

SOUTH PASADENA SCIENCE STANDARDS

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SOUTH PASADENA SCIENCE STANDARDS

Kindergarten

1.0 Physical Sciences

1.1 Properties of materials can be observed, measured and predicted.

As a basis for understanding this concept, students know:

1.1.1 objects can be described in terms of the materials they are made of (clay, cloth, paper, etc.) and their physical properties (color, size, shape, weight, texture, flexibility, attraction to magnets, floating and sinking, etc.).

1.1.2 water can be a liquid or a solid and can be made to change back and forth from one form to the other.

1.1.3 water left in an open container evaporates (goes into the air), but water in a closed container does not.

2.0 Life Sciences

2.1 Different types of plants and animals inhabit the Earth.

As a basis for understanding this concept, students know:

2.1.1 how to observe and describe similarities and differences in the appearance and behavior of plants and of animals (e.g., seed-bearing plants, birds, fish, insects).

2.1.2 stories sometimes give plants and animals attributes they do not really have.

2.1.3 how to identify major structures of common plants and animals (e.g., stems, leaves, roots, arms, wings, legs).

3.0 Earth Sciences

3.1 The Earth is composed of land, air and water.

As a basis for understanding this concept, students know:

3.1.1 characteristics of mountains, rivers, oceans, valleys, deserts, and local landforms.

3.1.2 changes in weather occur from day to day and over seasons, affecting the Earth and its inhabitants.

3.1.3 how to identify resources from the Earth that are used in everyday life, and that many resources can be conserved.

4.0 Investigation and Experimentation

4.1 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions and perform investigations. Students will:

4.1.1 observe common objects using the five senses.

4.1.2 describe the properties of common objects.

4.1.3 describe the relative position of objects using one reference (e.g., above or below).

4.1.4 compare and sort common objects based on one physical attribute (including color, shape, texture, size, weight).

4.1.5 communicate observations orally and in drawings.

SOUTH PASADENA SCIENCE STANDARDS

Grade 1

1.0 Physical Sciences

1.1 Materials come in different forms (states) including solids, liquids, and gases.

As a basis for understanding this concept, students know:

1.1.1 solids, liquids, and gases have different properties.

1.1.2 the properties of substances can change when the substances are mixed, cooled, or heated.

2.0 Life Sciences

2.1 Plants and animals meet their needs in different ways.

As a basis for understanding this concept, students know:

2.1.1 different plants and animals inhabit different kinds of environments and have external features that help them thrive in different kinds of places.

2.1.2 plants and animals both need water; animals need food, and plants need light.

2.1.3 animals eat plants or other animals for food and may also use plants or even other animals for shelter and nesting.

2.1.4 how to infer what animals eat from the shapes of their teeth (e.g., sharp teeth: eats meat; flat teeth: eats plants).

2.1.5 roots are associated with the intake of water and soil nutrients, green leaves with making food from sunlight.

3.0 Earth Sciences

3.1 Weather can be observed, measured and described.

As a basis for understanding this concept, students know:

3.1.1 how to use simple tools (e.g., thermometer, wind vane) to measure weather conditions and record changes from day to day and over the seasons.

3.1.2 the weather changes from day to day, but trends in temperature or of rain (or snow) tend to be predictable during a season.

3.1.3 the sun warms the land, air, and water.

4.0 Investigation and Experimentation

4.1 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept, and to address the content the other three strands, students should develop their own questions and perform investigations. Students will:

4.1.1 draw pictures that portray some features of the thing being described.

4.1.2 record observations and data with pictures, numbers, and/or written statements.

4.1.3 record observations on a bar graph.

4.1.4 describe the relative position of objects using two references (e.g., above and next to, below and left of).

4.1.5 make new observations when discrepancies exist between two descriptions of the same object or phenomena.

SOUTH PASADENA SCIENCE STANDARDS

Grade 2

1.0 Physical Sciences

1.1 The motion of objects can be observed and measured.

As a basis for understanding this concept, students know:

1.1.1 the position of an object can be described by locating it relative to another object or the background.

1.1.2 an object's motion can be described by recording the change in its position over time.

1.1.3 the way to change how something is moving is to give it a push or a pull. The size of the change is related to the strength, or the amount of "force," of the push or pull.

1.1.4 tools and machines are used to apply pushes and pulls (forces) to make things move.

1.1.5 objects near the Earth fall to the ground unless something holds them up.

1.1.6 magnets can be used to make some objects move without being touched.

1.1.7 sound is made by vibrating objects and can be described by its pitch and volume.

2.0 Life Sciences

2.1 Plants and animals have predictable life cycles.

As a basis for understanding this concept, students know:

2.1.1 organisms reproduce offspring of their own kind. The offspring resemble their parents and each other.

2.1.2 the sequential stages of life cycles are different for different animals, for example butterflies, frogs, and mice.

2.1.3 many characteristics of an organism are inherited from the parents. Some characteristics are caused by, or influenced by, the environment.

2.1.4 there is variation among individuals of one kind within a population.

2.1.5 the germination, growth, and development of plants can be affected by light, gravity, touch, or environmental stress.

2.1.6 in plants flowers and fruits are associated with reproduction.

3.0 Earth Sciences

3.1 Earth is made of materials that have distinct properties and provide resources for human activities.

As the basis for understanding this concept, students know:

3.1.1 how to compare the physical properties of different kinds of rocks and that rock is composed of different combinations of minerals.

3.1.2 smaller rocks come from the breakage and weathering of larger rocks.

3.1.3 soil is made partly from weathered rock and partly from organic materials, and that soils differ in their color, texture, capacity to retain water, and ability to support the growth of many kinds of plants.

3.1.4 fossils provide evidence about the plants and animals that lived long ago, and scientists learn about the past history of Earth by studying fossils.

3.1.5 rock, water, plants, and soil provide many resources including food, fuel, and building materials that humans use.

4.0 Investigation and Experimentation

4.1 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept, and to address the content the other three strands, students should develop their own questions and perform investigations. Students will:

4.1.1 make predictions based on patterns of observation rather than random guessing.

4.1.2 measure length, weight, temperature, and liquid volume with appropriate tools and express measurements in standard and non-standard units.

4.1.3 compare and sort common objects based on two or more physical attributes (including color, shape, texture, size, weight).

4.1.4 write or draw descriptions of a sequence of steps, events, and observations.

4.1.5 construct bar graphs to record data using appropriately labeled axes.

4.1.6 write or draw descriptions of a sequence of steps, events and observations, and include the use of magnifiers or microscopes to extend senses.

4.1.7 follow verbal instructions for a scientific investigation.

SOUTH PASADENA SCIENCE STANDARDS

Grade 3

1.0 Physical Sciences

1.1 Energy and matter have multiple forms and can be changed from one form to another.

As a basis for understanding this concept, students know:

1.1.1 energy comes from the sun to the Earth in the form of light.

1.1.2 sources of stored energy take many forms, such as food, fuel, and batteries.

1.1.3 machines and living things convert stored energy to motion and heat.

1.1.4 energy can be carried from one place to another by waves, such as water waves and sound, by electric current, and by moving objects.

1.1.5 matter has three forms: solid, liquid, and gas.

1.1.6 evaporation and melting are changes that occur when the objects are heated.

1.1.7 when two or more substances are combined a new substance may be formed that can have properties that are different from those of the original materials.

1.1.8 all matter is made of small particles called atoms, too small to see with our eyes.

1.1.9 people once thought that earth, wind, fire, and water were the basic elements that made up all matter. Science experiments show that there are over 100 different types of atoms which are displayed on the Periodic Table of the Elements.

1.2 Light has a source and travels in a direction.

As a basis for understanding this concept, students know:

1.2.1 sunlight can be blocked to create shadows.

1.2.2 light is reflected from mirrors and other surfaces.

1.2.3 the color of light striking an object affects how our eyes see it.

1.2.4 we see objects when light traveling from an object enters our eye.

2.0 Life Sciences

2.1 Adaptations in physical structure or behavior may improve an organism's chance for survival.

As a basis for understanding this concept, students know:

2.1.1 plants and animals have structures that serve different functions in growth, survival, and reproduction.

2.1.2 examples of diverse life forms in different environments, such as oceans, deserts, tundra, forests, grasslands, and wetlands.

2.1.3 living things cause changes in the environment where they live; some of these changes are detrimental to the organism or other organisms, whereas others are beneficial.

2.1.4 when the environment changes, some plants and animals survive and reproduce, and others die or move to new locations.

2.1.5 some kinds of organisms that once lived on Earth have completely disappeared; some of these resembled others that are alive today.

3.0 Earth Sciences

3.1 Objects in the sky move in regular and predictable patterns.

As a basis for understanding this concept, students know:

3.1.1 the patterns of stars stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.

3.1.2 how the moon's appearance changes during the four-week lunar cycle.

3.1.3 telescopes magnify the appearance of some distant objects in the sky, including the moon and the planets. The number of stars that can be seen through telescopes is dramatically greater than can be seen by the unaided eye.

3.1.4 the Earth is one of several planets that orbit the sun, and the moon orbits the Earth.

3.1.5 the position of the sun in the sky changes during the course of the day and from season to season.

4.0 Investigation and Experimentation

4.1 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept, and to address the content the other three strands, students should develop their own questions and perform investigations. Students will:

4.1.1 repeat observations to improve accuracy, and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.

4.1.2 differentiate evidence from opinion, and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.

4.1.3 use numerical data in describing and comparing objects, events and measurements.

4.1.4 predict the outcome of a simple investigation, and compare the result to the prediction.

4.1.5 collect data in an investigation and analyze them to develop a logical conclusion.

SOUTH PASADENA SCIENCE STANDARDS

Grade 4

1.0 Physical Sciences

1.1 Electricity and magnetism are related effects that have many useful applications in everyday life.

As a basis for understanding this concept, students know:

1.1.1 how to design and build simple series and parallel circuits using components such as wires, batteries, and bulbs.

1.1.2 how to build a simple compass and use it to detect magnetic effects, including Earth's magnetic field.

1.1.3 electric currents produce magnetic fields and how to build a simple electromagnet.

1.1.4 the role of electromagnets in the construction of electric motors, electric generators, and simple devices such as doorbells and earphones.

1.1.5 electrically charged objects attract or repel each other.

1.1.6 magnets have two poles, labeled north and south, and like poles repel each other while unlike poles attract each other.

1.1.7 electrical energy can be converted to heat, light, and motion.

2.0 Life Sciences

2.1 All organisms need energy and matter to live and grow. As a basis for understanding this concept, students know:

2.1.1 plants are the primary source of matter and energy entering most food chains.

2.1.2 producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs, and may compete with each other for resources in an ecosystem.

2.1.3 decomposers, including many fungi, insects, and microorganisms, recycle matter from dead plants and animals.

3.0 Living organisms depend on one another and on their environment for survival.

As a basis for understanding this concept, students know:

3.1.1 ecosystems can be characterized in terms of their living and nonliving components.

3.1.2 for any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

3.1.3 many plants depend on animals for pollination and seed dispersal, while animals depend on plants for food and shelter.

3.1.4 most microorganisms do not cause disease and many are beneficial.

3.0 Earth Sciences

3.1 The properties of rocks and minerals reflect the processes that formed them.

As a basis for understanding this concept, students know:

3.1.1 how to differentiate among igneous, sedimentary, and metamorphic rocks by their properties and methods of formation (the rock cycle).

3.1.2 how to identify common rock-forming minerals (including quartz, calcite, feldspar, mica, and hornblende) and ore minerals using a table of diagnostic properties.

3.2 Waves, wind, water, and ice shape and reshape the Earth's land surface.

As a basis for understanding this concept, students know:

3.2.1 some changes in the Earth are due to slow processes, such as erosion, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

3.2.2 natural processes, including freezing/thawing and growth of roots, cause rocks to break down into smaller pieces.

3.2.3 moving water erodes landforms, reshaping the land by taking it away from some places and depositing it as pebbles, sand, silt, and mud in other places (weathering, transport, and deposition).

4.0 Investigation and Experimentation

4.1 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept, and to address the content the other three strands, students should develop their own questions and perform investigations. Students will:

4.1.1 differentiate observation from inference (interpretation), and know that scientists' explanations come partly from what they observe and partly from how they interpret their observations.

4.1.2 measure and estimate weight, length, or volume of objects.

4.1.3 formulate predictions and justify predictions based on cause and effect relationships.

4.1.4 conduct multiple trials to test a prediction and draw conclusions about the relationships between results and predictions.

4.1.5 construct and interpret graphs from measurements.

4.1.6 follow a set of written instructions for a scientific investigation.

SOUTH PASADENA SCIENCE STANDARDS

Grade 5

1.0 Physical Sciences

1.1 Elements and their combinations account for all the varied types of matter in the world.

As a basis for understanding this concept, students know:

1.1.1 during chemical reactions, the atoms in the reactants rearrange to form products with different properties.

1.1.2 all matter is made of atoms, which may combine to form molecules.

1.1.3 metals have properties in common, such as electrical and thermal conductivity. Some metals, such as aluminum (Al), iron (Fe), nickel (Ni), copper (Cu), silver (Ag), gold (Au), are pure elements while others, such as steel and brass, are composed of a combination of elemental metals.

1.1.4 each element is made of one kind of atom. These elements are organized in the Periodic Table by their chemical properties.

1.1.5 scientists have developed instruments that can create images of atoms and molecules showing that they are discrete and often occur in well ordered arrays.

1.1.6 differences in chemical and physical properties of substances are used to separate mixtures and identify compounds.

1.1.7 properties of solid, liquid, and gaseous substances, such as sugar ($C_6H_{12}O_6$), water (H_2O) helium (He), oxygen (O_2), nitrogen (N_2), and carbon dioxide (CO_2).

1.1.8 living organisms and most materials are composed of just a few elements.

1.1.9 common properties of salts, such as sodium chloride (NaCl).

2.0 Life Sciences

2.1 Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials.

As a basis for understanding this concept, students know:

2.1.1 many multicellular organisms have specialized structures to support the transport of materials.

2.1.2 how blood circulates through the heart chambers, lungs, and body, and how carbon dioxide (CO_2) and oxygen (O_2) are exchanged in the lungs and tissues.

2.1.3 the sequential steps of digestion, and the roles of teeth and mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.

2.1.4 the role of the kidney in removing cellular wastes from blood and converting them into urine, which is stored in the bladder.

2.1.5 how sugar, water, and minerals are transported in a vascular plant.

2.1.6 plants use carbon dioxide (CO₂) and energy from sunlight to build molecules of sugar and release oxygen.

2.1.7 plant and animal cells break down sugar to obtain energy, forming carbon dioxide (CO₂) and water (respiration).

3.0 **Earth Sciences**

3.1 **Water on Earth moves between the oceans and land through the processes of evaporation and condensation.**

As a basis for understanding this concept, students know:

3.1.1 most of the Earth's water is present as salt water in the oceans, which cover most of the Earth's surface.

3.1.2 when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled, or as a solid if cooled below the freezing point of water.

3.1.3 water moves in the air from one place to another in the form of clouds or fog, which are tiny droplets of water or ice, and falls to the Earth as rain, hail, sleet, or snow.

3.1.4 the amount of fresh water, located in rivers, lakes, underground sources, and glaciers, is limited, and its availability can be extended through recycling and decreased use.

3.1.5 the origin of water used by their local communities.

3.2 **Energy from the sun heats the Earth unevenly, causing air movements resulting in changing weather patterns.**

As a basis for understanding this concept, students know:

3.2.1 uneven heating of the Earth causes air movements (convection currents).

3.2.2 the influence of the ocean on weather, and the role of the water cycle in weather.

3.2.3 causes and effects of different types of severe weather.

3.2.4 how to use weather maps and weather forecasts to predict local weather, and that prediction depends on many changing variables.

3.2.5 the Earth's atmosphere exerts a pressure that decreases with distance above the Earth's surface, and is the same in all directions.

3.3 **The solar system consists of planets and other bodies that orbit the sun in predictable paths.**

As a basis for understanding this concept, students know:

3.3.1 the sun, an average star, is the central and largest body in the solar system and is composed primarily of hydrogen and helium.

3.3.2 the solar system includes the Earth, moon, sun, eight other planets and their satellites, and smaller objects such as asteroids and comets.

3.3.3 the path of a planet around the sun is due to the gravitational attraction between the sun and the planet.

4.0 Investigation and Experimentation

4.1 Scientific progress is made by asking meaningful questions and conducting careful investigations.

As a basis for understanding this concept, and to address the content the other three strands, students should develop their own questions and perform investigations. Students will:

4.1.1 classify objects (e.g., rocks, plant, leaves) based on appropriate criteria.

4.1.2 develop a testable question.

4.1.3 plan and conduct a simple investigation based on a student-developed question, and write instructions others can follow to carry out the procedure.

4.1.4 identify the dependent and controlled variables in an investigation.

4.1.5 identify a single independent variable in a scientific investigation and explain what will be learned by collecting data on this variable.

4.1.6 select appropriate tools (e.g., thermometers, meter sticks, balances, and graduated cylinders) and make quantitative observations.

4.1.7 record data using appropriate graphic representation (including charts, graphs, and labeled diagrams), and make inferences based on those data.

4.1.8 draw conclusions based on scientific evidence and indicate whether further information is needed to support a specific conclusion.

4.1.9 write a report of an investigation that includes tests conducted, data collected or evidence examined, and conclusions drawn.