Alignment with California's Science Standards

This document evaluates the state's Education Standards for Science to determine alignment with content found in Cogno board games. Grades 3-8 were analyzed.

Highlighting Key

Indicates a significant amount of material addresses the standard

Indicates a moderate amount of material is present to develop student understanding of the standard

GRADE THREE

Physical Sciences

1. Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept:

A. Students know energy comes from the Sun to Earth in the form of light.
B. Students know sources of stored energy take many forms, such as food, fuel, and batteries.
C. Students know machines and living things convert stored energy to motion and heat.
D. Students know energy can be carried from one place to another by waves, such as water waves and sound waves, by electric current, and by moving objects.
E. Students know matter has three forms: solid, liquid, and gas.
F. Students know all matter is made of small particles called atoms, too small to see with the naked eye.

2. Light has a source and travels in a direction. As a basis for understanding this concept:

A. Students know light is reflected from mirrors and other surfaces.
B. Students know the color of light striking an object affects the way the object is seen.
C. Students know an object is seen when light traveling from the object enters the eye.

Life Sciences

3. Adaptations in physical structure or behavior may improve an organism's chance for survival. As a basis for understanding this concept:

A. Students know plants and animals have structures that serve different functions in growth, survival, and reproduction.
B. Students know examples of diverse life forms in different environments, such as oceans, deserts, tundra, forests, grasslands, and wetlands.

C. Students know living things cause changes in the environment in which they live: some of these changes are detrimental to the organism or other organisms, and some are beneficial.

D. Students know when the environment changes, some plants and animals survive and reproduce; others die or move to new locations.

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 kno*w* 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 kno*w* 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.

Investigation and Experimentation

5. 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. 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.

B. 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.

C. Use numerical data in describing and comparing objects, events, and measurements.

D. Predict the outcome of a simple investigation and compare the result with the prediction.

E. Collect data in an investigation and analyze those data to develop a logical conclusion.

GRADE FOUR

Physical Sciences

1. Electricity and magnetism are related effects that have many useful applications in everyday life. As a basis for understanding this concept:

A. Students know electrically charged objects attract or repel each other.

B. Students know electrical energy can be converted to heat, light, and motion.

Life Sciences

2. All organisms need energy and matter to live and grow. As a basis for understanding this concept:

A. Students know plants are the primary source of matter and energy entering most food chains.

3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:

A. Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

B. Students know that most microorganisms do not cause disease and that many are beneficial.

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

B. Measure and estimate the weight, length, or volume of objects.

C. Formulate and justify predictions based on cause-and-effect relationships.

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

E. Follow a set of written instructions for a scientific investigation.

GRADE FIVE

Physical Sciences

1. Elements and their combinations account for all the varied types of matter in the world. As a basis for understanding this concept:

A. Students know all matter is made of atoms, which may combine to form molecules.

Life Sciences

2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. As a basis for understanding this concept:

A. Students know many multicellular organisms have specialized structures to support the transport of materials.

B. Students know plants use carbon dioxide (CO_2) and energy from sunlight to build molecules of sugar and release oxygen.

Earth Sciences

3. Water on Earth moves between the oceans and land through the processes of evaporation and condensation. As a basis for understanding this concept:

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

B. Students know that 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.

C. Students know water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.

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.

C. 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.

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. Develop a testable question.

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

C. Draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion.

D. Write a report of an investigation that includes conducting tests, collecting data or examining evidence, and drawing conclusions.

GRADE SIX

Focus on Earth Science

Plate Tectonics and Earth's Structure

7. Plate tectonics accounts for important features of Earth's surface and major geologic events. As a basis for understanding this concept:

A. Students know Earth is composed of several layers: a cold, brittle lithosphere; a hot, convecting mantle; and a dense, metallic core.

B. Students know lithospheric plates the size of continents and oceans move at rates of centimeters per year in response to movements in the mantle.

Heat (Thermal Energy) (Physical Sciences)

9. Heat moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature. As a basis for understanding this concept:

A. Students know energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects.

B. Students know heat energy is also transferred between objects by radiation (radiation can travel through space).

Energy in the Earth System

10. 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)

11. 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.

Investigation and Experimentation

13. 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. Communicate the steps and results from an investigation in written reports and oral presentations.

C. Recognize whether evidence is consistent with a proposed explanation.

GRADE SEVEN

Focus on Life Science

Genetics

2. A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept:

A. Students know sexual reproduction produces offspring that inherit half their genes from each parent.

B. Students know DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

Evolution

3. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:

A. Students know both genetic variation and environmental factors are causes of evolution and diversity of organisms.

B. Students know the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.

C. Students know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

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:

A. Students know Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.

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.

C. Students know that evidence from geologic layers and radioactive dating indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.

Physical Principles in Living Systems (Physical Sciences)

6. Physical principles underlie biological structures and functions. As a basis for understanding this concept:

A. Students know visible light is a small band within a very broad electromagnetic spectrum.

B. Students know that for an object to be seen, light emitted by or scattered from it must be detected by the eye.

C. Students know light travels in straight lines if the medium it travels through does not change.

D. Students know how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.

E. Students know that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.

F. Students know light can be reflected, refracted, transmitted, and absorbed by matter.

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. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.

B. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.

C. Communicate the steps and results from an investigation in written reports and oral presentations.

GRADE EIGHT

Focus on Physical Science

Motion

1. The velocity of an object is the rate of change of its position. As a basis for understanding this concept:

A. Students know position is defined in relation to some choice of a standard reference point and a set of reference directions.

B. Students know changes in velocity may be due to changes in speed, direction, or both.

Forces

2. Unbalanced forces cause changes in velocity. As a basis for understanding this concept:

A. Students know that when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction).

B. Students know the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.

C. Students know the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system.

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.

Reactions

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept:

A. Students know the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.

Chemistry of Living Systems (Life Sciences)

6. Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept:

A. Students know that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms.

B. Students know that living organisms are made of molecules consisting largely of carbon,

hydrogen, nitrogen, oxygen, phosphorus, and sulfur.

C. Students know that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA.

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