

Alignment with Arizona's Science Standards

This document evaluates the state's Education Standards for Science to determine alignment with content found in Cagno 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

Concept 1: Observations, Questions, and Hypotheses

Grade 3

PO 1. Formulate relevant questions about the properties of objects, organisms, and events of the environment using observations and prior knowledge.

Grade 4

PO 3. Formulate predictions in the realm of science based on observed cause and effect relationships.

PO 4. Locate information (e.g., book, article, website) related to an investigation.

Grade 5

PO 1. Formulate a relevant question through observations that can be tested by an investigation.

PO 2. Formulate predictions in the realm of science based on observed cause and effect relationships.

PO 3. Locate information (e.g., book, article, website) related to an investigation.

Grade 6

PO 2. Formulate questions based on observations that lead to the development of a hypothesis.

PO 3. Locate research information, not limited to a single source, for use in the design of a controlled investigation.

Grade 7

PO 3. Explain the role of a hypothesis in a scientific inquiry.

Grade 8

PO 3. Generate a hypothesis that can be tested.

Concept 2: Scientific Testing (Investigating and Modeling)

Grade 3

PO 4. Use metric and U.S. customary units to measure objects.

Concept 3: Analysis and Conclusions

Organize and analyze data; compare to predictions.

Grade 3

PO 4. Generate questions for possible future investigations based on the conclusions of the investigation.

PO 5. Record questions for further inquiry based on the conclusions of the investigation.

Grade 4

PO 2. Formulate conclusions based upon identified trends in data.

PO 3. Determine that data collected is consistent with the formulated question.

PO 5. Develop new questions and predictions based upon the data collected in the investigation.

Grade 5

PO 1. Analyze data obtained in a scientific investigation to identify trends and form conclusions.

PO 2. Analyze whether the data is consistent with the proposed explanation that motivated the investigation.

Grade 6

PO 1. Analyze data obtained in a scientific investigation to identify trends.

PO 2. Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).

PO 3. Evaluate the reasonableness of the outcome of an investigation.

PO 3. Evaluate the observations and data reported by others.

PO 4. Develop new investigations and predictions based on questions that arise from the findings of an investigation.

PO 5. Analyze the results from previous and/or similar investigations to verify the results of the current investigation.

PO 6. Formulate new questions based on the results of a completed investigation.

Grade 7

PO 1. Analyze data obtained in a scientific investigation to identify trends.

PO 2. Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).

PO 3. Analyze results of data collection in order to accept or reject the hypothesis.

PO 5. Formulate a conclusion based on data analysis.

PO 6. Refine hypotheses based on results from investigations.

PO 7. Formulate new questions based on the results of a previous investigation.

Grade 8

PO 1. Analyze data obtained in a scientific investigation to identify trends.

PO 2. Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).

PO 8. Formulate new questions based on the results of a previous investigation.

Concept 4: Communication

Communicate results of investigations.

Grade 3

PO 1. Communicate investigations and explanations using evidence and appropriate terminology.

PO 3. Communicate with other groups to describe the results of an investigation.

Grade 4

PO 1. Communicate verbally or in writing the results of an inquiry.

PO 3. Communicate with other groups or individuals to compare the results of a common investigation.

Concept 1: History of Science as a Human Endeavor

Identify individual and cultural contributions to scientific knowledge.

Grade 3

PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., John Muir [naturalist], supports Strand 4; Thomas Edison [inventor], supports Strand 5; Mae Jemison [engineer, physician, astronaut], supports Strand 6; Edmund Halley [scientist], supports Strand 6).

PO 2. Describe science-related career opportunities.

Grade 4

PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Margaret Mead [anthropologist], supports Strand 4; Nikola Tesla [engineer, inventor] supports Strand 5; Michael Faraday [scientist], supports Strand 5; Benjamin Franklin [scientist], supports Strand 5).

PO 2. Describe science-related career opportunities.

Grade 5

PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Percy Lavon Julian [scientist], supports Strand 4; Niels Bohr [scientist], supports Strand 5; Edwin Hubble [scientist], supports Strand 6).

Grade 6

PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Jacques Cousteau [inventor, marine explorer], supports Strand 4; William Beebe [scientist], supports Strand 4; Thor Heyerdahl [anthropologist], supports Strand 6).

PO 2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., Cell Theory, sonar, SCUBA, underwater robotics).

PO 3. Analyze the impact of a major scientific development occurring within the past decade.

PO 4. Describe the use of technology in science-related careers.

Grade 7

PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Rachel Carson [scientist], supports Strand 4; Luis Alvarez [scientist] and Walter Alvarez [scientist], support Strand 6; Percival Lowell [scientist], supports Strand 6; Copernicus [scientist], supports Strand 6).

PO 2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., global positioning system, telescopes, seismographs, photography).

PO 3. Analyze the impact of a major scientific development occurring within the past decade.

PO 4. Analyze the use of technology in science-related careers.

Grade 8

PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Watson and Crick [scientists], support Strand 4; Rosalind Franklin [scientist], supports Strand 4; Charles Darwin [scientist], supports Strand 4; George Washington Carver [scientist, inventor], supports Strand 4; Joseph Priestley [scientist], supports Strand 5; Sir Frances Bacon [philosopher], supports Strand 5; Isaac Newton [scientist], supports Strand 5).

PO 2. Evaluate the effects of the following major scientific milestones on society:

- Mendelian Genetics
- Newton's Laws

PO 3. Evaluate the impact of a major scientific development occurring within the past decade.

PO 4. Evaluate career opportunities related to life and physical sciences.

Concept 2: Nature of Scientific Knowledge

Understand how science is a process for generating knowledge.

Grade 3

PO 1. Describe how, in a system (e.g., terrarium, house) with many components, the components usually influence one another.

PO 2. Explain why a system may not work if a component is defective or missing.

Grade 4

PO 1. Explain the role of experimentation in scientific inquiry.

PO 3. Explain various ways scientists generate ideas (e.g., observation, experiment, collaboration, theoretical and mathematical models).

Grade 5

PO 1. Provide examples that support the premise that science is an ongoing process that changes in response to new information and discoveries (e.g., space exploration, medical advances).

PO 2. Explain the cycle by which new scientific knowledge generates new scientific inquiry.

PO 3. Describe how scientific knowledge is subject to modification and/or change as new information/technology challenges prevailing theories.

PO 5. Describe qualities of the scientists' habits of mind (e.g., openness, skepticism, integrity, tolerance).

Grade 6

PO 1. Describe how science is an ongoing process that changes in response to new information and discoveries.

PO 2. Describe how scientific knowledge is subject to change as new information and/or technology challenges prevailing theories.

Grade 7

PO 1. Describe how science is an ongoing process that changes in response to new information and discoveries.

PO 2. Describe how scientific knowledge is subject to change as new information and/or technology challenges prevailing theories.

Grade 8

PO 2. Describe how scientific knowledge is subject to change as new information and/or technology challenges prevailing theories.

PO 3. Defend the principle that accurate record keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.

PO 4. Explain why scientific claims may be questionable if based on very small samples of data, biased samples, or samples for which there was no control.

Concept 2: Science and Technology in Society

Develop viable solutions to a need or problem.

Grade 3

PO 1. Identify ways that people use tools and techniques to solve problems.

Grade 4

PO 1. Describe how science and technology (e.g., computers, air conditioning, medicine) have improved the lives of many people.

PO 2. Describe benefits (e.g., easy communications, rapid transportation) and risks (e.g., pollution, destruction of natural resources) related to the use of technology.

Grade 5

PO 1. Describe the relationship between science and technology.

PO 2. Explain how scientific knowledge, skills, and technological capabilities are integral to a variety of careers.

Grade 6

PO 1. Propose viable methods of responding to an identified need or problem.

PO 2. Compare possible solutions to best address an identified need or problem.

PO 4. Describe a technological discovery that influences science.

Grade 7

PO 1. Propose viable methods of responding to an identified need or problem.

PO 2. Compare solutions to best address an identified need or problem.

PO 4. Describe a scientific discovery that influences technology.

Grade 8

PO 1. Propose viable methods of responding to an identified need or problem.

PO 2. Compare solutions to best address an identified need or problem.

PO 4. Compare risks and benefits of the following technological advances:

- radiation treatments
- genetic engineering
- airbags

Concept 3: Organisms and Environments

Understand the relationships among various organisms and their environment.

Grade 3

PO 1. Identify the living and nonliving components of an ecosystem.

Grade 4

PO 1. Describe ways various resources (e.g., air, water, plants, animals, soil) are utilized to meet the needs of a population.

Grade 6

PO 1. Explain that sunlight is the major source of energy for most ecosystems.

Concept 4: Diversity, Adaptation and Behavior

Identify plant and animal adaptations.

Grade 3

PO 1. Identify adaptations of plants and animals that allow them to live in specific environments.

PO 2. Describe ways that species adapt when introduced into new environments.

PO 3. Cite examples of how a species' inability to adapt to changing conditions in the ecosystem led to the extinction of that species.

Grade 4

PO 1. Recognize that successful characteristics of populations are inherited traits that are favorable in a particular environment.

Grade 8

PO 1. Explain how an organism's behavior allows it to survive in an environment.

Concept 1: Properties and Changes of Properties in Matter

Understand physical and chemical properties of matter.

Grade 5

PO 1. Identify that matter is made of smaller units called:

- molecules (e.g., H₂O, CO₂)
- atoms (e.g., H, N, Na)

Concept 2: Motion and Forces

Understand the relationship between force and motion.

Grade 5

PO 1. Describe the following forces:

- gravity
- friction

PO 2. Describe the various effects forces can have on an object (e.g., cause motion, halt motion, change direction of motion, cause deformation).

Grade 8

PO 1. Demonstrate velocity as the rate of change of position over time.

PO 2. Identify the conditions under which an object will continue in its state of motion (Newton's 1st Law of Motion).

PO 3. Describe how the acceleration of a body is dependent on its mass and the net applied force (Newton's 2nd Law of Motion).

PO 4. Describe forces as interactions between bodies (Newton's 3rd Law of Motion).

Concept 3: Energy and Magnetism

Investigate different forms of energy.

Grade 3

PO 1. Demonstrate that light can be:

- reflected (with mirrors)
- refracted (with prisms)
- absorbed (by dark surfaces)

PO 3. Demonstrate that vibrating objects produce sound.

Concept 1: Properties of Earth Materials

Identify the basic properties of Earth materials.

Grade 3

PO 1. Identify the layers of the Earth:

- crust
- mantle
- core (inner and outer)

Concept 1: Structure of the Earth

Describe the composition and interactions between the structure of the Earth and its atmosphere.
Grade 6

PO 1. Describe the properties and the composition of the layers of the atmosphere.

Grade 7

PO 2. Describe the properties and the composition of the following major layers of the Earth:

- crust
- mantle
- core

PO 3. Explain the following processes involved in the formation of the Earth's structure:

- erosion
- deposition
- plate tectonics
- volcanism

Concept 2: Earth's Processes and Systems

Understand the processes acting on the Earth and their interaction with the Earth systems.
Grade 5

PO 4. Describe the role of gravity as an attractive force between celestial objects.

Concept 3: Earth in the Solar System

Understand the relationships of the Earth and other objects in the solar system.

Grade 5

PO 1. Identify the known planets of the solar system.

PO 2. Describe the distinguishing characteristics of the known planets in the solar system.

PO 3. Describe various objects in the sky (e.g., asteroids, comets, stars, meteors/shooting stars).

PO 4. Describe the change in position and motion of the following objects in the sky over time:

- real motion – Moon, planets
- apparent motion (due to the motion of the Earth) – Sun, Moon, stars

PO 5. Explain the apparent motion of the Sun and stars.

PO 6. Describe efforts to explore space (e.g., Apollo missions, space shuttles, Hubble space telescope, space probes).

(See Strand 2)

Grade 7

PO 6. Explain the relationship among common objects in the solar system, galaxy, and the universe.

High School

Concept 3: Origin and Evolution of the Earth System

Analyze the factors used to explain the history and evolution of the Earth.

Earth Origin/System:

PO 1. Describe the scientific theory of the origin of the solar system (solar nebular hypothesis).

PO 2. Describe the characteristics, location, and motions of the various kinds of objects in our solar system, including the Sun, planets, satellites, comets, meteors, and asteroids.

PO 6. Investigate scientific theories of how life originated on Earth (high temperature, low oxygen, clay catalyst model).

Concept 4: Origin and Evolution of the Universe

Analyze the factors used to explain the origin and evolution of the universe.

- PO 1. Describe the Big Bang Theory as an explanation for the origin of the universe.
- PO 2. Describe the fusion process that takes place in stars.
- PO 4. Compare the evolution (life cycles) of stars of different masses (low and high mass).
- PO 5. Explain the formation of the light elements in stars and the heavier elements (what astronomers call “metals”) in supernova explosions.
- PO 6. Explain the evolution and life cycles of galaxies.

Please note that use of these standards does not imply this state’s endorsement of Cogno.