

Alignment with New Mexico'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

Strand I: Scientific Thinking and Practice

Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

K-4 Benchmark I: Use scientific methods to observe, collect, record, analyze, predict, interpret, and determine reasonableness of data.

Grade 3

2. Recognize the difference between data and opinion.

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

4. Collect data in an investigation and analyze those data.

5. Know that the same scientific laws govern investigations in different times and places (e.g., gravity, growing plants).

Grade 4

3. Conduct multiple trials to test a prediction, draw logical conclusions, and construct and interpret graphs from measurements.

K-4 Benchmark II: Use scientific thinking and knowledge and communicate findings.

Grade 3

2. Understand that predictions are based on observations, measurements, and cause-and-effect relationships.

Grade 4

1. Communicate ideas and present findings about scientific investigations that are open to critique from others.

K-4 Benchmark III: Use mathematical skills and vocabulary to analyze data, understand patterns and relationships, and communicate findings.

Grade 3

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

2. Pose a question of interest and present observations and measurements with accuracy.

3. Use various methods to display data and present findings and communicate results in accurate mathematical language.

Grade 4

2. Use mathematical equations to formulate and justify predictions based on cause-and-effect relationships.

Strand II: Content of Science

Standard I (Physical Science): Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

K-4 Benchmark I: Recognize that matter has different forms and properties.

Grade 4

2. Know that materials are made up of small particles (atoms and molecules) that are too small to see with the naked eye.

3. Know that the mass of the same amount of material remains constant whether it is together, in parts, or in a different state.

K-4 Benchmark II: Know that energy is needed to get things done and that energy has different forms.

Grade 3

1. Understand that light is a form of energy and can travel through a vacuum.

2. Know that light travels in a straight line until it strikes an object and then it is reflected, refracted, or absorbed.

Grade 4

2. Recognize that energy can be stored in many ways (e.g., potential energy in gravity or springs, chemical energy in batteries).

3. Describe how some waves move through materials (e.g., water, sound) and how others can move through a vacuum (e.g., x-ray, television, radio).

K-4 Benchmark III: Identify forces and describe the motion of objects.

Grade 3

1. Recognize that magnets can produce motion by attracting some materials (e.g., steel) and have no effect on others (e.g., plastics).

3. Observe that some forces produce motion without objects touching (e.g., magnetic force on nails).

4. Describe motion on different time scales (e.g., the slow motion of a plant toward light, the fast motion of a tuning fork).

Grade 4

1. Know that energy can be carried from one place to another by waves (e.g., water waves, sound waves), by electric currents, and by moving objects.

2. Describe the motion of an object by measuring its change of position over a period of time.

3. Describe that gravity exerts more force on objects with greater mass (e.g., it takes more force to hold up a heavy object than a lighter one).

4. Describe how some forces act on contact and other forces act at a distance (e.g., a person pushing a rock versus gravity acting on a rock).

Strand II: Content of Science

Standard II (Life Science): Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

K-4 Benchmark I: Know that living things have diverse forms, structures, functions, and habitats.

Grade 3

1. Know that an adaptation in physical structure or behavior can improve an organism's chance for survival (e.g., horned toads, chameleons, cacti, mushrooms).
3. Classify common animals according to their observable characteristics (e.g., body coverings, structure).
4. Classify plants according to their characteristics (e.g., tree leaves, flowers, seeds).

K-4 Benchmark II: Know that living things have similarities and differences and that living things change over time.

Grade 4

1. Know that in any particular environment some kinds of plants and animals survive well, some survive less well, and others cannot survive at all.

K-4 Benchmark III: Know the parts of the human body and their functions.

Grade 3

1. Know that bacteria and viruses are germs that affect the human body.

Strand II: Content of Science

Standard III (Earth and Space Science): Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.

K-4 Benchmark I: Know the structure of the solar system and the objects in the universe.

Grade 3

1. Describe the objects in the solar system (e.g., sun, Earth and other planets, moon) and their features (e.g., size, temperature).
2. Describe the relationships among the objects in the solar system (e.g., relative distances, orbital motions).
3. Observe that the pattern of stars stays the same as they appear to move across the sky nightly.
4. Observe that different constellations can be seen in different seasons.
5. Know that telescopes enhance the appearance of some distant objects in the sky (e.g., the moon, planets).

Grade 4

1. Understand that the number of stars visible through a telescope is much greater than the number visible to the naked eye.
2. Know that there are various types of telescopes that use different forms of light to observe distant objects in the sky.
3. Know that the pattern of stars (e.g., constellations) stays the same although they appear to move across the sky nightly due to Earth's rotation.

K-4 Benchmark II: Know the structure and formation of Earth and its atmosphere and the processes that shape them.

Grade 3

1. Know that Earth's features are constantly changed by a combination of slow and rapid processes that include the action of volcanoes, earthquakes, mountain building, biological changes, erosion, and weathering.
3. Know that air takes up space, is colorless, tasteless, and odorless, and exerts a force.

4. Identify how water exists in the air in different forms (e.g., in clouds and fog as tiny droplets; in rain, snow, and hail) and changes from one form to another through various processes (e.g., freezing/condensation, precipitation, evaporation).

Grade 4

2. Describe how weather patterns generally move from west to east in the United States.

Strand III: Science and Society

Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.

K-4 Benchmark I: Describe how science influences decisions made by individuals and societies.

Grade 4

4. Know that both men and women of all races and social backgrounds choose science as a career.

5th – 8th Grade

Strand I: Scientific Thinking and Practice

Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

5-8 Benchmark I: Use scientific methods to develop questions, design and conduct experiments using appropriate technologies, analyze and evaluate results, make predictions, and communicate findings.

Grade 5

1. Plan and conduct investigations, including formulating testable questions, making systematic observations, developing logical conclusions, and communicating findings.

5. Communicate the steps and results of a scientific investigation.

Grade 6

2. Examine the reasonableness of data supporting a proposed scientific explanation.

3. Justify predictions and conclusions based on data.

Grade 7

1. Use a variety of print and web resources to collect information, inform investigations, and answer a scientific question or hypothesis.

2. Use models to explain the relationships between variables being investigated.

5-8 Benchmark II: Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge.

Grade 5

2. Understand that scientific conclusions are subject to peer and public review.

Grade 6

1. Understand that scientific knowledge is continually reviewed, critiqued, and revised as new data become available.

2. Understand that scientific investigations use common processes that include the collection of relevant data and observations, accurate measurements, the identification and control of variables, and logical reasoning to formulate hypotheses and explanations.

Grade 7

3. Analyze and evaluate scientific explanations.

Grade 8

1. Examine alternative explanations for observations.

2. Describe ways in which science differs from other ways of knowing and from other bodies of knowledge (e.g. experimentation, logical arguments, skepticism).

3. Know that scientific knowledge is built on questions posed as testable hypotheses, which are tested until the results are accepted by peers.

5-8 Benchmark III: Use mathematical ideas, tools, and techniques to understand scientific knowledge.

Grade 5

1. Use appropriate units to make precise and varied measurements.
2. Use mathematical skills to analyze data.
3. Make predictions based on analyses of data, observations, and explanations.
4. Understand the attributes to be measured in a scientific investigation and describe the units, systems, and processes for making the measurement.

Grade 6

2. Use probabilities, patterns, and relationships to explain data and observations.

Grade 7

2. Use mathematical expressions to represent data and observations collected in scientific investigations.
3. Select and use an appropriate model to examine a phenomenon.

Grade 8

1. Use mathematical expressions and techniques to explain data and observations and to communicate findings (e.g., formulas and equations, significant figures, graphing, sampling, estimation, mean).
2. Create models to describe phenomena.

Strand II: Content of Science

Standard I (Physical Science): Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

5-8 Benchmark I: Know the forms and properties of matter and how matter interacts.

Grade 5

1. Describe properties (e.g., relative volume, ability to flow) of the three states of matter.
3. Know that matter is made up of particles (atoms) that can combine to form molecules and that these particles are too small to see with the naked eye.

Grade 7

2. Know that the total amount of matter (mass) remains constant although its form, location, and properties may change (e.g., matter in the food web).
3. Identify characteristics of radioactivity, including:
 - decay in time of some elements to others
 - release of energy
 - damage to cells.

5-8 Benchmark II: Explain the physical processes involved in the transfer, change, and conservation of energy.

Performance Standards

Grade 5

3. Know that there are different forms of energy.

Grade 6

1. Identify various types of energy (e.g., heat, light, mechanical, electrical, chemical, nuclear).
3. Know that there are many forms of energy transfer but that the total amount of energy is conserved (i.e., that energy is neither created nor destroyed).
4. Understand that some energy travels as waves (e.g., seismic, light, sound), including:

- the sun as source of energy for many processes on Earth
- different wavelengths of sunlight (e.g., visible, ultraviolet, infrared)
- vibrations of matter (e.g., sound, earthquakes)
- different speeds through different materials.

Grade 7

1. Know how various forms of energy are transformed through organisms and ecosystems, including:
 • sunlight and photosynthesis

Grade 8

Energy Transformation

1. Know that energy exists in many forms and that when energy is transformed some energy is usually converted to heat.

2. Know that kinetic energy is a measure of the energy of an object in motion and potential energy is a measure of an object's position or composition, including:
 • transformation of gravitational potential energy of position into kinetic energy of motion by a falling object.

Waves

5. Understand how light and radio waves carry energy through vacuum or matter by:
 • straight-line travel unless an object is encountered
 • reflection by a mirror, refraction by a lens, absorption by a dark object
 • separation of white light into different wavelengths by prisms
 • visibility of objects due to light emission or scattering.

6. Understand that vibrations of matter (e.g., sound, earthquakes, water waves) carry wave energy, including:
 • sound transmission through solids, liquids, and gases
 • relationship of pitch and loudness of sound to rate and distance (amplitude) of vibration
 • ripples made by objects dropped in water.

5-8 Benchmark III: Describe and explain forces that produce motion in objects.

Grade 5

1. Understand how the rate of change of position is the velocity of an object in motion.

2. Recognize that acceleration is the change in velocity with time.

3. Identify forces in nature (e.g., gravity, magnetism, electricity, friction).

4. Understand that when a force (e.g., gravity, friction) acts on an object, the object speeds up, slows down, or goes in a different direction.

Grade 6

1. Know that every object exerts gravitational force on every other object dependent on the masses and distance of separation (e.g., motions of celestial objects, tides).

2. Know that gravitational force is hard to detect unless one of the objects (e.g., Earth) has a lot of mass.

Grade 8

Forces

1. Know that there are fundamental forces in nature (e.g., gravity, electromagnetic forces, nuclear forces).

2. Know that a force has both magnitude and direction.

3. Analyze the separate forces acting on an object at rest or in motion (e.g., gravity, elastic forces, friction), including how multiple forces reinforce or cancel one another to result in a net force that acts on an object.

6. Know that Earth has a magnetic field.

Motion

7. Know that an object's motion is always described relative to some other object or point (i.e., frame of reference).

8. Understand and apply Newton's Laws of Motion:

- Objects in motion will continue in motion and objects at rest will remain at rest unless acted upon by an unbalanced force (inertia).
- If a greater force is applied to an object a proportionally greater acceleration will occur.
- If an object has more mass the effect of an applied force is proportionally less.

Strand II: Content of Science

Standard II (Life Science): Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

5-8 Benchmark I: Explain the diverse structures and functions of living things and the complex relationships between living things and their environments.

Grade 6

1. Understand how organisms interact with their physical environments to meet their needs (i.e., food, water, air) and how the water cycle is essential to most living systems.
3. Describe how organisms have adapted to various environmental conditions.

5-8 Benchmark II: Understand how traits are passed from one generation to the next and how species evolve.

Grade 6

2. Describe how species have responded to changing environmental conditions over time (e.g., extinction, adaptation).

Grade 7

Biological Evolution

7. Describe how typical traits may change from generation to generation due to environmental influences (e.g., color of skin, shape of eyes, camouflage, shape of beak).
8. Explain that diversity within a species is developed by gradual changes over many generations.
11. Understand the process of natural selection.
12. Explain how species adapt to changes in the environment or become extinct and that extinction of species is common in the history of living things.

5-8 Benchmark III: Understand the structure of organisms and the function of cells in living systems.

Grade 8

2. Explain that photosynthesis in green plants captures the energy from the sun and stores it chemically.

Strand II: Content of Science

Standard III (Earth and Space Science): Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.

5-8 Benchmark I: Describe how the concepts of energy, matter, and force can be used to explain the observed behavior of the solar system, the universe, and their structures.

Grade 5

1. Know that many objects in the universe are huge and are separated from one another by vast distances (e.g., many stars are larger than the sun but so distant that they look like points of light).
2. Understand that Earth is part of a larger solar system, which is part of an even larger galaxy (Milky Way), which is one of many galaxies.
3. Know that there have been manned and unmanned journeys to space and to the moon.

Universe

1. Describe the objects in the universe, including:

- billions of galaxies, each containing billions of stars
- different sizes, temperatures, and colors of stars in the Milky Way galaxy.

Solar System

2. Locate the solar system in the Milky Way galaxy.
3. Identify the components of the solar system, and describe their defining characteristics and motions in space, including:
 - sun as a medium sized star
 - sun's composition (i.e., hydrogen, helium) and energy production
 - nine planets, their moons, asteroids.
4. Know that the regular and predictable motions of the Earth-moon-sun system explain phenomena on Earth, including:
 - Earth's motion in relation to a year, a day, the seasons, the phases of the moon, eclipses, tides, and shadows
 - moon's orbit around Earth once in 28 days in relation to the phases of the moon.

Grade 7

1. Explain why Earth is unique in our solar system in its ability to support life.
2. Explain how energy from the sun supports life on Earth.

Grade 8

1. Understand how energy from the sun and other stars, in the form of light, travels long distances to reach Earth.
2. Explain how the properties of light (e.g., emission, reflection, refraction) emitted from the sun and stars are used to learn about the universe, including:
 - distances in the solar system and the universe
 - temperatures of different stars.
3. Understand how gravitational force acts on objects in the solar system and the universe, including:
 - similar action on masses on Earth and on other objects in the solar system
 - explanation of the orbits of the planets around the sun.

5-8 Benchmark II: Describe the structure of Earth and its atmosphere and explain how energy, matter, and forces shape Earth's systems.

Grade 5

1. Understand that water and air relate to Earth's processes, including:
 - how the water cycle relates to weather
 - how clouds are made of tiny droplets of water, like fog or steam.
2. Know that air is a substance that surrounds Earth (atmosphere), takes up space, and moves, and that temperature fluctuations and other factors produce wind currents.
3. Know that most of Earth's surface is covered by water, that most of that water is salt water in oceans, and that fresh water is found in rivers, lakes, underground sources, and glaciers.
4. Recognize that the seasons are caused by Earth's motion around the sun and the tilt of Earth's axis of rotation.

Grade 6

Structure of Earth

1. Know that Earth is composed of layers that include a crust, mantle, and core.
2. Know that Earth's crust is divided into plates that move very slowly, in response to movements in the mantle.

Weather and Climate

4. Describe the composition (i.e., nitrogen, oxygen, water vapor) and strata of Earth's atmosphere, and differences between the atmosphere of Earth and those of other planets.

Changes to Earth

7. Know that landforms are created and change through a combination of constructive and destructive forces, including:
 - weathering of rock and soil, transportation, deposition of sediment, and tectonic activity

- similarities and differences between current and past processes on Earth's surface (e.g., erosion, plate tectonics, changes in atmospheric composition)

- impact of volcanoes and faults on New Mexico geology.

8. Understand the history of Earth and how information about it comes from layers of sedimentary rock, including:

- evidence of asteroid impact, volcanic and glacial activity.

Grade 8

2. Understand the unique role water plays on Earth, including:

- ability to remain liquid at most Earth temperatures

- fresh and salt water in oceans, rivers, lakes, and glaciers

- reactant in photosynthesis.

Strand III: Science and Society

Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.

5-8 Benchmark I: Explain how scientific discoveries and inventions have changed individuals and societies.

Grade 5

2. Describe how various technologies have affected the lives of individuals (e.g., transportation, entertainment, health).

Grade 6

1. Examine the role of scientific knowledge in decisions (e.g., space exploration, what to eat, preventive medicine and medical treatment).

2. Describe the technologies responsible for revolutionizing information processing and communications (e.g., computers, cellular phones, Internet).

Grade 7

2. Analyze how technologies have been responsible for advances in medicine (e.g., vaccines, antibiotics, microscopes, DNA technologies).

3. Describe how scientific information can help individuals and communities respond to health emergencies (e.g., CPR, epidemics, HIV, bio-terrorism).

Grade 8

3. Describe how technological revolutions have significantly influenced societies (e.g., energy production, warfare, space exploration).

4. Critically analyze risks and benefits associated with technologies related to energy production.

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