

Science Objectives

The Nature of Science

1. Identifies situations for which various methods of scientific investigation are appropriate (e.g., reading the research literature, conducting a laboratory experiment) (TEKS 5.2 A)
2. Collects and verifies data, using simple scientific tools: calculators, microscopes, cameras, sound recorders, computers, thermometers, hand lenses, rulers, balances, magnets, and compasses (TEKS 5.2 B, 5.4 A)
3. Uses research techniques and materials to investigate scientific questions (TEKS 5.2 A)
4. Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information (TEKS 5.3 A)
5. Uses facts and figures from research materials when presenting scientific information (TEKS 5.2 C)
6. Designs and carries out scientific investigations appropriate for fifth graders (TEKS 5.2 A)
7. Lists reasons why experimental results from two similar experiments are not exactly the same (e.g., the observations were not exact; the methods may have been slightly different; the conditions may have been slightly different) (TEKS 5.2 D)
8. Recognizes that large differences in experimental results indicate that it is important to figure out why those differences exist (TEKS 5.2 D)
9. Recognizes the importance of recording scientific experiments (e.g., to check the differences in results, to relate to others accurate information about an experiment, to provide evidence so that others will accept claims based on an experiment) (TEKS 5.2 B)

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- 10. Makes inferences and predictions based on data from experiments, promotional materials and/or historical records (TEKS 5.3 B)**
- 11. Recognizes that honesty and accuracy in recording and reporting the results of scientific experiments are more important than finding “correct” answers (TEKS 5.2 B)**
- 12. Gives valid reasons to support his or her findings (TEKS 5.2 C)**
- 13. Recognizes that everything has a size limit (i.e., something can get only so big or so small (TEKS 5.2 C)**
- 14. Determines the size limit of an object or thing (e.g., *How small can this bridge be? How large can this balloon be?*)**
- 15. Measures and mixes both dry and liquid materials in instructed amounts**
- 16. Demonstrates safe practices during laboratory investigations and fieldwork at all times (TEKS 5.1 A)**

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Zoology

- 1. Recognizes that behavior in lower animals is mostly instinctive, while in human beings it is mostly learned**
- 2. Identifies beneficial animal characteristics (e.g., strong muscles, quick reaction time) (TEKS 5.9 A)**
- 3. Identify learned characteristics that are results from environmental influences (i.e., reading, writing tricks) (TEKS 5.10 B)**
- 4. Defines *vertebrates* as animals that have backbones and *invertebrates* as animals that do not**
5. Names the characteristics of each of the three main kinds of worms: flat, round, and segmented; Life cycle of worms
6. Describes the life cycle of worms (TEKS 5.6 C)
- 7. Names the characteristics of *mollusks* (e.g., are cold-blooded invertebrates, breathe through gills, have a soft body, often have shells)**
- 8. Describes the life cycle of mollusks (TEKS 5.6 C)**
- 9. Lists examples of mollusks (e.g., snails, clams, octopuses); Life cycle of mollusks**
10. Compares and contrasts the internal structures of worms, mollusks, fish, and amphibians
11. Compares and contrasts the external structures of worms, mollusks, fish, and amphibians
12. Compares and contrasts the habitats of worms, mollusks, fish, and amphibians
13. Compares and contrasts the food needs of worms, mollusks, fish, and amphibians

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- 14. Recognizes that *zoologists* are scientists who study various aspects of animal life (e.g., the different groups of animals, the classification of animals, the bodily functions and structures of animals) (TEKS 5.3 D)**

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Botany

- 1. Describes the growth process in plants from sprout to seed production (TEKS 5.6 C)**
- 2. Identifies the parts of a tree trunk: *pith, xylem, phloem, cambium, and bark***
- 3. Describes the function of each part of a tree trunk: *pith, xylem, phloem, cambium, and bark***
- 4. Describes how tree rings may be used to tell about trees and their ages (TEKS 5.11 B)**
- 5. Describes how trees produce seeds (TEKS 5.6 C)**
6. Identifies the many uses and values of trees
7. Describes the plant enemies that cause problems for trees in his or her community (e.g., fungal diseases; plants, such as kudzu and mistletoe; insects, such as the pine bark beetle, aphid, tent caterpillar, and cicada)
- 8. Describes the nature-related contributions of Theodore Roosevelt (e.g., his initiation of the national forest system), John Muir (e.g., his work as a forest conservationist), and John James Audubon (e.g., his work recording bird species) (TEKS 5.3 D & E)**
9. Recognizes that *foresters* are scientists who care for trees (e.g., protecting them from disease, promoting good growth)

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Ecology

1. Defines a *limiting factor* as anything that keeps a population from growing (e.g., lack of food supply, harsh climate)
2. Lists the limiting factors for any given organism in a specified ecosystem (e.g., a squirrel in a deciduous forest limited by predators, lack of a food supply, fire, lack of trees affording protection) (TEKS 5.3 C)
3. Gives reasons why populations increase (e.g., good nutrition) and why they decrease (e.g., disease) (TEKS 5.9 A)
4. Lists examples of competition within a population (e.g., many birds and only a few worms, many ducks in a small pond)
5. **Identify adaptive characteristic required for survival and reproduction by an organism in an ecosystem (TEKS 5.9 C) Introduced in 3rd and expanded in a 4th**
6. Describes how and why populations disperse (e.g., to find more food or shelter)
7. Gives examples of natural barriers to population dispersal (e.g., oceans, mountains)
8. Gives examples of endangered species (e.g., California condor, black rhinoceros, black-footed ferret)
9. Explains how a species may become endangered
10. **Describes an organism's *niche* within a community (TEKS 5.9 B)**
11. **Analyze and describe an organisms adaptive characteristics that result in an organism's unique niche in an ecosystem (TEKS 5.9 B)**
12. **Describes the carbon, nitrogen and water cycles (TEKS 5.6 B)**
13. **Recognizes the importance of protecting the environment (Health TEKS 5.8 D)**

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14. Recognizes the importance of water conservation

15. Recognizes that *ecologists* are scientists who study the relationships among animals and plants and their natural environment
(TEKS 5.3 D)

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Human Anatomy

- 1. Identifies the functions of the circulatory system: to bring food, heat, and water to the cells and to collect wastes from the cells**
- 2. Identifies the parts of the circulatory system: *heart, veins, arteries, and capillaries* (TEKS 5.5 A)**
- 3. Describes the function of each part of the circulatory system: *heart, veins, arteries, and capillaries***
- 4. Describes how the circulatory system works (TEKS 5.5 B)**
- 5. Identifies the major parts of the heart: *left and right auricle, left and right ventricle, and valves* (TEKS 5.5 B)**
- 6. Traces the path of blood through the heart**
- 7. Recognizes that the heartbeat is measured by the pulse**
- 8. Identifies three places to take a pulse measurement: wrist, temple, and neck**
- 9. Recognizes that *cardiologists* are scientists who study and treat the heart (TEKS 5.3 D & E)**

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Cell Biology

- 1. Identifies the structures of a simple cell: *cell membrane, nucleus, cytoplasm, and vacuole* (TEKS 5.5 A)**
- 2. Describes the function of each part of a simple cell: *cell membrane, nucleus, cytoplasm, and vacuole* (TEKS 5.5 A)**
- 3. Recognizes that genetic information is located in the nucleus and is passed on to the offspring (TEKS 5.10 A)**
4. Recognizes that some microscopic organisms are made of one cell, while large organisms, like people, are made of many cells
- 5. Recognizes the intricate workings of a cell (TEKS 5.5 B)**
- 6. Describes the contributions of Robert Hooke (e.g., the first scientist to describe a cell) (TEKS 5.3 D & E)**
7. Recognizes that some organisms are neither plant nor animal (e.g., mold, bacteria)

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Chemistry

1. Describes the structure of an *atom*: a *nucleus* in the center, containing *protons* and *neutrons*, with *electrons* moving very fast around the outside
2. Recognizes that different kinds of atoms have different numbers of electrons and that every atom has a matching number of protons and electrons
3. States these symbols: oxygen = O, carbon = C, and hydrogen = H
4. Identifies the charges of protons (+), neutrons (0), and electrons (-)
5. Constructs a model of a simple atom
6. Describes the contributions of John Dalton (e.g., his proposal of the first acceptable model of the atom)
7. Defines a *molecule* as the smallest particle that can be identified as the substance of which it is a part and that is made of one or more atoms functioning together
8. Defines an *element* as one kind of atom and recognizes that all the atoms of one element are alike
9. Identifies some common elements (e.g., hydrogen, oxygen, carbon, nitrogen, aluminum, iron, helium, silver, gold)
10. Recognizes that each element has properties that stay the same (e.g., boiling point, melting point, solubility) (TEKS 5.7 D)
11. Recognizes that *mixtures* and *compounds* are composed of molecules of different kinds of matter and differentiates between them (TEKS 5.7 B)
12. Identifies some common mixtures and compounds (e.g., water, salt, lemonade, air, acids, bases, and PH concepts) (TEKS 5.7 C)

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- 13. Recognizes that matter may be classified by physical properties (ability to conduct or insulate heat, electricity and sound) (TEKS 5.7 A)**
- 14. Recognizes that a new material can be made by combining two or more materials and describes ways that the new material is different (e.g., size, shape, color, melting or boiling point, buoyancy, density) (TEKS 5.7 C)**
- 15. Recognizes that substances may change form, but that they cannot be created or destroyed**
- 16. Recognizes the wide variety of combinations of new materials that can be made**

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Physics

1. Describes ways to produce heat
2. Describes what happens when a warm object and a cool object are put together: the warm object loses heat, and the cool object gains it
3. Recognizes that a warm object does not have to touch a cooler one in order to warm it
4. Recognizes what will happen to an object in motion (e.g., it will change its direction; it will move steadily; it will slow down)
5. Describes the effect of increasing either the force or the size of an object on the motion of that object (i.e., the greater the force, the greater the change in motion; the greater the mass, the less the effect of a force)
6. Recognizes that the speed of objects varies greatly
7. Determines experimentally the speed of objects (e.g., a toy car going down a ramp, a napkin being dropped to the floor)
8. **Describes *refraction* and how it is used to focus light (TEKS 5.8 B)**
9. **Describes *reflection* and how it is used to focus light (TEKS 5.8 B)**
10. Describes the contributions of Thomas A. Edison (e.g., his patents on over 1,000 inventions, many dealing with electricity) and Granville T. Woods (e.g., his railway telegraph system, his automatic air brake) (TEKS 5.3 D & E)
11. **Recognize that fossil fuels come indirectly from the sun because the ancient plants that make up the coal or oil needed the sun to grow (TEKS 5.12 B)**
12. **Explains the importance of conserving energy resources (TEKS 5.1 B)**
13. **Recognize different forms of electric energy including light, heat, electrical and solar energy (TEKS 5.8 A)**

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- 14. Electrical energy can produce light, heat, and sound and magnetic effects (TEKS 5.8 C)**
- 15. Sound energy can be produced by vibrations of objects (TEKS 5.8 D)**

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Earth Science

1. Differentiates between *spring tides* and *neap tides* (TEKS 5.6 A)
2. Identifies the causes of currents
3. Differentiates between surface currents and deep-water currents
4. Describes what causes a wave to break when it nears the shore
5. **Recognizes that rocks are made of minerals and that they come in many combinations (TEKS 5.12 A)**
6. **Distinguishes among the layers of the earth: crust, mantle, and core (TEKS 5.12 A)**
7. **Recognizes that *weathering* of rock is caused by the wind and by the freezing and thawing of water and waves (TEKS 5.11 A)**
8. **Explains how given factors affect weathering (e.g., climate, time, mineral composition) (TEKS 5.11 A)**
9. **Defines *erosion* as the movement of rocks and soil from one location to another (e.g., by water, wind, glaciers)**
10. **Identifies forces that help erosion (e.g., gravity, moving water) (TEKS 5.11 A)**
11. **Describes how weathering and erosion reshape the earth's surface (TEKS 5.11 A, 5.12 A)**
12. Explains how soil is formed (TEKS 5.11 B)
13. **Identifies past events that lead to the formation of the Earth's renewable, non-renewable, and inexhaustible resources (TEKS 5.11 C)**

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Astronomy

- 1. Explains why stars appear to change position in the sky (TEKS 5.6 A)**
- 2. Explains why different stars can be seen during different seasons (TEKS 5.6 A)**
- 3. Recognizes that stars vary greatly in size, temperature, and distance from the earth**
- 4. Identify and compare physical characteristics of the earth and the moon (TEKS 5.12 C) OF THE SUN,EARTH,MOON**
- 5. Identify that gravity is the force that keeps the planets in orbit around the sun and moon around the earth (TEKS 5.12 D)**
- 6. Creates a model or diagram to show relative sizes and distances of the planets and the sun within the solar system**
- 7. Recognizes the usefulness of models and diagrams for describing the solar system**
- 8. Evaluates the necessity of the sun to the earth**
- 9. Describes how the revolution of the earth affects our view of the sun, moon, planets, and stars (e.g., it makes it appear as though the objects are orbiting the earth)**
- 10. Describes the major contributions of Nicolaus Copernicus (e.g., his proposal that the sun—not the earth—is the center of our solar system) (TEKS 5.3 D & E)**

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Science and Technology

- 1. Identifies and describes the purpose of each part of a simple microscope: *eyepiece; body tube; nosepiece; lens; arm; focus adjustment; stage; diaphragm; lumnirod, mirror, or light; and base***
- 2. Explains how to focus a microscope**
- 3. Describes a simple procedure for preparing a slide: start with a clean slide; place a thin sample on the slide; add a drop of water, if dry; and cover with a cover slip**
- 4. Prepares microscope slides properly and examines them under the microscope**
- 5. Follows safety rules when using microscopes (e.g., always lift a microscope with two hands; carry a microscope by holding the and the base)**
- 6. Describes the contributions of Anton van Leeuwenhoek (e.g., his development of the first microscope)**
- 7. Relates Leeuwenhoek's invention of the microscope to the discovery of cells by Hooke**
- 8. Recognizes the importance of microscopes to scientists**
- 9. Follows safety rules in the laboratory (e.g., always wears eye protection; always reads and follows directions carefully; never conducts unsupervised experiments; knows the location of first aid equipment) (TEKS 5.1 A)**
- 10. Demonstrates how to use science laboratory equipment**
- 11. Recognizes that naturally occurring materials can be processed or combined with other materials to change their properties (e.g., animal skins can be processed to make soft clothing; cotton can be processed and woven into cloth; wood can be laminated or processed into plywood or particleboard; clay can be heated until it becomes very hard)**
- 12. Recognizes that some materials that do not occur in nature have been created by scientists (e.g., nylon, steel, liquid crystals)**

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13. Proposes uses for unused materials that would otherwise compound the problem of waste disposal (TEKS 5.1 B)
14. **Debates the pros and cons of recycling and reusing discarded materials (e.g., technology has not developed ways to recycle all materials; sorting and processing some materials is difficult; the cost of recycling some materials is more than using new original material) (TEKS 5.1 B)**

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Scientific and Mathematical Reasoning

1. Recognizes that a 0 on a scale may mean something other than none of something (e.g., 0° on a temperature scale does not mean “no temperature” or “no warmth”)
2. Uses a variety of scales (displays of units) on a variety of measuring devices (e.g., spring scales, balances, thermometers, odometers, speedometers, anemometers, sphygmomanometers)
3. **Recognizes that graphs and charts can make patterns in data more noticeable (TEKS 5.2 E)**
4. Explains how scale drawings can be used to compare shapes and locations of objects
5. Distributes scientific data on a number line in order to identify numerical statistics: extremes, median, and range (TEKS 5.2 E)
6. **Describes how bias can occur in scientific investigations when using only a portion or a sample to represent a whole (TEKS 5.4 B)**
7. **Identifies sources of bias in statistical data collections in scientific investigations (TEKS 5.3 B)**
8. **Identifies situations in scientific investigations when comparisons may not be fair because not all conditions were kept the same (TEKS 5.4 B)**
9. Recognizes that it is challenging to measure things that are either very small or very large