

Project ASTRO

Meets CA Content Standards

Project ASTRO is designed to help meet the CA Science Content Standards in grades 4-8. The full standards may be found at:

<http://www.cde.ca.gov/be/st/ss/scmain.asp>

The precise standards addressed are listed below for your convenience, but please note that many Project ASTRO activities also address standards in math and literacy – please let us know which activities you feel best address which standard. (*Thanks to Pat Paluso for compiling these*).

GRADE 8

Earth in the Solar System (Earth Sciences)

4. The structure and composition of the universe can be learned from studying stars and galaxies and their evolution. As a basis for understanding this concept:
 - a. *Students know* galaxies are clusters of billions of stars and may have different shapes.
 - b. *Students know* that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color.
 - c. *Students know* how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth.
 - d. *Students know* that stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light.
 - e. *Students know* the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.

Investigation and Experimentation

9. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
 - a. Plan and conduct a scientific investigation to test a hypothesis.
 - b. Evaluate the accuracy and reproducibility of data.
 - c. Distinguish between variable and controlled parameters in a test.
 - d. Recognize the slope of the linear graph as the constant in the relationship $y=kx$ and apply this principle in interpreting graphs constructed from data.
 - e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
 - f. Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure \times area, volume = area \times height).
 - g. Distinguish between linear and nonlinear relationships on a graph of data.

7th

Earth and Life History (Earth Sciences)

4. Evidence from rocks allows us to understand the evolution of life on Earth. As a basis for understanding this concept:
 - b. *Students know* the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.

Investigation and Experimentation

7. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
 - a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
 - b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
 - c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
 - d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).
 - e. Communicate the steps and results from an investigation in written reports and oral presentations.

6th

Energy in the Earth System

4. Many phenomena on Earth's surface are affected by the transfer of energy through radiation and convection currents. As a basis for understanding this concept:
 - a. *Students know* the sun is the major source of energy for phenomena on Earth's surface; it powers winds, ocean currents, and the water cycle.
 - b. *Students know* solar energy reaches Earth through radiation, mostly in the form of visible light.

Ecology (Life Sciences)

5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. As a basis for understanding this concept:
 - a. *Students know* energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs.

Resources

6. Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. As a basis for understanding this concept:
 - a. *Students know* the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.

Investigation and Experimentation

7. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
 - a. Develop a hypothesis.
 - b. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
 - c. Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
 - d. Communicate the steps and results from an investigation in written reports and oral presentations.
 - e. Recognize whether evidence is consistent with a proposed explanation.
 - f. Read a topographic map and a geologic map for evidence provided on the maps and construct and interpret a simple scale map.
 - g. Interpret events by sequence and time from natural phenomena (e.g., the relative ages of rocks and intrusions).
 - h. Identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hill slope).

5th

Earth Sciences

4. Energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns. As a basis for understanding this concept:
 - a. *Students know* uneven heating of Earth causes air movements (convection currents).
 - b. *Students know* the influence that the ocean has on the weather and the role that the water cycle plays in weather patterns.
 - f. *Students know* that the Earth's atmosphere exerts a pressure that decreases with distance above Earth's surface and that at any point it exerts this pressure equally in all directions.

Earth Sciences

5. The solar system consists of planets and other bodies that orbit the Sun in predictable paths. As a basis for understanding this concept:
 - a. *Students know* the Sun, an average star, is the central and largest body in the solar system and is composed primarily of hydrogen and helium.
 - b. *Students know* the solar system includes the planet Earth, the Moon, the Sun, eight other planets and their satellites, and smaller objects, such as asteroids and comets.
 - c. *Students know* the path of a planet around the Sun is due to the gravitational attraction between the Sun and the planet.

Investigation and Experimentation

6. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
 - a. Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria.
 - b. Develop a testable question.
 - c. Plan and conduct a simple investigation based on a student-developed question and write instructions others can follow to carry out the procedure.
 - d. Identify the dependent and controlled variables in an investigation.
 - e. Identify a single independent variable in a scientific investigation and explain how this variable can be used to collect information to answer a question about the results of the experiment.
 - f. Select appropriate tools (e.g., thermometers, meter sticks, balances, and graduated cylinders) and make quantitative observations.
 - g. Record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data.
 - h. Draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion.
 - i. Write a report of an investigation that includes conducting tests, collecting data or examining evidence, and drawing conclusions.

4th

Read what they should have learned in third grade.

Investigation and Experimentation

9. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
 - a. Plan and conduct a scientific investigation to test a hypothesis.
 - b. Evaluate the accuracy and reproducibility of data.
 - c. Distinguish between variable and controlled parameters in a test.

3rd

Earth Sciences

4. Objects in the sky move in regular and predictable patterns. As a basis for understanding this concept:
 - a. *Students know* 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.
 - b. *Students know* the way in which the Moon's appearance changes during the four-week lunar cycle.
 - c. *Students know* 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 the number that can be seen by the unaided eye.
 - d. *Students know* that Earth is one of several planets that orbit the Sun and that the Moon orbits Earth.
 - e. *Students know* the position of the Sun in the sky changes during the course of the day and from season to season.