

## Alignment with New Jersey'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

### K-12 Broad Goals of Science Education

1. Students will use inquiry strategies to investigate and understand the natural world.
2. Students will demonstrate an understanding of key concepts and principles central to the biological, physical, and earth sciences, and engineering, while recognizing the interrelationship of all the sciences.
3. Students will demonstrate an understanding of the basic laws which govern and explain phenomena observed in the natural world
4. Students will demonstrate an understanding of, and be able to practice, the basic processes which scientists use to obtain and continually revise knowledge about the natural world.
5. Students will perceive that scientific and technological knowledge is the result of the cumulative efforts of people, past and present, who have attempted to explain the world through an objective, peer-tested, rational approach to understanding natural phenomena and occurrences.
6. Students will display a sense of curiosity and wonder about the natural world, and demonstrate an increasing awareness of the interdependence between all living things and the environment.
7. Students will demonstrate their abilities to identify human needs and concerns and to engage in problem-solving processes to define the problem, research and generate solutions, and develop simulations and prototypes to test their ideas before implementation.
8. Students will be able to apply rational, creative-thinking, and investigative skills and use scientific and technical knowledge in their roles as citizens, workers, family members, and consumers in an increasingly technological society.

9. Students will use oral and written communication, mathematical representation, and physical and conceptual models to describe and explain scientific concepts and ideas, and will be able to apply scientific and technical knowledge.

10.

## Science Process Skills

### SPS1– Scientific Inquiry and Critical Thinking Skills (INQ)

#### MAKING OBSERVATIONS AND ASKING QUESTIONS

##### Grade 4

S:SPS1:4:1.7 Ask questions about objects, organisms and events in their local environment.

S:SPS1:4:1.8 Pose questions to investigate and practical problems to solve.

##### Grade 6

S:SPS1:6:1.8 Ask questions about relationships between and among observations.

S:SPS1:6:1.10 Distinguish between those questions that can be answered by science and those that cannot.

##### Grade 8

S:SPS1:8:1.6 Rephrase questions so that they can be tested or investigated using scientific methodologies.

#### EVALUATING SCIENTIFIC EXPLANATIONS

##### Grade 4

S:SPS1:4:5.1 Cite evidence or data to support conclusions.

S:SPS1:4:5.2 Determine if an observation or measurement supports a given scientific explanation.

##### Grade 6

S:SPS1:6:5.2 Explain how a hypothesis is a direct extension of a scientific idea and therefore makes that idea “testable.”

### SPS2– Unifying Concepts of Science

#### NATURE OF SCIENCE (NOS)

##### Grade 4

S:SPS2:4:1.1 Recognize that sometimes scientists have different explanations for the same set of observations which usually lead them to make more observations to resolve the differences.

S:SPS2:4:1.2 Realize that results of similar scientific investigations seldom turn out exactly the same, but if the differences are large it’s important to try to figure out why.

##### Grade 6

S:SPS2:6:1.1 Explain that scientists do not pay much attention to claims about how something works unless they are backed up with evidence that can be confirmed with a logical argument.

##### Grade 8

S:SPS2:8:1.1 Describe how scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.

S:SPS2:8:1.3 Realize that knowledge, based on science, is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.

S:SPS2:8:1.4 Provide examples that show how some scientific knowledge is very old and yet is still applicable today.

### **SPS3– Personal, Social, and Technological Perspectives**

#### COLLABORATION IN SCIENTIFIC ENDEAVORS

##### Grade 4

S:SPS3:4:1.1 Be able to complete an assigned task when given a specific role in a group.

S:SPS3:4:1.2 Communicate ideas to others.

S:SPS3:4:1.3 Give specific feedback about work of others.

##### Grade 6

S:SPS3:6:1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities.

S:SPS3:6:1.2 Work collectively within a group toward a common goal.

S:SPS3:6:1.3 Demonstrate respect of one another's abilities and contributions to the group.

##### Grade 8

S:SPS3:8:1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities.

S:SPS3:8:1.2 Work collectively within a group toward a common goal.

S:SPS3:8:1.3 Demonstrate respect of one another's abilities and contributions to the group.

S:SPS3:8:1.4 Demonstrate an understanding of the ethics involved in scientific inquiry.

#### SCIENCE AND TECHNOLOGY, TECHNOLOGICAL DESIGN AND APPLICATION

##### Grade 4

S:SPS3:4:3.1 Describe the design process as a logical progression for transforming ideas into reality.

S:SPS3:4:3.2 Describe how people have designed and used tools throughout history; and provide examples of how many of these tools, while improved, are still in use today.

S:SPS3:4:3.3 Provide examples illustrating that throughout history, people of all ages and from all walks of life have made significant contributions to the fields of science and technology.

### **SPS4– Science Skills for Information, Communication and Media Literacy**

#### CRITICAL THINKING AND SYSTEMS THINKING

##### Grade 8

S:SPS4:8:3.1 Execute steps of scientific inquiry to engage in the problem-solving and decision making processes.

S:SPS4:8:3.2 Apply new and unusual applications of existing knowledge to new and different situations.

#### PROBLEM IDENTIFICATION, FORMULATION, AND SOLUTION

##### Grade 4

S:SPS4:4:4.1 Ask questions and plan investigations to find answers.

S:SPS4:4:4.3 Use evidence to construct explanations.

## Earth Space Science

**ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.**

### ATMOSPHERE, CLIMATE, AND WEATHER

Grade 4

S:ESS1:4:1.1 Explain how water exists in the atmosphere in different forms and describe how it changes from one form to another through various processes such as freezing, condensation, precipitation and evaporation.

S:ESS1:4:1.2 Explain that air surrounds the Earth, it takes up space, and it moves around as wind.

Grade 6

S:ESS1:6:1.3 Explain the composition and structure of the Earth's atmosphere.

### WATER

Grade 4

S:ESS1:4:7.1 Recognize and describe the Earth's surface as mostly covered by water.

Grade 6

S:ESS1:6:7.1 Explain the properties that make water an essential component of the Earth's system, including solvency and its ability to maintain a liquid state at most temperatures.

**ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.**

### EARTH, SUN, AND MOON

Grade 4

S:ESS2:4:1.2 Describe the Sun as a star.

Grade 6

S:ESS2:6:1.2 Recognize that of all the known planets, Earth appears to be somewhat unique; and describe the conditions that exist on Earth that allow it to support life.

Grade 8

S:ESS2:8:1.1 Identify the characteristics of the Sun and its position in the universe.

### ENERGY

Grade 4

S:ESS2:4:2.1 Recognize that the Sun provides the light and heat necessary to maintain the temperature of the Earth.

Grade 8

S:ESS2:8:2.1 Describe the Sun as the principle energy source for phenomena on the Earth's surface.

## SOLAR SYSTEM

### Grade 4

S:ESS2:4:3.1 Recognize that the Moon orbits the Earth.

S:ESS2:4:3.2 Recognize that the Earth is one of a number of planets that orbit the Sun.

### Grade 8

S:ESS2:8:3.1 Identify the characteristics and movement patterns of the planets in our Solar System and differentiate between them.

S:ESS2:8:3.2 Explain the effects of gravitational force on the planets and their moons.

S:ESS2:8:3.3 Explain why Earth and our Solar System appear to be somewhat unique, while acknowledging recent evidence that suggests similar systems exist in the universe.

S:ESS2:8:3.5 Explain how gravitational force affects objects in the Solar System (e.g., moons, tides, orbits, satellites).

## VIEW FROM EARTH

### Grade 4

S:ESS2:4:4.1 Recognize that although star patterns seen in the sky appear to move slowly each night from east to west they actually remain the same, and explain why different stars can be seen during different seasons.

S:ESS2:4:4.2 Explain why the planets look like stars, and why, over a period of time, they appear to wander among the constellations.

### Grade 6

S:ESS2:6:4.1 Explain the historical perspective of planetary exploration and man's achievements in space, beginning with Russia's Sputnik mission in 1957.

### Grade 8

S:ESS2:8:4.1 Explain how technological advances have allowed scientists to re-evaluate or extend existing ideas about the Solar System.

**ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.**

## SIZE AND SCALE

### Grade 4

S:ESS3:4:1.1 Recognize that astronomical objects in space are massive in size and are separated from one another by vast distances.

S:ESS3:4:1.2 Explain that telescopes magnify the size of distant objects and significantly increase the number of these objects that can be viewed from Earth.

### Grade 8

S:ESS3:8:1.1 Define an astronomical unit as the distance from the Earth to the Sun.

S:ESS3:8:1.2 Explain that special units of measure, such as light years and astronomical units, are used to calculate distances in space.

## STARS AND GALAXIES

### Grade 4

S:ESS3:4:2.1 Recognize and describe the stars, like the Sun, as spherical in nature.

S:ESS3:4:2.2 Recognize that stars come in different colors, and that the Sun is a yellow star.

S:ESS4:8:1.1 Describe ways in which technology has increased our understanding of the world in which we live.

Grade 8

S:ESS3:8:2.1 Describe objects such as asteroids, comets and meteors in terms of their characteristics and movement patterns.

## UNIVERSE

Grade 8

S:ESS3:8:3.1 Describe the universe as being comprised of billions of galaxies, each containing many billions of stars; and explain that there are vast distances separating these galaxies and stars from one another and from the Earth.

**ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.**

## DESIGN TECHNOLOGY

Grade 6

S:ESS4:6:1.1 Understand that technology is used to design tools that improve our ability to measure and observe the world.

Grade 8

S:ESS4:8:1.2 Recognize the importance of technology as it relates to science, for purposes such as: access to space and other remote locations, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.

## TOOLS

Grade 6

S:ESS4:6:2.1 Recognize that satellites and Doppler radar can be used to observe or predict the weather.

Grade 8

S:ESS4:8:2.3 Describe how man uses land-based light telescopes, radio telescopes, satellites, manned exploration, probes and robots to collect data.

## CAREER TECHNICAL EDUCATION CONNECTIONS

Grade 4

S:ESS4:4:4.1 Identify some jobs/careers that require knowledge and use of Earth science content and/or skills.

Grade 6

S:ESS4:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of Earth science.

Grade 8

S:ESS4:8:4.1 Understand that some scientific jobs/careers involve the application of Earth Space science content knowledge and experience in specific ways that meet the goals of the job.

## LIFE SCIENCE

**LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).**

### CLASSIFICATION

Grade 4

S:LS1:4:1.1 Recognize and identify the various ways in which living things can be grouped

S:LS1:4:1.2 Sort/classify different living things using similar and different characteristics; and describe why organisms belong to each group or cite evidence about how they are alike or not alike.

### LIVING THINGS AND ORGANIZATION

Grade 4

S:LS1:4:2.4 Identify the basic needs of plants and animals in order to stay alive (i.e., water, air, food, space).

### REPRODUCTION

Grade 6

S:LS1:6:3.3 Explain that all living things reproduce in order to continue their species.

Grade 8

S:LS1:8:3.3 Explain that in sexual reproduction, a single specialized cell from a female merges with a specialized cell from a male in a process called fertilization.

**LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).**

### NATURAL SELECTION

Grade 4

S:LS3:4:3.2 Recognize that for any particular environment, some kinds of animals and plants survive well, some less well, and some cannot survive at all.

Grade 8

S:LS3:8:3.2 Recognize that in any given environment the growth and survival of organisms depend on the physical conditions that exist; and explain that in all environments, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter.

## Physical Science

**PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).**

### COMPOSITION

Grade 4

S:PS1:4:1.1 Explain that materials may be composed of parts that are too small to be seen without magnification.

Grade 6

S:PS1:6:1.1 Recognize that all matter is composed of minute particles called atoms; and explain that all substances are composed of atoms, each arranged into different groupings.

## PROPERTIES

Grade 6

S:PS1:6:2.3 Differentiate between weight and mass.

Grade 8

S:PS1:8:2.1 Differentiate between volume and mass and define density.

S:PS1:8:2.2 Explain how different substances of equal volume usually have different weights.

**PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.**

## CHANGE

Grade 4

S:PS2:4:1.1 Recognize that energy has the ability to create change.

## CONSERVATION

Grade 6

S:PS2:6:2.1 Describe how mass remains constant in a closed system and provide examples relating to both physical and chemical change.

Grade 8

S:PS2:8:2.1 Explain the law of conservation of energy.

## ENERGY

Grade 4

S:PS2:4:3.1 Identify the various forms of energy, such as electrical, light, heat, sound.

S:PS2:4:3.5 Explain that light travels in a straight line until it strikes an object; and describe how it can be reflected by a mirror, bent by a lens, or absorbed by the object.

Grade 6

S:PS2:6:3.1 Explain that the pitch of a sound is dependent on the frequency of the vibration producing it.

S:PS2:6:3.2 Explain that sound vibrations move at different speeds, have different wavelengths; and establish wave-like disturbances that emanate from the source.

Grade 8

S:PS2:8:3.1 Differentiate between kinetic energy, which is the energy of motion and potential energy, which depends on relative position.

S:PS2:8:3.2 Recognize the Sun is a major energy source for the Earth, and describes how it affects the planet's surface.

S:PS2:8:3.3 Describe ways light can interact with matter, such as transmission (which includes refraction), absorption, and scattering (which includes reflection).

S:PS2:8:3.4 Explain that the human eye can only detect wavelengths of electromagnetic radiation within a narrow range; and explain that the differences of wavelength within that range of visible light are perceived as differences in color.

### **PS3– The motion of an object is affected by force.**

#### **FORCES**

##### Grade 4

S:PS3:4:1.2 Recognize that magnets attract and repel each other.

S:PS3:4:1.4 Recognize that the Earth's gravitational force pulls any object toward it.

##### Grade 6

S:PS3:6:1.2 Explain that when a force is applied to an object, it reacts in one of three ways: the object either speeds up, slows down, or goes in a different direction.

S:PS3:6:1.3 Describe the relationship between the strength of a force on an object and the resulting effect, such as the greater the force, the greater the change in motion.

##### Grade 8

S:PS3:8:1.1 Explain that the force of gravity gets stronger the closer one gets to an object and decreases the further away one gets from it.

S:PS3:8:1.2 Recognize the general concepts related to gravitational force.

#### **MOTION**

##### Grade 6

S:PS3:6:2.1 Explain the how balanced and unbalanced forces are related to an object's motion.

S:PS3:6:2.2 Explain that an object's motion can be tracked and measured over time and that the data can be used to describe its position.

##### Grade 8

S:PS3:8:2.1 Explain that an object in motion that is unaffected by a force will continue to move at a constant speed and in a straight line.

S:PS3:8:2.2 Explain how the motion of an object can be described by its position, direction of motion, and speed; and illustrate how that motion can be measured and represented graphically.

### **PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.**

#### **CAREER TECHNICAL EDUCATION CONNECTIONS**

##### Grade 4

S:PS4:4:4.1 Identify some jobs/careers that require knowledge and use of physical science content and/or skills.

##### Grade 6

S:PS4:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of physical science.

Grade 8

S:PS4:8:4.1 Understand that some scientific jobs/careers involve the application of physical science content knowledge and experience in specific ways that meet the goals of the job.

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