

Alignment with Louisiana'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

Louisiana Content Standards, Benchmarks, and Grade Level Expectations for Science

§901. Science As Inquiry

A. Focus. The process of scientific inquiry involves "asking a question, planning and conducting an investigation, using appropriate tools, mathematics, and techniques, thinking critically and logically about the relationships between evidence and explanations, constructing and analyzing alternative explanations, and communicating scientific arguments" (*NSE Standards*, pp. v- 4). Students develop these skills as they are encouraged to think scientifically rather than simply memorize and/or study science facts.

B. Standard. The students will do science by engaging in partial and full inquiries that are within their developmental capabilities.

§903. Benchmarks K-4

A. In Grades K-4, what students know and are able to do includes:

1. the abilities necessary to do scientific inquiry:

- a. SI-E-A1: asking appropriate questions about organisms and events in the environment (1, 3);
- c. SI-E-A3: communicating that observations are made with one's senses (1, 3);
- e. SI-E-A5: using data, including numbers and graphs, to explain observations and experiments (1, 2, 3);

2. understanding scientific inquiry:

- f. SI-E-B6: reviewing and asking questions about the results of investigations(1, 3, 4).

§905. Benchmarks 5-8

A. As students in Grades 5-8 extend their knowledge, what they know and are able to do includes:

1. the abilities necessary to do scientific inquiry:

a. SI-M-A1: identifying questions that can be used to design a scientific investigation (1, 2, 3);

f. SI-M-A6: comparing alternative explanations and predictions (1, 3, 4);

g. SI-M-A7: communicating scientific procedures, information, and explanations (1, 3);

2. understanding scientific inquiry:

a. SI-M-B1: recognizing that different kinds of questions guide different kinds of scientific investigations (2, 4);

b. SI-M-B2: communicating that current scientific knowledge guides scientific investigations (1, 3, 4);

e. SI-M-B5: understanding that scientific knowledge is enhanced through peer review, alternative explanations, and constructive criticism (1, 4, 5);

f. SI-M-B6: communicating that scientific investigations can result in new ideas, new methods or procedures, and new technologies (1, 3, 4);

g. SI-M-B7: understanding that scientific development/technology is driven by societal needs and funding (4, 5).

§1101. Physical Science

A. Focus. Exploring the characteristics, forces, and changes in objects and materials encourages students to develop an understanding of the world in which they live to establish a basis for a lifelong study of their world. As students increase their understanding and abilities, they will be able to use more sophisticated qualitative and quantitative methods to construct and analyze information. This study will enable them to make informed decisions based on a better understanding of how things work in the physical world.

B. Standard. Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.

§1103. Benchmarks K-4

A. In Grades K-4, what students know and are able to do includes:

2. position and motion of objects:

a. PS-E-B1: observing and describing the position of an object relative to another object or the background (1, 2);

b. PS-E-B2: exploring and recognizing that the position and motion of objects can be changed by pushing or pulling (force) over time (1, 2, 3);

c. PS-E-B3: describing an object's motion by tracing and measuring its position over time (1, 2, 3, 4);

d. PS-E-B4: investigating and describing how the motion of an object is related to the strength of the force (pushing or pulling) and the mass of the object (1, 2, 3, 4);

3. forms of energy:

a. PS-E-C1: experimenting and communicating how vibrations of objects produce sound and how changing the rate of vibration varies the pitch (2);

b. PS-E-C2: investigating and describing how light travels and what happens when light strikes an object (reflection, refraction, and absorption) (2);

e. PS-E-C5: investigating and communicating that magnetism and gravity can exert forces on objects without touching the objects (2);

§1105. Benchmarks 5-8

A. As students in Grades 5-8 extend their knowledge, what they know and are able to do includes:

1. properties and changes of properties in matter:

b. PS-M-A2: understanding that all matter is made up of particles called atoms and that atoms of different elements are different (2, 4);

2. motions and forces:

a. PS-M-B1: describing and graphing the motions of objects (1, 2, 3);

b. PS-M-B2: recognizing different forces and describing their effects (gravity, electrical, magnetic) (1, 2);

c. PS-M-B3: understanding that, when an object is not being subjected to a force, it will continue to move at a constant speed and in a straight line (2, 3, 4);

d. PS-M-B4: describing how forces acting on an object will reinforce or cancel one another, depending upon their direction and magnitude (1, 2);

e. PS-M-B5: understanding that unbalanced forces will cause changes in the speed or direction of an object's motion (2, 4);

3. transformations of energy:

b. PS-M-C2: understanding the different kinds of energy transformations and the fact that energy can be neither destroyed nor created (2, 3, 4);

c. PS-M-C3: understanding that the sun is a major source of energy and that energy arrives at the earth's surface as light with a range of wavelengths (2, 3, 4);

d. PS-M-C4: observing and describing the interactions of light and matter (reflection, refraction, absorption, transmission, scattering) (1, 2, 3, 4);

§1301. Life Science

A. Focus. As investigations of the living environment are conducted, the rationales are set to establish further observations, measurements, and classifications of the various life forms. Patterns of similarities and differences within the diversity of life establish the basis for understanding the special relationships among living things in ecosystems.

B. Standard. The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.

§1303. Benchmarks K-4

A. In Grades K-4, what students know and are able to do includes:

1. characteristics of organisms, which includes:

a. LS-E-A1: identifying the needs of plants and animals, based on age-appropriate recorded observations (1, 2, 3, 4);

b. LS-E-A2: distinguishing between living and nonliving things (1, 2, 3, 4);

d. LS-E-A4: recognizing that there is great diversity among organisms (1);

3. Organisms and their environments, which include:

- a. LS-E-C1: examining the habitats of plants and animals and determining how basic needs are met within each habitat (1, 2, 3, 4, 5);
- b. LS-E-C2: describing how the features of some plants and animals enable them to live in specific habitats (1, 2, 3, 4, 5);

§1305. Benchmarks 5-8

A. As students in Grades 5-8 extend their knowledge, what they know and are able to do includes:

3. populations and ecosystems, which include:

- a. LS-M-C1: constructing and using classification systems based on the structure of organisms (1, 2, 3, 4);
- c. LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each (1, 2, 3, 4, 5);

4. adaptations of organisms:

- a. LS-M-D1: describing the importance of plant and animal adaptation, including local examples (1, 3, 4, 5);
- b. LS-M-D2: explaining how some members of a species survive under changed environmental conditions (1, 2, 3, 4, 5).

§1501. Earth and Space Science

A. Focus. In order to develop a basic understanding of our world, it is essential for students to reflect upon the structure, order, and origin of the universe. This understanding occurs gradually over time as students observe, investigate, model, describe, and find patterns in a changing world. As humans modify their surroundings, they must reflect upon the consequences that these changes will bring. Scientific knowledge about environmental forces and resources will provide a rich topic for critical thinking by students to analyze the effects of their choices on the world.

B. Standard. The students will develop an understanding of the properties of earth materials, the structure of the earth system, the earth's history, and the earth's place in the universe.

§1503. Benchmarks K-4

A. In Grades K-4, what students know and are able to do includes:

1. properties of earth materials, which include:

- b. ESS-E-A2: understanding that approximately three-fourths of the earth's surface is covered with water and how this condition affects weather patterns and climates (1);
- c. ESS-E-A3: investigating, observing, and describing how water changes from one form to another and interacts with the atmosphere (2, 4);

2. objects in the sky, which include:

- a. ESS-E-B1: observing and describing the characteristics of objects in the sky (1);
- e. ESS-E-B5: understanding that the sun, a star, is a source of heat and light energy and identifying its effects upon the earth (1, 2, 3, 4);

f. ESS-E-B6: understanding that knowledge of the earth as well as of the universe is gained through space exploration (1).

Chapter 19. Grade Level Expectations

§1909. Third Grade

A. Science as Inquiry: Strand One

1. The Abilities to Do Scientific Inquiry

- a. GLE 1: Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1).
- b. GLE 2: Pose questions that can be answered by using students' own observations, scientific knowledge, and testable scientific investigations (SI-E-A1).
- c. GLE 3: Use observations to design and conduct simple investigations or experiments to answer testable questions (SI-E-A2).
- d. GLE 4: Predict and anticipate possible outcomes (SI-E-A2).
- g. GLE 7: Measure and record length, temperature, mass, volume, and area in both metric system and U.S. system units (SI-E-A4).
- j. GLE 10: Combine information, data, and knowledge from one or more of the science content areas to reach a conclusion or make a prediction (SI-E-A5).

2. Understanding Scientific Inquiry

- a. GLE 13: Identify questions that need to be explained through further inquiry (SI-E-B1).
- b. GLE 14: Distinguish between what is known and what is unknown in scientific investigations (SI-E-B1).
- d. GLE 16: Describe procedures and communicate data in a manner that allows others to understand and repeat an investigation or experiment (SI-E-B5).
- e. GLE 17: Explain and give examples of how scientific discoveries have affected society (SI-E-B6).

B. Physical Science: Strand Two

1. Properties of Objects and Materials

- b. GLE 19: Select the appropriate metric system and U.S. system tools for measuring length, width, temperature, volume, and mass (PS-E-A2).

2. Position and Motion of Objects

- a. GLE 23: Demonstrate how force is a *push* or a *pull* by using students' bodies, toy cars, or balls (PS-E-B2).
- b. GLE 24: Explain how the amount and direction of force exerted on an object (e.g., push, pull, friction, gravity) determine how much the object will move (PS-E-B2).
- c. GLE 25: Observe and analyze motion and position of objects over time (e.g., shadows, apparent path of the sun across the sky) (PS-E-B3).
- d. GLE 26: Explain the effect of varying amounts of force on the motion of an object (PS-E-B4).

3. Forms of Energy

- b. GLE 28: Describe the reflection/absorption properties of various colored objects (PS-E-C2).

C. Life Science: Strand Three

1. Characteristics of Organisms

e. GLE 38: Classify groups of organisms based on common characteristics (LS-E-A4).

D. Earth and Space Science: Strand Four

2. Objects in the Sky

b. GLE 54: Describe the patterns of apparent change in the position of the sun (ESS-E-B2).

§1911. Fourth Grade

A. Science as Inquiry: Strand One

1. The Abilities to Do Scientific Inquiry

a. GLE 1: Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1).

b. GLE 2: Pose questions that can be answered by using students' own observations, scientific knowledge, and testable scientific investigations (SI-E-A1).

d. GLE 4: Predict and anticipate possible outcomes (SI-E-A2).

h. GLE 8: Measure and record length, temperature, mass, volume, and area in both metric system and U.S. system units (SI-E-A4).

k. GLE 11: Combine information, data, and knowledge from one or more of the science content areas to reach a conclusion or make a prediction (SI-E-A5).

2. Understanding Scientific Inquiry

a. GLE 14: Identify questions that need to be explained through further inquiry (SI-E-B1).

b. GLE 15: Distinguish between what is known and what is unknown in scientific investigations (SI-E-B1).

e. GLE 18: Base explanations and logical inferences on scientific knowledge, observations, and scientific evidence (SI-E-B4).

f. GLE 19: Describe procedures and communicate data in a manner that allows others to understand and repeat an investigation or experiment (SI-E-B5).

g. GLE 20: Determine whether further investigations are needed to draw valid conclusions (SI-E-B6).

h. GLE 21: Use evidence from previous investigations to ask additional questions and to initiate further explorations (SI-E-B6).

i. GLE 22: Explain and give examples of how scientific discoveries have affected society (SI-E-B6).

B. Physical Science: Strand Two

2. Position and Motion of Objects

b. GLE 27: Describe how the amount of force needed to cause an object to change its motion depends on the mass of the object (PS-E-B4).

3. Forms of Energy

- a. GLE 28: Explain the relationship between volume (amplitude) of sound and energy required to produce the sound (PS-E-C1).
- b. GLE 29: Compare the rates at which sound travels through solids, liquids, and gases (PS-E-C1).
- c. GLE 30: Explain the relationship between frequency (rate of vibration) and pitch (PS-E-C1).
- d. GLE 31: Diagram what happens to white light as it passes through a prism (PS-E-C2).
- e. GLE 32: Describe how light bends or refracts when traveling through various materials (e.g., pencil in a glass of water) (PS-E-C2).
- k. GLE 38: Explain the effects of earth's gravity on all objects at or near the surface of earth (PS-E-C5).

C. Life Science: Strand Three

3. Organisms and Their Environments

- c. GLE 52: Describe how some plants and animals have adapted to their habitats (LS-E-C2).
- d. GLE 53: Identify the habitat in which selected organisms would most likely live and explain how specific structures help organisms to survive (LS-E-C2).

D. Earth and Space Science: Strand Four

2. Objects in the Sky

- f. GLE 69: Explain how technology has improved our knowledge of the universe (e.g., Hubble telescope, space stations, lunar exploration) (ESS-E-B6).

§1913. Fifth Grade

A. Science as Inquiry: Strand One

1. The Abilities to Do Scientific Inquiry

- a. GLE 1: Generate testable questions about objects, organisms, and events that can be answered through scientific investigation (SI-M-A1).
- c. GLE 3: Use a variety of sources to answer questions (SI-M-A1).
- l. GLE 12: Use data and information gathered to develop an explanation of experimental results (SI-M-A4).
- m. GLE 13: Identify patterns in data to explain natural events (SI-M-A4).
- n. GLE 14: Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5).
- p. GLE 16: Use evidence to make inferences and predict trends (SI-M-A5).
- q. GLE 17: Recognize that there may be more than one way to interpret a given set of data, which can result in alternative scientific explanations and predictions (SI-M-A6).
- r. GLE 18: Identify faulty reasoning and statements that misinterpret or are not supported by the evidence (SI-M-A6).
- s. GLE 19: Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7).
- t. GLE 20: Write clear, step-by-step instructions that others can follow to carry out procedures or conduct investigations (SI-M-A7).

v. GLE 22: Use evidence and observations to explain and communicate the results of investigations (SI-M-A7).

2. Understanding Scientific Inquiry

a. GLE 25: Compare and critique scientific investigations (SI-M-B1).

c. GLE 27: Recognize that science uses processes that involve a logical and empirical, but flexible, approach to problem solving (SI-M-B1).

f. GLE 30: Describe why all questions cannot be answered with present technologies (SI-M-B3).

j. GLE 34: Recognize the importance of communication among scientists about investigations in progress and the work of others (SI-M-B5).

k. GLE 35: Explain how skepticism about accepted scientific explanations (i.e., hypotheses and theories) leads to new understanding (SI-M-B5).

l. GLE 36: Explain why an experiment must be verified through multiple investigations and yield consistent results before the findings are accepted (SI-M-B5).

m. GLE 37: Critique and analyze their own inquiries and the inquiries of others (SI-M-B5).

n. GLE 38: Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas (SI-M-B6).

o. GLE 39: Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA fingerprinting) (SI-M-B7).

p. GLE 40: Evaluate the impact of research on scientific thought, society, and the environment (SI-M-B7).

B. Physical Science: Strand Two

1. Properties and Changes of Properties in Matter

a. GLE 1: Measure a variety of objects in metric system units (PS-M-A1).

e. GLE 5: Describe the properties and behavior of water in its solid, liquid, and gaseous phases (states) (PS-M-A5).

2. Motions and Forces

b. GLE 8: Explain that gravity accelerates all falling objects at the same rate in the absence of air resistance (PS-M-B3).

c. GLE 9: Demonstrate a change in speed or direction of an object's motion with the use of unbalanced forces (PS-M-B5).

3. Transformations of Energy

a. GLE 10: Compare potential and kinetic energy and give examples of each (PS-M-C1).

c. GLE 12: Identify the sun as earth's primary energy source and give examples (e.g., photosynthesis, water cycle) to support that conclusion (PS-M-C3).

C. Life Science: Strand Three

2. Populations and Ecosystems

a. GLE 22: Develop and use a simple dichotomous key to classify common plants and animals (LS-M-C1).

3. Adaptations of Organisms

a. GLE 29: Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1).

D. Earth and Space Science: Strand Four

1. Structure of the Earth

f. GLE 35: Identify the atmosphere as a mixture of gases, water vapor, and particulate matter (ESS-M-A11).

2. Earth History

a. GLE 38: Estimate the range of time over which natural events occur (e.g., lightning in seconds, mountain formation over millions of years) (ESS-M-B3).

3. Earth in the Solar System

a. GLE 39: Identify the physical characteristics of the sun (ESS-M-C1).

d. GLE 42: Differentiate among moons, asteroids, comets, meteoroids, meteors, and meteorites (ESS-M-C2).

e. GLE 43: Describe the characteristics of the inner and outer planets (ESS-M-C2).

g. GLE 45: Identify earth's position in the solar system (ESS-M-C5).

i. GLE 47: Identify and explain advances in technology that have enabled the exploration of space (ESS-M-C8).

§1915. Middle School: Grades 5-8

A. Science as Inquiry: Strand One

1. The Abilities Necessary to Do Scientific Inquiry

a. GLE 1: Generate testable questions about objects, organisms, and events that can be answered through scientific investigation (SI-M-A1).

b. GLE 2: Identify problems, factors, and questions that must be considered in a scientific investigation (SI-M-A1).

c. GLE 3: Use a variety of sources to answer questions (SI-M-A1).

m. GLE 13: Identify patterns in data to explain natural events (SI-M-A4).

r. GLE 18: Identify faulty reasoning and statements that misinterpret or are not supported by the evidence (SI-M-A6).

2. Understanding Scientific Inquiry

c. GLE 27: Recognize that science uses processes that involve a logical and empirical, but flexible, approach to problem solving (SI-M-B1).

d. GLE 28: Recognize that investigations generally begin with a review of the work of others (SI-M-B2).

e. GLE 29: Explain how technology can expand the senses and contribute to the increase and/or modification of scientific knowledge (SI-M-B3).

f. GLE 30: Describe why all questions cannot be answered with present technologies (SI-M-B3).

- j. GLE 34: Recognize the importance of communication among scientists about investigations in progress and the work of others (SI-M-B5).
- k. GLE 35: Explain how skepticism about accepted scientific explanations (i.e., hypotheses and theories) leads to new understanding (SI-M-B5).
- l. GLE 36: Explain why an experiment must be verified through multiple investigations and yield consistent results before the findings are accepted (SI-M-B5).
- m. GLE 37: Critique and analyze their own inquiries and the inquiries of others (SI-M-B5).
- n. GLE 38: Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas (SI-M-B6).
- p. GLE 40: Evaluate the impact of research on scientific thought, society, and the environment (SI-M-B7).

§1917. Grade 5

A. Physical Science: Strand Two

1. Properties and Changes of Properties in Matter

a. GLE 1: Measure a variety of objects in metric system units (PS-M-A1).

2. Motions and Forces

a. GLE 7: Compare, calculate, and graph the average speeds of objects in motion using both metric system and U.S. system units (PS-M-B1).

b. GLE 8: Explain that gravity accelerates all falling objects at the same rate in the absence of air resistance (PS-M-B3).

c. GLE 9: Demonstrate a change in speed or direction of an object's motion with the use of unbalanced forces (PS-M-B5).

3. Transformations of Energy

a. GLE 10: Compare potential and kinetic energy and give examples of each (PS-M-C1).

c. GLE 12: Identify the sun as earth's primary energy source and give examples (e.g., photosynthesis, water cycle) to support that conclusion (PS-M-C3).

B. Life Science: Strand Three

1. Structure and Function in Living Systems

a. GLE 15: Identify the cell as the basic unit of living things (LS-M-A1).

2. Populations and Ecosystems

a. GLE 22: Develop and use a simple dichotomous key to classify common plants and animals (LS-M-C1).

3. Adaptations of Organisms

a. GLE 29: Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1).

C. Earth and Space Science: Strand Four

3. Earth in the Solar System

a. GLE 39: Identify the physical characteristics of the sun (ESS-M-C1).

c. GLE 41: Explain why the moon, sun, and stars appear to move from east to west across the sky (ESS-M-C1).

d. GLE 42: Differentiate among moons, asteroids, comets, meteoroids, meteors, and meteorites (ESS-M-C2).

g. GLE 45: Identify earth's position in the solar system (ESS-M-C5).

i. GLE 47: Identify and explain advances in technology that have enabled the exploration of space (ESS-M-C8).

§1919. Grade 6

A. Physical Science: Strand Two

2. Motions and Forces

f. GLE 19: Identify forces acting on all objects (PS-M-B3).

h. GLE 21: Determine the magnitude and direction of unbalanced (i.e., net) forces acting on an object (PS-M-B4).

i. GLE 22: Demonstrate that an object will remain at rest or move at a constant speed and in a straight line if it is not subjected to an unbalanced force (PS-M-B5) (PS-M-B3).

j. GLE 23: Predict the direction of a force applied to an object and how it will change the speed and direction of the object (PS-M-B5).

3. Transformations of Energy

a. GLE 24: Describe and give examples of how all forms of energy may be classified as potential or kinetic energy (PS-M-C1).

c. GLE 26: Describe and summarize observations of the transmission, reflection, and absorption of sound, light, and heat energy (PS-M-C1).

e. GLE 28: Explain the law of conservation of energy (PS-M-C2).

i. GLE 32: Identify and illustrate key characteristics of waves (e.g., wavelength, frequency, amplitude) (PS-M-C4).

j. GLE 33: Predict the direction in which light will refract when it passes from one transparent material to another (e.g., from air to water, from prism to air) (PS-M-C4).

k. GLE 34: Apply the law of reflection and law of refraction to demonstrate everyday phenomena (e.g., how light is reflected from tinted windows, how light is refracted by cameras, telescopes, eyeglasses) (PS-M-C4).

l. GLE 35: Determine through experimentation whether light is reflected, transmitted, and/or absorbed by a given object or material (PS-M-C4).

m. GLE 36: Explain the relationship between an object's color and the wavelength of light reflected or transmitted to the viewer's eyes (PS-M-C4).

§1921. Grade 7

B. Life Science: Strand Three

3. Populations and Ecosystems

a. GLE 23: Classify organisms based on structural characteristics, using a dichotomous key (LS-M-C1).

4. Adaptations of Organisms

a. GLE 30: Differentiate between structural and behavioral adaptations in a variety of organisms (LS-M-D1).

§1923. Grade 8

A. Physical Science: Strand Two

2. Motions and Forces

- b. GLE 5: Define gravity and describe the relationship among the force of gravity, the mass of objects, and the distance between objects (PS-M-B2).
- c. GLE 6: Predict how the gravitational attraction between two masses will increase or decrease when changes are made in the masses or in the distance between the objects (PS-M-B2).
- d. GLE 7: Explain the relationships among force, mass, and acceleration (PS-M-B5).

B. Earth and Space Science: Strand Four

3. Earth in the Solar System

- a. GLE 36: Describe the life cycle of a star and predict the next likely stage of the sun (ESS-M-C1).
- c. GLE 38: Use data to compare the planets in terms of orbit, size, composition, density, rotation, revolution, and atmosphere (ESS-M-C2).
- d. GLE 39: Relate Newton's laws of gravity to the motions of celestial bodies and objects on earth (ESS-M-C3).
- m. GLE 48: Communicate ways that information from space exploration and technological research have advanced understanding about earth, the solar system, and the universe (ESS-M-C8).
- n. GLE 49: Identify practical applications of technological advances resulting from space exploration and scientific and technological research (ESS-M-C8).

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