evolution – as the truth, God's Word is truth and reveals the knowledge of wonders of God's creation.

Our science curriculum allows children to see the wisdom and skill of our Creator. Unit lessons are taught at all grade levels covering physical, earth, and life science. Through hands-on-learning the students will be actively engaged in experiments, projects and presentations. These opportunities will allow them to develop skills such as observing, comparing, hypothesizing, predicting, measuring, testing and interpreting for a better understanding of the world our Lord created.

General Attitudes for Students to Develop in Science

Through Christ-centered science instruction, teachers strive to lead each child to:

- Understand and love God's creation
- Stand in awe of the almighty power of our Maker and Preserver
- Appreciate all that the Lord has given us in the world He created for us.

General Objectives

Through Christ-centered science instruction, teachers strive to lead each child to:

- Accept in faith the biblical account of heaven and earth.
- Appreciate the beauty and wonder of God's creation.
- Learn to appreciate and conserve the natural resources God has given us.

- Acquire the skills necessary to: become logical problem-solvers
- Work cooperatively in groups
- Use all types of traditional and modern resources to find answers to their questions.
- Develop curiosity
- Encourage learning through discovery
- Promote divergent thinking through open-ended problems and activity-based learning
- Encourage students to see problems as challenges and opportunities for discovery
- Foster the critical thinking necessary to evaluate the claims encountered in everyday life
- Provide settings to explore logical reasoning
- Develop a working knowledge of the scientific method
- Implement hands-on, activity based learning
- Integrate science, mathematics, and technology as interdependent disciplines

Kindergarten Objectives

By the end of kindergarten the students will:

1. develop an appreciation for the wonders and beauty of God's creation.
2. know that they have a responsibility to care for God's world.
3. learn the life cycle of certain plants and animals.
4. recognize the different habitats around the world.
5. identify animals and plants that live in these different habitats.
6. see God's hand of protection on the animal world with camouflage.
7. understand and appreciate how wonderfully our bodies are created.
8. learn to take care of our bodies by proper diet, exercise, hygiene and dental health.
9. recognize different types of weather and seasons.

Kindergarten Scope and Sequence

September

How are crayons made

- know that they are made from wax
- learn they are made in a factory
- understand about melting and hardening

Caterpillar to Butterfly

- learn the cycle of egg, caterpillar, cocoon or chrysalis, butterfly
- understand that his cycle continues over and over
- recognize this as God's creation

Nocturnal Animals

- become aware of the life that goes on at night
- label some animals that are nocturnal

October

Where Does All the Garbage Go?

- learn the importance of proper disposal
- recognize that we should keep God's world beautiful and clean
- know that waste is not good, we should reuse and recycle

Gorillas

- become aware of where gorillas live in nature
- learn about how they communicate and live in groups

Apples

- learn the apple cycle through the seasons
- try different varieties and decide which is their favorite

Alligators and Crocodiles

- become aware of the differences in appearance
- label as reptiles

Dinosaurs

- learn of meat eaters and plant eaters and their different characteristics
- understand how scientists study and learn about dinosaurs
- know that dinosaurs did not live before man, millions of years ago

November

Senses

- identify the five senses
- understand how each works to help us learn about our world
- know that we use the senses together to maximize our learning
- appreciate how wonderfully God created us.

Stars and Sun

- learn that the sun is a star
- become aware of the earth's revolution which causes night and day

Lizards

- learn of the many kinds and sizes
- label as reptiles
- learn of God's defense mechanism of losing their tail and it's regrowth

December

Insects

Life in a Tree

January

Tadpoles to Frogs

Chickens and Eggs

Electricity

Health and Exercise

February

Under the Sea

Shadows

Our Bodies

Dental Health

March

Rain Forest

Magnets

Polar Bears

Penguins

April

Volcanoes

Weather

Whales

Earth Day

May

Water

Zoo Animals

Kindergarten Resources

Macmillan Early Science Big Books

Newbridge Educational Program

Time For Kids magazine

numerous books on individual topics

Grades 1 and 2 Objectives (two year cycle)

Year 1

By the end of year 1 the students will:

1. experiment with mixing color pigments.
2. use paper chromatography to separate color pigments.
3. experiment with mixing colored filters.
4. investigate the interaction between colored filters and colored paper.
5. apply their knowledge of color mixing to solve a puzzle.
6. experiment with “after images”.
7. identify the ways in which they use water.
8. determine some of the physical properties of water.
9. recognize water’s three physical states.
10. investigate the processes of evaporation and condensation.
11. make a model cloud.
12. identify components of the water cycle.
13. identify the five senses.
14. use sense of sight, hearing, and smell to identify things around them.
15. use sense of touch to match objects blindfolded.
16. describe a smell that evokes a memory.
17. recognize the role of smell in tasting food.
18. conclude that senses work best when they work together.
19. compare plain water to bubble solution.
20. experiment with wand shape and bubble shape.
21. conclude that all (single) bubbles are round, regardless of wand shape.
22. observe interactions between bubbles.
23. recognize the colors of light on the surface of bubbles.
24. use language skills in creating a story about an imaginary bubbles ride.
25. demonstrate that air is a substance that takes up space and has weight.
26. observe that air can be found in water and soil.
27. demonstrate that air volume increases with temperature.
28. observe that hot air rises.
29. demonstrate the usefulness of air resistance for slowing the rate at which objects fall.
30. use the Beaufort Wind Speed Scale to estimate wind speed.
31. observe and describe characteristics of different rocks.
32. identify samples of the three basic types of rock.
33. use layering tubes to compare two soil samples.
34. experiment to determine where the rock pieces in soil come from.
35. experiment to determine where the organic matter in soil comes from.
36. observe the action of earthworms in soil.
37. identify atmospheric conditions that comprise the weather.
38. learn how to use weather instruments, including windsocks, thermometers, the Beaufort Wind speed Scale, cloud charts, rain gauges, and barometers.
39. use new skills to record weather data for one or more weeks.
40. recognize that some weather conditions seem to be linked.

41. dissect and label the parts of a seed.
42. experiment to determine the effect of light on plant health.
43. use new skills to record weather data for one or more weeks.
44. recognize that some weather conditions seem to be linked.
45. dissect and label the parts of a seed.
46. experiment to determine the effect of light on plant health.
47. experiment to determine the effect of water on plant health.
48. recognize that plant roots grow down and stems grow up regardless of plant orientation.
49. identify some of the needs of the plant.
50. observe a variety of physical changes and identify the agent of change.
51. observe a variety of chemical changes and identify the agent of change.
52. use an emulsifier to improve salad dressing.
53. experiment to determine which of four chemicals dissolve in water.
54. use experimental results to identify an acid.
55. use an acid to write a secret message and heat to reveal it.
56. observe the chemical reaction that bleach produces in cotton.
57. make homemade glue.

Year 2

By the end of year 2 the students will:

1. identify the living and nonliving parts of an aquatic environment.
2. recognize that organisms have basic needs.
3. identify structures and behaviors that help an organism survive in its environment.
4. draw and describe physical characteristics of mealworms and snails.
5. gather data on mealworm and snail preferences for warm and cool areas.
6. gather data on mealworm and snail preferences for wet and dry areas.
7. gather data on mealworm and snail preferences for light and dark areas.
8. observe how mealworms and snails move in search of food.
9. compare mealworm and snail behavior using a Venn diagram.
10. recall experiences with shadows.
11. identify the circumstances necessary for shadows to form.
12. demonstrate how long and short shadows are made.
13. recognize that opaque objects cast shadows while transparent objects do not.
14. track the movement of a shadow over time.
15. experiment with a simple sundial clock.
16. give examples of healthy and unhealthy foods.
17. identify the ingredients in a packaged food.
18. conduct fat, Vitamin C, and starch tests on various foods.
19. recognize the importance of calcium for strong bones.
20. plan a healthy meal based on the Food Guide Pyramid.
21. observe that skin can only feel differences in temperature.
22. recognize that heat moves from hotter objects to colder objects.
23. use a thermometer to measure temperature.
24. experiment with variables that affect ice cube melting time.
25. compare the absorption of solar energy by white and black surfaces.

26. identify a variety of sounds and infer how they are made.
27. recognize that vibrations produce sounds.
28. observe that sound travels through solids as well as gases.
29. experiment with volume and pitch.
30. apply knowledge of pitch to create a tune.
31. experiment to determine which objects are attracted to a magnet and which are not.
32. identify the poles of the magnet as the areas where magnetic force is strongest.
33. experiment with pole interactions.
34. use iron filings to show the magnetic field surrounding a magnet.
35. determine which objects can block the magnetic attraction between a magnet and an object.
36. create a temporary magnet.
37. construct a compass using a magnetized needle.
38. recall objects they have seen sink or float in water.
39. determine which of a set of small objects will sink or float.
40. recognize that objects in water push on the water, while the water pushes back on the objects.
41. recognize that denser liquids push harder than less dense liquids.
42. experiment with object shape and ability to float.
43. manipulate objects to make them sink or float.
44. compare reflection of light by different objects, including mirrors.
45. determine that light bounces off mirrors at the same but opposite angle if came in at.
46. experiment with curved mirrors and the upside-down images they produce.
47. observe the effects of refraction.
48. examine eyeglasses and recognize how different lenses bend light to help people see.
49. experiment to determine the order of colors in the visible light spectrum.
50. recognize that only living things have life cycles.
51. grow pea plants and observe each stage of their life cycle.
52. raise darkling beetles (mealworms) and observe each stage of their life cycle.
53. recognize that, in each case, the stages form a continuous cycle.
54. make predictions about where microorganisms might live and what they might need to survive.
55. observe bacterial colonies growing on different types of food.
56. experiment to determine what yeast needs to grow and be active.
57. recognize that yeast is a decomposer.
58. recognize that soil contains lots of microorganisms.
59. construct a class compost pile and observe the effects of microbial action on food and garden waste.
60. observe microorganisms living in pond water.

Grades 1 and 2 Scope and Sequence

Year 1

January

Colors

Water

February

My Five Senses

Bubbles

March

Air

Rocks and Soil

April

Weather

Plants

May

Chemistry

Year 2

January

Aquarium

Animal Behavior

February

Sun and Shadows

Nutrition

March

Cold and Heat

Sound

Magnets

April

Sink and Float

Light

May

Life Cycles

Microorganisms

Grades 1 and 2 Resources

Ballantyne, Kay, et al. Hands-On Science. Monterey, CA: Evan-Moor Corp, 2003

Potter, Jean. Science in Seconds for Kids. New York, NY: Scholast

Grades 3 and 4 Objectives (two year cycle)

Year 1

Unit A A World of Living things

By the end of Unit A the students will:

1. see the wonder of God in our world of living things
2. identify reasons why scientists classify living things
3. identify the five kingdoms of living things
4. recognize how scientists name living things
5. identify the two main groups of animals
6. describe how vertebrates and invertebrates differ
7. give examples of vertebrates and invertebrates
8. describe the two main groups of plants
9. give examples of vascular and nonvascular plants
10. recognize that all animals have five basic needs: food, water, oxygen, shelter, climate
11. conclude that animals meet their needs in different ways
12. identify three adaptations birds have to help them meet their needs
13. describe animal body part adaptations that enable them to meet their needs
14. identify ways animals behave to enable them to meet their needs
15. distinguish between instinctual behavior and learned behavior in animals
16. identify the four basic needs of plants
17. explain how plants make food
18. give examples of plant adaptations
19. explain how plant adaptations enable plants to survive in different environments
20. identify ways that leaves, stems and roots help plants live
21. give examples of unusual plant adaptations
22. describe the ways plants reproduce
23. give examples of ways seeds are spread
24. identify the basic parts that make up the body
25. explain how the skeletal and muscular systems work
26. describe what breathing does for the body
27. identify why blood is important to the body's cells
28. describe how the nervous system controls all the body's systems

29. analyze what the digestive system does for the body

Unit B Looking at Ecosystems

By the end of Unit B the students will:

1. understand how God has a plan for all living things
2. describe what makes up a system
3. identify ways that a system gains stability
4. describe the basic parts of an ecosystem
5. explain how the living things in ecosystems are organized
6. give examples of habitats and niches in ecosystems
7. explain how plants and animals interact and change their environments
8. explain how tropical rain forests and coral reefs are alike
9. describe the resources of rain forests and coral reefs
10. explain why the resources are important

Unit C Earth's Surface

By the end of Unit C the students will:

1. understand how God formed the earth to bring glory to him, how he permits us to see into its past, and how he continues to maintain it
2. recognize and describe the layers of Earth
3. describe how slabs of Earth's crust and upper mantle move
4. explain what causes an earthquake
5. describe where earthquakes occur
6. explain various ways to measure earthquakes
7. describe how volcanoes form
8. identify three types of volcanoes
9. give examples of how volcano eruptions can be harmful and how they have good effects on land around them
10. collect information about minerals using observational skills
11. describe properties of minerals
12. explain how minerals form and how they are used
13. differentiate among different kinds of rocks
14. describe the relationship between rocks and minerals
15. explain how different rocks form
16. give examples of sedimentary, igneous, and metamorphic rocks
17. observe patterns of change in earth's rocks
18. describe processes involved in the rock cycle
19. identify the effects of erosion, dissolving, and weathering, which take place over time
20. analyze the scientific explanation of how fossils form, using scientific evidence
21. describe the steps involved in fossil formation
22. compare and contrast various methods of fossil preservation
23. analyze and interpret sets of footprints in order to communicate valid conclusions based on direct evidence

24. conclude why fossils are important to both the present and the past

Year 2

Unit D Patterns on Earth and In Space

By the end of Unit D the students will:

1. recognize how the hand of God is in control of our weather, waters, and outer space
2. review and analyze theories about processes that take place in Earth's atmosphere as to their strengths and weaknesses using scientific evidence and information
3. describe the composition of Earth's atmosphere
4. explain what is meant by air pressure
5. compare and contrast the layers of the atmosphere
6. identify the sun as the major source of energy for Earth and recognize that this star provides the energy needed to generate wind and weather
7. compare and contrast air masses, and explain what happens when they pass over an area
8. construct a device to measure and observe changes in air pressure
9. explain how different weather conditions are measured
10. recognize symbols used on weather maps

Unit E Matter and Energy

By the end of Unit E the students will:

1. recognize the hand of God in all aspects of science
2. conclude that matter has three forms: solid, liquid, and gas
3. recognize that heat can cause a change in the state of matter
4. conduct tests to compare data and draw conclusions about states of matter
5. use numerical data to measure, describe and compare physical property of matter
6. conduct tests, compare data, and draw conclusions about mass, volume, and density
7. identify buoyancy as a physical property of matter
8. conduct tests, compare data and draw conclusions about the buoyancy of different materials
9. recognize that some materials combine to form solutions

Unit F Forces and Motion

By the end of Unit F the students will:

1. thank God for the fun in science
2. identify ways to describe motion
3. define *frame of reference* and *relative motion*
4. calculate speed using data of distance and time
5. define *force*
6. demonstrate how forces are added and subtracted
7. measure forces using a spring scale
8. recognize the relationship between gravity and weight

9. identify and describe the parts of an atom
10. give examples of different kinds of natural forces

Grades 3 and 4 Scope and Sequence (two year cycle)

Year 1

Classifying living things

- How do scientists classify living things?
- How are animals classified?
- How are plants classified?

Animal Growth and Adaptations

- What are the basic needs of animal?
- How do animals' body parts help them meet their needs?
- How do animals' behaviors help them meet their needs?

Plants Growth and Adaptations

- What do plants need to live?
- How do leaves, stems, and roots help plants live?
- How do plants reproduce?

Human Body Systems

- How do the skeletal and muscular systems work?
- How do the respiratory and circulatory systems work?
- How do the digestive and nervous systems work?

Ecosystems

- What are systems?
- What makes up an ecosystem?
- What are habitats and niches?
- What are tropical rain forests and coral reefs?

Soil—A Natural Resource

- How does soil form?
- What are some properties of soil?
- What are some ways to conserve soil?

Protecting Ecosystems

- What kinds of changes occur in Ecosystems?
- How do people change ecosystems?
- What is conservation?

Earthquakes and Volcanoes

- What are the layers of the earth?
- What causes earthquakes?

-How do volcanoes form?

Rocks and Minerals

- What are minerals?
- What are rocks/
- What is the rock cycle?
- How do fossils form?
- What can we learn from fossils?

Year 2

Weather Conditions

- What makes up Earth's atmosphere?
- How do air masses affect weather?"
- How is weather predicted?

Water in the Oceans

- What role do oceans play in the water cycle?
- What are the motions of oceans?

Planets and Other Objects in Space

- How do objects move in the solar system?
- What are the planets like?
- How do people study the solar system?
- What are constellations?

Physical Properties of Matter

- What are three states of matter?
- How can matter be measured and compared?
- What are some useful properties of matter?

Heat—Energy on the Move

- How does heat affect matter?
- How can thermal energy be transferred?
- How is thermal energy produced and used?

Sound

- What is sound?
- Why do sounds differ?
- How do sound waves travel?

Electricity and Magnetism

- What is static electricity?
- What is an electric current?
- What is a magnet?
- What is an electromagnet?

Motion—Forces at work

- What is motion?
- What effects do forces have on objects?
- What are some forces in nature?

Simple Machines

- How does a lever help us do work?
- How do a pulley and wheel and axel help us do work?
- How do some other simple machines help us do work?

Grades 3 and 4 Resources

Harcourt 3rd Grade Science, Copyright 2000

Diagrams

Charts

Time For Kids

Internet

Grades 5 and 6 Objectives (2 year cycle)

By the end of year 1 the students will:

1. distinguish between erosion and deposition.
2. explain how Earth's crust is broken down into soil.
3. describe how water, wind, and ice change landforms.
4. describe the three layers of earth.
5. explain how mountains form.
6. describe what causes volcanoes and earthquakes.
7. explain the theory of continental drift.
8. understand how fossils help scientists to learn about plants and animals of the past.
9. define natural resources.
10. distinguish between renewable and nonrenewable resources.
11. identify why some natural resources might get used up.
12. compare the three types of fossil fuels.
13. describe the formation of coal.
14. explain where petroleum and natural gas are found.
15. describe how people use natural resources and tell how people can conserve them.
16. identify careers related to science.
17. specify where most weather occurs.
18. describe how weather conditions are measured.
19. explain how clouds form and tell about the different types.
20. identify the causes of wind and describe their patterns.
21. explain what determines a climate and identify the five climate zones.
22. describe how waves move.

23. explain what causes currents and tides.
24. explain how waves, currents and human activities shape and affect the shore.
25. describe how scientists have explored the oceans and tell how people use ocean resources.
26. recognize the time-and-space relationships of the sun-earth-moon system.
27. describe lunar and solar eclipses.
28. identify telescopes, satellites, and space probes as instruments scientists use to study the solar system.
29. connect science concepts with the contributions of scientists.
30. evaluate information to construct reasonable explanations from direct evidence.
31. describe the structure and cycles of the sun.
32. classify stars based on their physical properties.
33. identify star formation.
34. recognize how scientists use telescopes to collect information about stars.
35. describe the four basic types of galaxies.
36. compare galactic clusters to nebulae.
37. recognize that matter is anything that has mass and takes up space.
38. conclude that an object's physical properties remain constant and can be used to identify it.
39. compare and classify matter according to its physical state.
40. recognize that heat is responsible for changes in the state of matter.
41. identify melting and boiling points as constant temperatures at which substances change state.
42. compare a physical change and a chemical change.
43. conclude that physical and chemical properties can be used to identify substances and to separate mixtures.
44. identify an atom and its major parts.
45. describe an element.
46. describe and compare the properties of metals.
47. recognize how the elements are grouped in the periodic table.
48. identify a compound as a combination of two or more elements.
49. describe what a chemical formula reveals about a molecule.
50. connect science concepts with the history of science.
51. describe potential and kinetic energy.
52. list the various forms of energy.
53. explain what electric energy is.
54. tell what an electric current is.
55. describe how electromagnets work.
56. describe the characteristics of light and sound energy.
57. identify and compare the characteristics of light waves and sound waves.
58. describe thermal energy.
59. explain how thermal energy moves.
60. describe chemical energy.
61. explain how fossil fuels form.
62. list some ways that people use fossil fuels.

63. explain why fossil fuels are nonrenewable resources.
64. explain how electric energy is produced from the mechanical energy of moving water.
65. explain how tidal energy stations work.
66. describe other energy sources that are used in the United States.
67. tell about the energy sources that we might rely on in the future.
68. understand that God our maker is in control of all things scientific.

By the end of year 2 the students will:

1. describe structures that are found in cells.
2. analyze processes that take place in cells.
3. describe interactions that take place in cells.
4. recognize that many-celled organisms have specialized structures that transport materials.
5. describe how the blood, heart, and lungs work together to help the body take in oxygen and give off carbon dioxide.
6. analyze how the parts of the digestive system function.
7. explain the role of the excretory system, and identify its organs.
8. describe the structures that make up the skeletal system.
9. identify and describe the structures that make up the muscular system.
10. explain how the parts of the nervous system work to carry messages through the body.
11. connect science concepts with the history of science.
12. connect science concepts with the contributions of scientists.
13. describe the role of mitosis in the growth of an organism.
14. identify meiosis as a process of sexual reproduction.
15. distinguish between mitosis and meiosis.
16. compare the life cycles of different animals.
17. identify actions that require time for changes to be measurable, including growth.
18. identify traits that animal young inherit from their parents.
19. identify traits that young plants inherit from their parents.
20. evaluate careers that are related to science.
21. compare characteristics of plants that improve their ability to survive in a specific environment.
22. describe how food is transported in plants.
23. describe the function of plant leaves.
24. compare the adaptive characteristics of species that improve their ability to survive and reproduce in an ecosystem.
25. compare life cycles of plants and animals.
26. identify the role of plants in the daily diet.
27. describe how people use plants in their daily lives.
28. describe the structures and processes involved in the food-making process of plants.
29. recognize photosynthesis as an adaptive characteristic of plants that improves their ability to survive in an ecosystem.

30. conclude that plants use carbon dioxide and energy from sunlight to build molecules of sugar for growth and maintenance, and that plants release oxygen into the air.
31. recognize that tropisms are adaptive characteristics of plants that improve their ability to survive in an ecosystem.
32. compare plant responses to light and gravity.
33. predict how plants will respond in order to get the light they need to survive in their ecosystem.
34. compare the adaptive characteristics of plants that result in their ability to reproduce.
35. identify traits in plants that are passed on from parents to offspring.
36. describe some structures that make up the reproductive systems of flowering plants.
37. describe structures that are found in a simple system such as a sprouting seed.
38. describe life cycles of plants.
39. compare the adaptive characteristics of species that improve their ability to survive or reproduce in an ecosystem.
40. identify the significance of the carbon dioxide-oxygen and nitrogen cycles.
41. describe processes responsible for the formation of coal and petroleum.
42. conclude that human activities can upset the balance of the carbon dioxide-oxygen cycle.
43. describe the importance of the water cycle.
44. describe the main processes in the water cycle.
45. recognize that water is a limited resource that needs to be protected.
46. describe interactions that occur within an ecosystem.
47. analyze adaptive characteristics that result in an organism's unique niche in an ecosystem.
48. identify factors that limit the number and type of organisms in an ecosystem.
49. identify the roles of producers, consumers, and decomposers in an ecosystem.
50. describe how energy flows from one organism to another in food chains and in food webs.
51. recognize that because energy is lost as heat at each level of consumption, ecosystems must have more producers than consumers.
52. identify ways in which organisms are adapted to compete for resources.
53. describe some mutually beneficial interactions that occur within ecosystems.
54. compare instinctive behaviors with learned ones.
55. identify trends in resource use.
56. describe some natural and human causes of extinction.
57. identify ways humans can work to prevent the extinction of endangered species.
58. recognize that the climate of an area determines which biome will develop there.
59. identify characteristics of each of the six major land biomes in North America.
60. compare the adaptive characteristics of species that improve their ability to survive in a particular biome.
61. observe pond organisms and classify them as producers and consumers.

62. identify three types of water ecosystems.
63. describe adaptations that allow organisms to survive in saltwater environments.
64. understand what it takes to live a healthy lifestyle.
65. identify the food groups and know the breakdown of how much to consume from each one.
66. value the sanctity of life.
67. understand that God our maker is in control of all things scientific.

Grades 5 and 6 Scope and Sequence

Year 1- Science

Changes to Earth's Surface

- What Processes Change Landforms?
- What Causes Mountains, Volcanoes, and Earthquakes?
- How Has Earth's Surface Changed?

Renewable and Nonrenewable Resources

- What Are Natural Resources?
- How Do Fossil Fuels Form?
- How Are Natural Resources Conserved?

Weather and Climate

- How Can You Observe and Measure Weather Conditions?
- What Causes Wind?
- What Is Climate and How Does It Change?

Exploring the Oceans

- How Do Ocean Waters Move?
- How Do Oceans Interact with the Land?
- How Do People Explore the Oceans and Use Ocean Resources?

Earth, Moon, and Beyond

- How Do Earth and the Moon Compare?
- How Have People Explored the Solar System?

The Sun and Other Stars

- What Are the Features of the Sun?
- How Are Stars Classified?
- What Are Galaxies?

Matter and Its Properties

- How Can Physical Properties Be Used to Identify Matter?
- How Does Matter Change from One State to Another?
- How Does Matter React Chemically?

Atoms and Elements

- What Are Atoms and Elements?
- What Are Compounds?

Forms of Energy

- What Are Kinetic and Potential Energy?
- What Is Electric Energy?

- What Are Light and Sound Energy?
- What Are Thermal and Chemical Energy?

How People Use Energy

- How Do People Use Fossil Fuels?
- How Can Moving Water Generate Electricity?
- What Other Sources of Energy Do People Use?

Year 2 – Science

From Single Cells to Body Systems

- What Are Cells, and What Do They Do?
- How Are Human Body Systems Organized?
- How Do Bones, Muscles, and Nerves Work Together?

Animal Growth and Reproduction

- How Do Animals Grow and Reproduce?
- What Is a Life Cycle?
- Why Are Offspring Like Their Parents?

Types of Plants and Their Adaptations

- What Are the Functions of Roots, Stems, and Leaves?
- What Are the Two Major Groups of Plants?
- How Do People Use Plants?

Plant Processes

- How Do Plants Make Food?
- How Do Plants Respond to Light and Gravity?
- How Do Plants Reproduce?
- How Do Plants Grow?

Cycles in Nature

- How Does Nature Reuse Materials?
- Why Is the Water Cycle Important?

Living Things Interact

- What Are Ecosystems?
- How Does Energy Flow Through an Ecosystem?
- How Do Organisms Compete and Survive in an Ecosystem?
- What Is Extinction and What Are Its Causes?

Biomes

- What Are Land Biomes?
- What Are Water Ecosystems?

Protecting and Preserving Ecosystems

- How Do Ecosystems Change Naturally?
- How Do People Change Ecosystems?
- How Can People Treat Ecosystems More Wisely?
- How Can People Help Restore Damaged Ecosystems?

Healthy Choices, Healthy Kids

- What is a Healthy Lifestyle?
- What Are the Basic Food Groups?
- How Much Should I Consume From Each of the Food Groups?

Grades 5 and 6 Resources

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Diagrams

Charts

Time For Kids

Positive Promotions

Internet

Grades 7 and 8 Objectives

By the end of grade 8, students will:

1. develop their understanding of the science themes by using the themes to frame questions about science-related issues and problems
2. describe limitations of science systems and give reasons why specific science themes are included in or excluded from those systems
3. defend explanations and models by collecting and organizing evidence that supports them and critique explanations and models by collecting and organizing evidence that conflicts with them
4. use models and explanations to predict actions and events in the natural world
5. design real or thought investigations to test the usefulness and limitations of a model
6. describe how scientific knowledge and concepts have changed over time in the earth and space, life and environmental, and physical sciences
7. identify and describe major changes that have occurred over in conceptual models and explanations in the earth and space, life and environmental, and physical sciences and identify the people, cultures, and conditions that led to these developments
8. explain how the general rules of science apply to the development and use of evidence in science investigations, model-making, and applications
9. describe types of reasoning and evidence used outside of science to draw conclusions about the natural world
10. explain ways in which science knowledge is shared, checked, and extended, and show how these processes change over time
11. explain the ways in which scientific knowledge is useful and also limited when applied to social issues
12. identify questions they can investigate using resources and equipment they have available
13. identify data and locate sources of information including their own records to answer the questions being investigated
14. design and safely conduct investigations that provide reliable quantitative or qualitative data, as appropriate, to answer their questions
15. use inferences to help decide possible results of their investigations, use observations to check their inferences
16. use accepted scientific knowledge, models, and theories to explain their results and to raise further questions about their investigations
17. state what they have learned from investigations, relating their inferences to scientific knowledge and to data they have collected

18. explain their data and conclusions in ways that allow an audience to understand the questions they selected for investigation and the answers they have developed
19. use computer software and other technologies to organize, process, and present their data
20. evaluate, explain, and defend the validity of questions, hypotheses, and conclusions to their investigations
21. discuss the importance of their results and implications of their work with peers, teachers, and other adults
22. raise further questions which still need to be answered
23. observe, describe, and measure physical and chemical properties of elements and other substances to identify and group them according to properties such as density, melting points, boiling points, conductivity, magnetic attraction, solubility, and reactions to common physical and chemical tests
24. use the major ideas of atomic theory and molecular theory to describe physical and chemical interactions among substances, including solids, liquids, and gases
25. understand how chemical interactions and behaviors lead to new substances with different properties
26. while conducting investigations, use the science themes to develop explanations of physical and chemical interactions and energy exchanges

MOTIONS AND FORCES

27. while conducting investigations, explain the motion of objects by describing the forces acting on them
28. while conducting investigations, explain the motion of objects using concepts of speed, velocity, acceleration, friction, momentum, and changes over time, among others, and apply these concepts and explanations to real-life situations outside the classroom
29. while conducting investigations of common physical and chemical interactions occurring in the laboratory and the outside world, use commonly accepted definitions of energy and the idea of energy conservation

TRANSFER OF ENERGY

30. describe and investigate the properties of light, heat, gravity, radio waves, magnetic fields, electrical fields, and sound waves as they interact with material objects in common situations
31. explain the behaviors of various forms of energy by using the models of energy transmission, both in the laboratory and in real-life situations in the outside world
32. explain how models of the atomic structure of matter have changed over time, including historical models and modern atomic theory

STRUCTURE OF EARTH SYSTEM

33. using the science themes, explain and predict changes in major features of land, water, and atmospheric systems
34. describe underlying structures of the earth that cause changes in the earth's surface
35. using the science themes during the process of investigation, describe climate, weather, ocean currents, soil movements and changes in the forces acting on the earth
36. using the science themes, analyze the influence living organisms have had on the earth's systems, including their impact on the composition of the atmosphere and the weathering of rocks

EARTH'S HISTORY

37. E.8.5 Analyze the geologic and life history of the earth, including change over time, using various forms of scientific evidence
38. E.8.6 Describe through investigations the use of the earth's resources by humans in both past and current cultures, particularly how changes in the resources used for the past 100 years are the basis for efforts to conserve and recycle renewable and non-renewable resources

EARTH IN THE SOLAR SYSTEM

39. describe the general structure of the solar system, galaxies, and the universe, explaining the nature of the evidence used to develop current models of the universe
40. using past and current models of the structure of the solar system, explain the daily, monthly, yearly, and long-term cycles of the earth, citing evidence gained from personal observation as well as evidence used by scientists

STRUCTURE AND FUNCTION IN LIVING THINGS

41. understand the structure and function of cells, organs, tissues, organ systems, and whole organisms
42. show how organisms have adapted structures to match their functions, providing means of encouraging individual and group survival within specific environments
43. differentiate between single-celled and multiple-celled organisms (humans) through investigation, comparing the cell functions of specialized cells for each type of organism

REPRODUCTION AND HEREDITY

44. investigate and explain that heredity is comprised of the characteristic traits found in genes within the cell of an organism
45. show how different structures both reproduce and pass on characteristics of their group

REGULATION AND BEHAVIOR

46. understand that an organism is regulated both internally and externally
47. understand that an organism's behavior evolves through adaptation to its environment

POPULATIONS AND ECOSYSTEMS

48. show through investigations how organisms both depend on and contribute to the balance or imbalance of populations and/or ecosystems, which in turn contribute to the total system of life on the planet

DIVERSITY AND ADAPTATIONS OF ORGANISMS

49. explain how some of the changes on the earth are contributing to changes in the balance of life and affecting the survival or population growth of certain species
50. project how current trends in human resource use and population growth will influence the natural environment, and show how current policies affect those trends.
51. identify and investigate the skills people need for a career in science or technology and identify the academic courses that a person pursuing such a career would need
52. explain how current scientific and technological discoveries have an influence on the work people do and how some of these discoveries also lead to new careers
53. illustrate the impact that science and technology have had, both good and bad, on careers, systems, society, environment, and quality of life
54. propose a design (or re-design) of an applied science model or a machine that will have an impact in the community or elsewhere in the world and show how the design (or re-design) might work, including potential side-effects
55. investigate a specific local problem to which there has been a scientific or technological solution, including proposals for alternative courses of action, the choices that were

- made, reasons for the choices, any new problems created, and subsequent community satisfaction
56. use current texts, encyclopedias, source books, computers, experts, the popular press, or other relevant sources to identify examples of how scientific discoveries have resulted in new technology
 57. show evidence of how science and technology are interdependent, using some examples drawn from personally conducted investigations
 58. evaluate the scientific evidence used in various media (for example, television, radio, internet, popular press, and scientific journals) to address a social issue, using criteria of accuracy, logic, bias, relevance of data, and credibility of sources
 59. present a scientific solution to a problem involving the earth and space, life and environmental, or physical sciences and participate in a consensus-building discussion to arrive at a group decision
 60. understand the consequences of decisions affecting personal health and safety

Grades 7 and 8 Scope and Sequence (two year cycle)

Year 1

Earth Science

- Earth's Atmosphere
- Space Science

Life Science

- Cells and Heredity
- Life Over Time
- Diversity of Living Things
- Ecology
- Human Biology

Year 2

Earth Science

- Earth's Surface
- The Changing Earth
- Earth's Waters

Physical Science

- Matter and Energy
- Chemical Interactions
- Motion and Forces
- Waves, Sound, and Light
- Electricity and Magnetism