

The Covenant School
Science Content Standards

The Covenant School Science Standards are divided into the following strands:

- Unifying Concepts and Processes
- Science as Inquiry
- Science and Technology
- History and the Nature of Science
- Physical Science
- Life Science
- Earth Science
- Science in the Personal and Social Perspective

The Covenant School Science program is an inquiry based program that focuses on the mission of TCS to provide a superior education informed by the Biblical worldview. The Covenant School Science Content Standards were created from the National Science Education Standards*. There are four strands that are important for science instruction at all levels and will be experienced by all the students in Grades PreK-6. The remaining strands were divided among Grades PreK-6 in order to provide depth to both the content knowledge and the scientific processing knowledge that the students acquire in science. By Grade 6, the students will cycle through the strands three times. Additionally, at the end of Grade 6, the students will review all of the eight strands to examine and reflect on the scientific knowledge constructed over time.

Overview of TCS Science Content Standards

Strands	PreK	K	1	2	3	4	5	6
Unifying Concepts and Processes								
Science as Inquiry								
Science and Technology								
History and the Nature of Science								
Physical Science								
Life Science								
Earth Science								
Science in the Personal and Social Perspective								

*retrieved July 2007 from

<http://www.nap.edu/readingroom/books/nse/overview.html#organization>

The Covenant School Science Curriculum
Curriculum Map for Science Instruction Grades PreK-6

Strand	Grade	Units of Study
Physical Science	PreK	Magnets Electricity Changes in Water: Introduce Liquid/Solid/Gas Colors/Color Mixing
	1 st Grade	Simple Machines Force and Motion/Sound Solids/Liquids
	4 th Grade	Magnets-electromagnets Electricity Solubility/Solutions/Mixtures Inventions
Earth Science	PreK	Wind and Weather Seasons What is in the Sky? Shadows/Reflections Fossils
	1 st Grade	Weather and Seasons/Sun and Moon/Heat Landforms
	3 rd Grade	Rocks and Minerals/Soil and Sand Solar System/Gravity Weather/Water Cycle Landforms Gravity
Life Science	K	My Body Owls, Bats/Earthworms Life Cycles: Insects/Plants
	2	Plants/Parts of the Plant Animals: Classifications/Life Cycles/Habitats and Adaptations/Food Chains
	5	Structure/Functions of Living Systems Cells Heredity Reproduction: Plants/Animals Regulation and Behavior Populations/Ecosystems Biomes Diversity Adaptation
	K	Personal Health and Nutrition Being Safe Renewable/Nonrenewable Resources Identifying Feelings
	2	Nutrition Guide Communication Skills/Goal Setting Personal Health and Nutrition Ecology: Conservation/Recycling
Personal/Social Perspectives	6	Disease Prevention/Personal Health Mass Communication/Culture Ecology: Conservation/Recycling Population Resources/Environment Natural Hazards Biblical Worldview of Science

PreKindergarten Science Standards

(1) Unifying Concepts and Processes

- 1.1 Identify that anyone can participate in science.*
- 1.2 Explore different ways to carry out scientific investigations.*
- 1.3 Describe that things can change in different ways.*
- 1.4 Investigate the way living and nonliving things are made of various parts.*

(2) Science as Inquiry

- 2.1 Conduct simple exploration through observation and play.*
- 2.2 Ask questions and make predictions about objects, organisms, and events that occur in the environment.*
- 2.3 Use scientific tools (such as magnifying glass, computers, ruler, simple balance, thermometer, and timer) as part of investigation.*
- 2.4 Demonstrate and explain the safe and proper use of tools, equipment, and materials.*
- 2.5 Use language to describe with reason or draw pictures to record scientific observations and experimentation.*
- 2.6 Begin to make comparisons between objects or organisms based on the characteristics.*

(3) Science and Technology

- 3.1 Begin to identify the way tools, such as thermometers, balances, magnifying glasses, and computers are used to increase understanding (such as thermometer tells us the temperature, magnifiers help us see things by enlarging the view, computers help us research and record scientific information, etc.).*

(4) History and the Nature of Science

- 4.1 Recognize that many different people have contributed to the understanding of our world.*
- 4.2 Investigate the scientific contributions made by Ben Franklin and Thomas Edison.*

(5) Physical Science

- 5.1 Identify the changes that can be observed in water (solid, liquid, gas) that describe the three states of matter.*
- 5.2 Describe the effects of basic forces in nature (wind, lightning).*
- 5.3 Use language to describe basic physical phenomenon (sink, float).*

5.4 Explore musical instruments and describe the different qualities of sound (high, low, soft, loud).

5.5 Explore sources of color, heat, and light in our environment (rainbow, prism, sun, shadow).

5.6 Explore magnets and electricity as a source of energy.

(6) Earth Science

6.1 Investigate the seasons and observe seasonal changes.

6.2 Observe and describe daily weather.

6.3 Participate in activities to explore the earth (rocks, fossils, landforms, air) and the sky (clouds, sun, moon, stars).

6.4 Identify that the Earth is comprised of water and land.

6.5 Investigate and describe natural phenomena with repeating patterns such as day and night and the seasons.

Kindergarten Science Standards

(1) Unifying Concepts and Processes

1.1 Identify that anyone can participate in science.

1.2 Explore different ways to carry out scientific investigations.

1.3 Describe that things can change in different ways.

1.4 Investigate the way living and nonliving things are made of various parts.

(2) Science as Inquiry

2.1 Use the senses to make and describe careful observations.

2.2 Ask open-ended questions and make predictions.

2.3 Perform simple investigations using tools and technology (computers, thermometers, rulers, magnifiers, balances).

2.3 Record data, report on findings and explain with reasons.

(3) Science and Technology

3.1 Utilize tools and technology (computers, thermometers, rulers, magnifiers, balances) to perform simple investigations.

(4) History and the Nature of Science

4.1 Recognize that many different people have contributed to the understanding of God's world.

(5) Life Science

5.1 Standard: Identify different types of plants and animals that inhabit God's world.

(A) Observe and describe similarities and differences in the appearance and behavior of plants and animals (seed-bearing plants such as pumpkins and apples, birds, and insects such as the butterfly, ant, bee, and ladybug).

(B) Identify major structures of common plants and animals (stems, leaves, roots, wings, head, thorax, abdomen, arms, legs).

5.2 Standard: Investigate and understand basic needs and life processes of plants and animals.

(A) Living things change as they grow and need food, water, light, and air to survive.

(B) Plants and animals go through a life cycle (chicken, apple and oak tree).

(C) Offspring of plants and animals are similar but not identical to their parents and one another.

(6) Personal/Social Perspectives

6.1 Standard: Ecology: Conservation/ Recycling

(A) Identify resources from God's creation that are used in everyday life.

(B) Investigate and understand that materials can be reused, recycled, and conserved.

6.2 Standard: Personal Health and Safety

(A) Begin to understand that eating a nutritious diet, getting exercise and plenty of rest promote good health.

(B) Explore and identify the basic functions of the human body (eyes, nose, legs, arms, mouth, stomach, brain, and heart).

(C) Explore and identify feelings (jealousy, anger, happiness, joy).

(D) Understand basic safety principles (911, fire safety, bike safety, and stranger safety).

First Grade Science Standards

(1) Unifying Concepts and Processes

(1.1) Identify that anyone can participate in science.

(1.2) Explore different ways to carry out scientific investigations.

(2) Science as Inquiry

(2.1) Use appropriate safety procedures when completing scientific investigations.

(2.2) Use appropriate tools and simple equipment/instruments (such as rulers, magnifiers, timers, simple balances and other tools) to gather scientific data.

(2.3) Work in a small group to complete an investigation and then share findings with others.

(2.4) Create individual conclusions about group findings.

(2.5) Make estimates to compare familiar lengths, weights and time intervals.

(2.6) Use oral, written and pictorial representation to communicate work.

(2.7) Compare, classify and sequence objects by number, shape, texture, size, color and motion using standard English units of measurement where appropriate.

(3) Science and Technology

(3a) Utilize various tools such as thermometers, rulers and balances to investigate the world and make observations.

(3b) Use the computer as a tool for research and gaining scientific understanding.

(4) History and the Nature of Science

(4a) Recognize that many different people have contributed to the understanding of our world.

(5) Physical Science

(5a) Recognize and explain that water can be a liquid or solid and can go back and forth from one form to the other.

(5b) Investigate by observing that if water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing.

(5c) Investigate by observing and then describing that water left in an open

container disappears but water in a closed container does not disappear.

(5d) Identify the location of an object relative to another object.

(5e) Explain the importance of pushing and pulling to the motion of an object.

(5f) Investigate by observing and then describe how things move in many different ways, such as straight, zigzag, round-and-round, and back-and-forth.

(5g) Illustrate the fact that sound is produced by vibrating objects.

(6) Earth Science

(6a) Compare the features of the day and night sky.

(6b) Recognize that the Sun and the Moon appear to rise and set.

(6c) Illustrate changes in the Moon's appearance (including patterns over time).

(6d) Recall that the Sun is a source of heat and light for the Earth.

(6e) Investigate by observing and also measuring that the Sun warms the land, air, and water.

(6f) Observe, recognize, and record patterns and changes in weather from day to day and over the course of the seasons.

(6g) Know that the weather changes from day to day but that trends in temperature or rain (or snow) tend to be predictable within a particular season.

(6h) Begin to identify landforms such as mountains, hills, valleys, plains, and islands, as well as other features of earth's surface such as lakes, rivers and oceans.

Second Grade Science Standards

(1) Unifying Concepts and Processes

1.1 Identify that everybody can do science and invent things and ideas.

1.2 Recognize and explain that when a scientific investigation is repeated, a similar result is expected.

1.3 Describe that things can change in different ways, such as in size, weight, color, age, and movement. Investigate that some small changes can be detected by taking measurements.

1.4 Investigate that most objects are made of parts and that when the parts are put together they can do things that they could not do by themselves. Investigate and describe that something may not work if a part or parts are missing.

1.5 Explain how a model of something is different from the real thing but can be used to learn something about the real thing.

(2) Science as Inquiry

2.1 Participate in different types of guided scientific investigations, such as observing objects and events and collecting specimens for analysis

2.2 Keep and report records of investigations and observations using tools, such as journals, charts, graphs, and computers.

2.3 Use tools - such as thermometers, magnifiers, rulers, timers, computers or balances to gain more information about objects.

2.4 Discuss the results of investigations and consider the explanations of others.

2.5 Manipulate an object to gain additional information about it.

2.6 Make new observations when there is disagreement among initial observations.

2.7 Use appropriate safety procedures when completing scientific investigations.

(3) Science and Technology

3.1 Describe how tools are used to do things better or more easily and to do some things that could not be done otherwise.

3.2 Use tools to investigate, observe, measure, design, and build things.

3.3 Explain that developing and using technology involves benefits and risks.

(4) History and Nature of Science

4.1 Describe, both in writing and verbally, objects as accurately as possible and compare observations with those of other people.

4.2 Explain that people, alone or in groups, are always inventing new ways to solve problems and get work done. The tools and ways of doing things that people have invented have affected all aspects of life.

4.3 Explain that people may not be able to actually make and do everything that they can design.

4.4 Explain why scientists review and ask questions about the results of other scientist's work.

(5) Life Science

5.1 Standard: The student will demonstrate an understanding of the special characteristics and needs of plants that allow them to survive in their own distinct environments.

(A) Recall the basic needs of plants (including air, water, nutrients, space, and light) for energy and growth.

(B) Illustrate the major structures of plants (including stems, roots, leaves, flowers, fruits, and seeds).

(C) Classify plants according to their characteristics (including what specific type of environment they live in, whether they have edible parts, and what particular kinds of physical traits they have).

(D) Summarize the life cycle of plants (including germination, growth, and the production of flowers and seeds).

(E) Explain how distinct environments throughout the world support the life of different types of plants.

(F) Identify characteristics of plants (including types of stems, roots, leaves, flowers, and seeds) that help them survive in their own distinct environments.

5.2 Standard: The student will demonstrate an understanding of the needs and characteristics of animals as they interact in their own distinct environments.

(A) Recall the basic needs of animals (including air, water, food, and shelter) for energy, growth, and protection.

(B) Classify animals (including mammals, birds, amphibians, reptiles, fish, and insects) according to their physical characteristics.

(C) Explain how distinct environments throughout the world support the life of different types of animals.

(D) Summarize the interdependence between animals and plants as sources of food and shelter.

(E) Illustrate the various life cycles of animals (including birth and the stages of development).

(F) Observe and describe how offspring are very much like, but not exactly, like their parents and like one another.

5.3 Standard: The student will demonstrate an understanding of the structures, characteristics, and adaptation of organisms that allow them function and survive within their habitats.

(A) Illustrate the life cycles of seed plants and various animals and summarize how they grow and are adapted to conditions within their habitats.

(B) Explain how physical and behavioral adaptations allow organisms to survive (including hibernation, defense, locomotion, movement, food obtainment, and camouflage for animals and seed dispersal, color, and response to light for plants).

(C) Recall the characteristics of an organism's habitat that allow the organism to survive there.

(D) Observe and describe that there can be differences, such as size or markings, among the individuals within one kind of plant or animal group.

(E) Explain how changes in the habitats of plants and animals affect their survival.

(F) Summarize the organization of simple food chains (including the roles of producers, consumers, and decomposers)

(6) Science in the Personal and Social Perspective

6.1 Standard: Ecology: Conservation/Recycling

(A) Recognize and describe ways that some materials – such as recycled paper, cans, plastic jugs – can be used over again.

(B) Describe how discarded products contribute to the problem of waste disposal and that recycling can help this problem.

(C) Energy can be saved by turning off machines when they are not in use.

6.2 Standard: Personal Health and Nutrition

(A) Explain that eating a variety of healthful foods and getting enough exercise and rest help people stay healthy.

(B) Explain that some things people take into their bodies from the environment can hurt them and give examples of such things.

(C) Explain that some diseases are caused by the spread of germs and some are not. Understand that washing hands with soap and warm water reduces the number of germ that can get into the body or that can be passed on to other people.

(D) Describe that vaccinations and other scientific treatments protect people from getting certain diseases, and different kinds of medicines may help those who do become sick to recover.

(E) Understand the basic functions of the human body and its parts (Eyes, nose, legs, arms, mouth, brain, heart, and stomach)

6.3 Standard: Communication Skills/Goal Setting

(A) Understand that disagreements are common, even between family members or friends. Some ways of dealing with them work better than others. People who are not involved in an argument may be helpful in solving it.

(B) Identify that rules at home, at school, and in the community let individuals know what to expect and so it can reduce the number of disputes.

(C) Identify that people have many different feelings- sadness, joy, anger, fear, etc. about events, themselves, and other people.

(D) Identify that praying and talking to someone (a friend, relative, teacher, and pastor) may help people understand their feelings and problems and what to do about them.

Third Grade Science Standards

(1) Unifying Concepts

Some important themes are seen throughout science and appear repeatedly across disciplines. Students work with an increasing variety of systems and notice the changes that result. Students can begin to formulate their own models to explain things they cannot observe directly. By testing their models and changing them as more information is acquired, they begin to understand how science works.

1.1 Systems

(A) Investigate how and describe that when parts are put together, they can do things that they could not do by themselves.

(B) Investigate how and describe that something may not work if some of its parts are missing.

1.2. Models and Scale

(A) Explain how a model of something is different from the real thing but can be used to learn something about the real thing.

(B) Understand how a model works after changes are made to it may suggest how the real thing would work if the same were done to it.

(C) Understand that almost anything has limits on how big or small it can be.

1.3. Constancy and Change

(A) Take, record, and display counts and simple measurements of things over time, such as plant or student growth.

(B) Observe that and describe how some changes are very slow and some are very fast and that some of these changes may be hard to see and/or record.

(C) Investigate by observing and then describe that some events in nature have a repeating pattern, such as seasons, day and night, and migrations.

(D) Give examples of how change, such as weather patterns, is a continual process occurring on Earth.

(E) Understand that many times the best way to tell which kinds of change are happening is to make a table or graph of measurements.

(2) Science as Inquiry

Students use a variety of skills and techniques when attempting to answer questions and solve problems. They describe their observations accurately and clearly, using numbers, words, and sketches, and are able to communicate their thinking to others.

2.1 Computation and Estimation

(A) Add and subtract whole numbers mentally, on paper, and with a calculator.

(B.) Appropriately use simple tools, such as clamps, rulers, scissors, hand lenses, and other technology, such as calculators and computers, to help solve problems.

2.2 Manipulation and Observation

(A) Measure and mix dry and liquid materials in prescribed amounts, following reasonable safety precautions.

(B) Classify objects by two of their properties (attributes).

(C) Classify objects or events in sequential order.

(D) Use appropriate safety procedures when conducting investigations.

(E) Participate in different types of guided scientific investigations, such as observing objects and events and collecting specimens for analysis.

(F) Keep and report records of investigations and observations using tools, such as journals, charts, graphs, and computers.*

(G) Recognize and explain that when a scientific investigation is repeated, a similar result is expected.

2.3 Communication Skills

(A) Generate questions such as “what if?” or “how?” about objects, organisms, and events in the environment and use those questions to conduct a simple scientific investigation.

(B) Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations).

(C) Discuss the results of investigations and consider the explanations of others.

(D) Demonstrate the ability to work cooperatively while respecting the ideas of others and communicating one’s own conclusions about findings.

2.4. Critical Response Skills

(A) Ask “How do you know?” in appropriate situations and attempt reasonable answers when others ask the same question.

(B) Predict the outcome of a simple investigation and compare the result with the prediction.

(C) Infer meaning from data communicated in graphs, tables, and diagrams.

(D) Explain why similar investigations might produce different results.

(3) Science and Technology

Students need to understand the effects of technology on Scientific achievements and be able to utilize technology when conducting their own experiments.

3.1 Describe how technology can extend human abilities.

3.2 Describe ways that using technology can have helpful and/or harmful results.

3.3 Give examples of how tools, such as automobiles, computers, and electric motors, have affected the way we live.

3.4 Recognize that and explain how an invention can be used in different ways, such as a radio being used to get information and for entertainment.

3.5 Describe how discarded products contribute to the problem of waste disposal and that recycling can help solve this problem.

3.6 Investigate ways that the results of technology may affect the individual, family, and community.

3.7 Use a simple design process to solve a problem.

(4) The History and Nature of Science

Students understand the historical implications of science and the standards that have guided the study of science throughout history.

4.1 Explore through stories how men and women have contributed to the development of science.

(A) Learn that Copernicus (1473-1543) theorized that the sun is the center of the universe.

(B) Learn that Johannes Kepler (1571-1630) worked out that the planets orbits are not perfect circles, but actually ellipses.

(C) Learn that Isaac Newton (1642-1727) developed the Law of Gravity.

(D) Learn that Edmond Halley (1656-1742) studied comets and correctly predicted the appearance of the Great Comet in 1758.

(E) Learn that Caroline Herschel (1750-1848) discovered many comets and won several awards.

(F) Learn that Justus von Liebig (1803-1873) developed a cooling device that turns gases into liquids.

4.2 Identify various careers in science.

4.3 Discuss how both men and women find science rewarding as a career and in their everyday lives.

4.4 Keep records of investigations and observations and do not change the records that are different from someone else's work.

4.5 Describe different kinds of investigations that scientists use depending on the questions they are trying to answer.

4.6 Understand that science is an adventure that people everywhere can take part in, as they have for many centuries

(5) Earth Science

5.1. Solar System/Gravity

Students will demonstrate an understanding of the properties, movements, and locations of objects in the solar system.

(A) Recall that Earth is one of many planets in the solar system that orbit the Sun.

(B) Understand that gravity is the force that keeps objects in orbit.

(C) Compare the properties (including the type of surface and atmosphere) and the location of Earth to the Sun, which is a star, and the Moon.

(D) Interpret the change in the length of shadows during the day in relation to the position of the Sun in the sky.

(E) Explain how the tilt of Earth's axis and the revolution around the Sun results in the seasons of the year.

(F) Explain how the rotation of Earth results in day and night.

(G) Observe and report that the moon can be seen sometimes at night and sometimes during the day

(H) Illustrate the phases of the Moon and the Moon's effect on ocean tides.

(I) Understand the properties of asteroids and comets.

(J) Recognize the purpose of telescopes.

5.2 Weather/Water Cycle

The student will demonstrate an understanding of daily and seasonal weather conditions, patterns, and phenomena.

(A) Begin to investigate and explain that air is a substance that surrounds us and takes up space, and that moving air (wind) affects objects.

(B) Use pictorial weather symbols to record observable sky conditions.

(C) Summarize the processes of the water cycle (including evaporation, condensation, precipitation, and runoff).

(D) Classify clouds according to their types (cumulus, cirrus, stratus, cirrostratus, and cumulonimbus) and summarize how clouds form.

(E) Investigate and carry out the procedures for data collecting and measuring daily weather conditions (including wind speed and direction, precipitation, and temperature) by using appropriate tools and instruments.

(F) Understand the difference between daily weather activity and climate.

(G) Predict weather from data collected through observation and measurements.

(H) Summarize the conditions and effects of severe weather phenomena (including thunderstorms, hurricanes, and tornadoes) and related safety concerns.

5.3 Rocks/Minerals/Soil/Sand

Students will demonstrate an understanding of Earth's composition.

(A) Classify rocks (including sedimentary, igneous, and metamorphic) and soils (including humus, clay, sand, and silt) on the basis of their properties.

(B) Recognize and describe that rock is composed of different combinations of minerals.

(C) Explain that smaller rocks come from the breakage and weathering of bedrock and larger rocks.

(D) Understand and explain the process by which sedimentary, igneous, and metamorphic rocks are formed (the Rock Cycle).

(E) Identify common minerals on the basis of their properties by using a minerals identification key.

(F) Recognize types of fossils (including molds, casts, imprints, and preserved parts of plants and animals).

(G) Identify Earth materials that are used as fuel, as a resource for building materials, and as a medium for growing plants.

*(H) Explain that soil is made partly from *weathered rock, partly from plant remains, and also contains many living organisms.*

(I) Identify the layers of soil according to the composition of those layers.

5.4 Landforms/Oceans

Students will understand the various features of Earth's surface and the causes that change those features.

(A) Identify the layers of Earth based on their characteristics (crust, mantle, outer core, inner core).

(B) Understand and illustrate Earth's land features (including volcanoes, mountains, valleys, canyons, caverns, and islands) by using models, pictures, diagrams, and maps.

(C) Illustrate changes in Earth's surface that are due to slow processes (including weathering, erosion, and deposition) and changes that are due to rapid processes (including landslides, volcanic eruptions, floods, and earthquakes).

(D) Describe how waves, wind, water, and glacial ice shape and reshape Earth's land surface by the erosion of rock and soil in some areas and depositing them in other areas.*

-erosion: the process by which the products of weathering are moved from one place to another*

-weathering: breaking down of rocks and other materials on Earth's surface by such processes as rain or wind

(E) Identify salt as the major difference between fresh and ocean waters.

(F) Understand Earth's saltwater and freshwater features (including oceans, seas, rivers, lakes, ponds, streams, and glaciers).

(G) Describe some of the effects of oceans on climate.

(H) Understand the characteristics of the different layers of the ocean floor.

4th Grade Science Standards

(1) Unifying Concepts and Processes

1.1 Recognize that the results of scientific investigations are hardly ever the same. When these differences occur, students will look for reasons as to why they occurred and record information that supports their analysis.

1.2 Record and communicate their procedures, observations, and results of scientific investigations then compare them to the class results for final analysis.

(2) Science as Inquiry

2.1 Generate questions; design and conduct scientific investigations to answer those questions.

2.2 Plan and conduct simple investigations.

2.3 Employ tools to gather, analyze, and interpret data.

2.4 Use data to construct reasonable explanations.

2.5 Develop and communicate explanations using evidence.

2.6 Analyze alternative explanations and predictions.

2.7 Understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge.

(3) Science and Technology

3.1 Develop students' abilities in technological design.

(A) Identify a simple problem and propose a solution.

(B) Evaluate a product or design.

(C) Communicate a problem, design, and solution.

3.2 Develop students' understandings about science and technology.

(A) Scientists work collaboratively in teams and use tools and scientific techniques to make better observations.

(4) History and the Nature of Science

4.1 Science and technology have been practiced by people for a long time.

4.2 People make discoveries about the natural world that contribute to global knowledge.

4.3 Men and women have made a variety of contributions throughout the history of science and technology.

(5) Physical Science

5.1 Develop students' understanding of electricity and magnetism.

(A) Magnets attract and repel each other and certain kinds of other materials; electricity in circuits can produce light, heat, sound, and magnetic effects; electric circuits require a complete loop through which an electric current can pass.

(B) Measure the change in force between two magnets as the distance between them changes.

(C) Identify materials that are conductors and insulators.

(D) Understand and construct simple open, closed, parallel, and series circuits.

(E) Learn how to make an electromagnet.

(F) Experience the relationship between the number of turns of wire around an electromagnet core and the strength of the magnetism

(G) Acquire vocabulary associated with magnetism and electricity

5.2 Develop students' understanding of properties of matter and changes in properties of matter.

(A) Substances have characteristic properties, such as solubility. A mixture of substances often can be separated into the original substances using one or more of the properties.

(B) Substances react chemically in characteristic ways with other substances to form new substances.

(C) More than 100 known elements (92 of them naturally occurring) combine in a multitude of ways to produce compounds, which account for the living and nonliving substances in our world.

(D) Gain experience with the concepts of concentration and saturation.

(E) Acquire vocabulary associated with chemistry and the periodic table.

(F) Be introduced to the concept that all matter is made of very small particles called atoms and that atoms combine to form molecules.

(G) Use scientific thinking processes to conduct investigations and build explanations: observing, communicating, comparing, organizing, and relating.

5.3 Develop students' understanding of metric measurement using length, mass, temperature, and volume.

- (A) Develop an understanding and intuitive feel for the metric system.*
- (B) Measure length and distance in meters and centimeters with a meter tape.*
- (C) Measure mass in grams with a balance and mass pieces.*
- (D) Measure liquid volume and capacity of containers in liters and milliliters with 50-ml syringes and graduated cylinders.*
- (E) Measure temperature of liquids and air in degrees Celsius with a thermometer.*
- (F) Acquire the vocabulary associated with metric measurement.*
- (G) Exercise language and math skills in the context of metric measurement.*
- (H) Apply appropriate measuring skills in everyday situations.*

5th grade Science Standards

(1) Unifying Concepts and Processes

1.1 Systems

(A) Recognize and describe that systems contain objects as well as processes that interact with each other.

1.2 Models and Scale

(A) Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail.

(B) Recognize and describe that almost anything has limits on how big or small it can be.

1.3 Constancy and Change

(A) Investigate, observe, and describe that things change in steady, repetitive, or irregular ways.

(B) Note that the best way to tell which kinds of changes are happening is to make a table or a graph of measurements

(2) Science as Inquiry

2.1 Manipulation and Observation

(A) Use technology, such as calculators or spreadsheets, in determining area and volume.

(B) Find area, volume, mass, time, and cost, and find the difference between two quantities of anything.

2.2 Communication Skills

(A) Write instructions that others can follow in carrying out a procedure.

(B) Read and follow step-by-step instructions when learning new procedures.

2.3 Critical Response Skills

(A) Recognize when and describe that comparisons might not be accurate because some of the conditions (variables) are not kept the same.

(B) Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations.

(C) Begin to evaluate the validity of claims based on the amount and quality of the evidence cited.

(D) Identify questions suitable for generating a hypothesis.

(E) Identify independent (manipulated), dependent (responding), and controlled variables in an experiment.

(F) Plan and conduct controlled scientific investigations, manipulating one variable at a time.

(G) Use appropriate tools and instruments (including a timing device and a 10x magnifier) safely and accurately when conducting a controlled scientific investigation.

(H) Construct a line graph from recorded data with correct placement of independent (manipulated) and dependent (responding) variables.

(I) Evaluate results of an investigation to formulate a valid conclusion based on evidence and communicate the findings of the evaluation in oral or written form.

(J) Use a simple technological design process to develop a solution or a product, communicating the design by using descriptions, models, and drawings.

(K) Use appropriate safety procedures when conducting investigations.

(3) Science and Technology

3.1 Technology and Science

(A) Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.

(B) Explain that technology extends the ability of people to make positive and/or negative changes in the world.

(C) Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems.

(D) Give examples of materials not present in nature, such as cloth, plastic, and concrete, which have become available because of science and technology.

(E) Use electronic resources to conduct research and communicate findings.

(4) History and the Nature of Science

4.1 Understand and explain that from the earliest times until now, people have believed that even though countless different kinds of materials seem to exist in the world, most things can be made up of combinations of just a few basic kinds of things.

4.2 Note that there has not always been agreement, however, on what those basic kinds of things are, such as the theory of long ago that the basic substances were earth, water, air, and fire. Understand that this theory seemed to explain many observations about the world, but as we know now, it fails to explain many others.

4.3 Understand and describe that scientists are still working out the details of what the basic kinds of matter are on the smallest scale, and of how they combine, or can be made to combine, to make other substances.

4.4 Understand and explain that the experimental and theoretical work done by scientists around the globe in the early years of American Civilization contributed crucially to the modern science.

4.5 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds.

4.6 Investigate the scientific contributions made by Ernst Abbe, Mary Anning, John James Audubon, Charles Darwin, Ernst Everett Just, Robert Hooke, Gregor Mendel, Louis Pasteur (list not exclusive).

(5) Life Science

5.1 Diversity of Life

(A) Investigate, observe, and describe that insects and various other organisms depend on dead plant and animal material for food.

(B) Observe and describe that organisms interact with one another in various ways, such as providing food, pollination, and seed dispersal.

(C) Observe and describe that some source of energy is needed for all organisms to stay alive and grow.

(D) Observe and explain that most plants produce far more seeds than those that actually grow into new plants.

(E) Explain how in all environments, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones.

(F) Explain that for offspring to resemble their parents there must be a reliable way to transfer information from one generation to the next.

(G) Observe and describe that some living things consist of a single cell that needs food, water, air, a way to dispose of waste, and an environment in which to live.

(H) Explain that one of the most general distinctions among organisms is between green plants, which use sunlight to make their own food, and animals, which consume energy-rich foods.

(I) Give examples of organisms that cannot be neatly classified as either plants or animals, such as fungi and bacteria.

(J) Describe some of the great variety of body plans and internal structures animals and plants have that contribute to their being able to make or find food and reproduce, i. e. survival of the species.

(K) Recognize and describe that a species comprises all organisms that can mate with one another to produce fertile offspring.

(L) Investigate and explain that all living things are composed of cells whose details are usually visible only through a microscope.

(M) Distinguish the main differences between plant and animal cells, such as the presence of chlorophyll and cell walls in plant cells and their absence in animal cells.

(N) Explain that about two-thirds of the mass of a cell is accounted for by water. Understand that water gives cells many of their properties.

5.2 Interdependence of Life

(A) Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.

(B) Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful.

(C) Recognize and explain that most microorganisms do not cause disease and many are beneficial.

(D) Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (plants and animals) an advantage in surviving and reproducing.

(E) Observe that and describe how fossils can be compared to one another and to living organisms according to their similarities and differences.

(F) Explain that in all environments, such as freshwater, marine, forest, desert, grassland, mountain, and others, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. Note that in any environment, the growth and survival of organisms depend on the physical conditions.

(G) Recognize and explain that two types of organisms may interact in a competitive or cooperative relationship, such as producer/consumer, predator/prey, or parasite/host.

(H) Describe how life on Earth depends on energy from the sun.

6th grade Science Standardsii

(1) Unifying Concepts and Processes

1.1 Systems

(A) Describe that a system, such as the human body, is composed of subsystems.

1.2 Models and Scale

(A) Use models to illustrate processes that happen too slowly, too quickly, or on too small a scale to observe directly, or are too vast to be changed deliberately, or are potentially dangerous.

1.3 Constancy and Change

(A) Identify examples of feedback mechanisms within systems that serve to keep changes within specified limits.

(2) Science as Inquiry

2.1 Use appropriate safety procedures when conducting investigations.

2.2 Explain the reasons for testing one independent variable at a time in a controlled scientific investigation.

2.3 Explain the importance that repeated trials and a well-chosen sample size have with regard to the validity of a controlled scientific investigation.

2.4 Explain the relationships between independent and dependent variables in a controlled scientific investigation through the use of appropriate graphs, tables, and charts.

2.5 Manipulation and Observation

(A) Select tools, such as cameras and tape recorders, for capturing information.

(B) Use appropriate tools and instruments safely and accurately when conducting a controlled scientific investigation.

(C) Differentiate between observation and inference during the analysis and interpretation of data.

(D) Classify organisms, objects, and materials according to their physical characteristics by using a dichotomous key.

2.9 Communication Skills

(A) Organize information in simple tables and graphs and identify relationships they reveal. Use tables and graphs as examples of evidence for explanations when writing essays or writing about lab work, fieldwork, etc.

(B) Read simple tables and graphs produced by others and describe in words what they show.

(C) Analyze and interpret a given set of findings, demonstrating that there may be more than one good way to do so.

(3) Science and Technology in Society

3.1 Give examples of how human beings use technology to match or exceed many of the abilities of other species

3.2 Describe that human beings have made tools and machines, such as x-rays, microscopes, and computers, to sense and do things that they could not otherwise sense or do at all, or as quickly, or as well

3.3. Use technology, such as calculators or computer spreadsheets, in analysis of data

3.4. Know and explain that artifacts and preserved remains provide some evidence of the physical characteristics and possible behavior of human beings who lived a very long time ago.

(4) History and the Nature of Science

4.1 Studying scientists in related areas to gain further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.

4.2 In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and

engineers of high achievement are considered to be among the most valued contributors to their culture from the beginnings of civilization.

4.3 Tracing the history of science that can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.

4.4 Investigate the scientific contributions made by Benjamin Banneker, Ben Carson, Rachel Carson, Marjory Stoneman Douglas, Alexander Fleming, Jane Goodall, Hippocrates, Aldo Leopold, John Muir, Florence Nightingale, Charles Richter, and Theodore Roosevelt (list not exclusive).

(5) Science in the Personal and Social Perspective

5.1 Populations, resources and environments

(A) 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.

(B) 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.

(C) Describe how science and technology have helped, and in some cases hindered, progress in providing better food, more rapid information, quicker and safer transportation, and more effective health care.

(D) Identify local and state issues that are helped by science and technology and explain how science and technology can also cause a problem.

(E) Investigate how current plans or proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment, ecology, and quality of life in a community or region.

(F) Develop a list of issues that citizens must make decisions about and describe a strategy for becoming informed about the science behind these issues.

(G) Investigate how current plans or proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment, ecology, and quality of life in a community or region.

(H) Evaluate proposed policy recommendations (local, state, and/or national) in science and technology for validity, evidence, reasoning, and implications, both short and long-term.

(I) Provide examples of how different cultures use natural resources reflecting the economic, aesthetic, and other values of that culture.

(J) Diagram how resources are distributed around the world.

(K) Identify the natural resources that are found in Tennessee.

(L) Analyze how people impact their environment through resource use.

(M) Recognize the economic, environmental, and other factors that impact resource availability and explain why certain resources are becoming depleted.

(N) Explain how human resource use can impact the environment; e.g., erosion, burning fossil fuels.

(O) Identify major air, water, or land pollutants and their sources.

(P) Distinguish between point and nonpoint source pollution.

(Q) Identify types of waste and methods for waste reduction.

(R) Identify and analyze individual, local, regional, national, and global effects of pollution on plant, animal, and human health.

5.2 Natural hazards

(A) Internal and external processes of the earth system cause natural hazards, events that change or destroy human and wildlife habitats, damage property, and harm or kill humans.

(B) Natural hazards include earthquakes, landslides, wildfires, volcanic eruptions, floods, storms, and even possible impacts of asteroids.

(C) Human activities also can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes.

(D) Natural hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.

5.3 Personal Health

(A) Explain that food provides energy and materials for growth and repair of body parts. Recognize that vitamins and minerals, present in small amounts in foods, are essential to keep everything working well. Further understand that as people grow up, the amounts and kinds of food and exercise needed by the body may change.

(B) Explain that if germs are able to get inside the body, they may keep it from working properly. Understand that for defense against germs, the human body has tears, saliva, skin, some blood cells, and stomach secretions. Also note that a healthy body can fight most germs that invade it. Recognize, however, that there are some germs that interfere with the body's defenses.

(C) Explain that there are some diseases that human beings can only catch once. Explain that there are many diseases that can be prevented by vaccinations, so that people do not catch them even once.

(D) Regular exercise is important to the maintenance and improvement of health. The benefits of physical fitness include maintaining healthy weight, having energy and strength for routine activities, good muscle tone, bone strength, strong heart/lung systems, and improved mental health. Personal exercise, especially developing cardiovascular endurance, is the foundation of physical fitness.

(E) Explain that like other animals, human beings have body systems.

(F) Explain that some organisms' cells, such as human nerve and muscle cells vary greatly in appearance and perform very different roles in the organism.

(G) Describe that human beings have body systems for obtaining and providing energy, defense, reproduction, and the coordination of body functions.

(H) Explain that human beings have many similarities and differences and that the similarities make it possible for human beings to reproduce and to donate blood and organs to one another.

(I) Summarize the levels of structural organization within the human body (including cells, tissues, organs, and systems).

(J) Recall the major organs of the human body and their function within their particular body system.

(K) Summarize the relationships of the major body systems (including the circulatory, respiratory, digestive, excretory, nervous, muscular, and skeletal systems).

(L) Explain the effects of disease on the major organs and body systems (including infectious diseases such as colds and flu, AIDS, and athlete's foot and noninfectious diseases such as diabetes, Parkinson's, and skin cancer).

i Standards compiled and revised from Indiana State Academic Standards from <http://www.doe.state.in.us/standards/welcome2.html> and South Carolina Academic Standards from <http://ed.sc.gov/agency/offices/cso/>.

ii Standards compiled and revised using Indiana State Academic Standards from <http://www.doe.state.in.us/standards/welcome2.html>, South Carolina Academic Standards from <http://ed.sc.gov/agency/offices/cso/>, and Wisconsin's Model Academic Standards from <http://dpi.state.wi.us/standards/sciintro.html>.