



Cogno Board Games' Alignment with the National Aeronautics and Space Administration Science Standards

NASA's mission is to pioneer the future in space exploration, scientific discovery and aeronautics research. To do that, thousands of people have been working around the world -- and off of it -- for almost 50 years, trying to answer some basic questions. What's out there in space? How do we get there? What will we find? What can we learn there, or learn just by trying to get there, that will make life better here on Earth?

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

I. SCIENCE AS INQUIRY

Activity based learning that is multifaceted and multi-sensory. The process of learning is encouraged and guided by questions that engage interest, require the observation and manipulation of objects, and assessments that encourage creativity of thought and diversity of results.

II. TECHNOLOGY CONNECTIONS

The use of tools which promote the understanding of natural phenomenon: Instruments which enhance and extend the senses and robotic explorers which journey, record and report from vast distances where humans cannot go. Scientists use computing devices which enhance the interpretation and dissemination of conclusions by assisting and complimenting human intellect.

III. PERSONAL/SOCIAL CONNECTIONS

Developmentally appropriate materials that are interesting and relevant to student's lives. The process includes inquiry into authentic questions generated from student experiences and concludes with learner ownership of the concepts and processes. (Personal/Community Health,

Population, Natural Resources, Environmental Quality, Personal Effects of Science/ Technology.)

IV. NATURE & HISTORY OF SCIENCE

Recognition of the natural world as the source of scientific information and awareness of the collaborative and cumulative nature of scientific investigation. Scientists observe and investigate the natural world, work in teams, and employ the recorded observations of previous investigators.

V. UNIFYING CONCEPTS & PROCESSES

Conceptual and procedural schemes that unify scientific ideas. Through the use of models and ordering systems, the form and function of a scientific concept is made visible, multi-dimensional, and relational.

TOPICS

Sky: Atmospheric Processes

- Weather has measurable quantities such as temperature, wind and precipitation (K-4)
- Atmospheres are mixtures of gases and vapor (5-8)
- Clouds form by condensation (5-8)
- Heating causes convection in atmospheres (9-12)

Planetary Objects: Composition and Structure

- Planetary materials are solid rock, soil and ice (K-4)
- Planetary objects have layers (5-8)
- Rock layers may form plates that can move (5-8)
- Landforms result from constructive and destructive forces (5-8)
- Planetary objects have internal and external sources of energy (9-12)

Apparent Motion: Earth/Sun, Moon, Planets, Seasons

- Objects in the sky as seen from Earth appear to move in similar ways every day (K-4)
- The sun is clearly the largest object in the sky but is a star like nighttime points of light (5-8)
- The universe appears to be expanding away from Earth (9-12)

Patterns: Sun, Moon, Planets, Stars, Seasons

- Motions of Sun, Moon, Planetary objects, and Stars can be observed and patterns noted (K-4)
- Patterns of rock layers help estimate geologic time (9-12)
- Patterns of radioactive decay help estimate geologic time (9-12)
- Patterns of atmospheric currents are influenced by angle of the Sun's rays. (9-12)
- Data from radiation measurements and observation of galaxies shows the patterns of galaxies and movement

Size, Scale, Properties: Planetary object, Stars

- Objects in the sky have properties (color, texture, features, brightness) that can be observed and described (K-4)
- Sun and Moon appear to be the largest objects in the sky because they are nearby (K-4)
- Relative sizes of the Sun and planetary objects including small bodies (comets, asteroids, moons) can be calculated and modeled (5-8)

- Relative distances of the Sun of planetary objects including small bodies (comets, asteroids, moons) can be calculated and modeled (5-8)
- The size of the orbits of all solar objects can be calculated and modeled (5-8)
- Objects in the solar system differ in composition including rocky and gaseous materials (5-8)
- The Sun is an average star (5-8)
- Gravity is the force that keeps the objects of the solar system in orbits (5-8)
- Many objects in the solar system are in dynamic change (9-12)
- The "big bang" theory places the origin of the universe between 10 and 20 billion years ago. (9-12)
- Galaxies contain billions of stars. The universe contains billions of galaxies (9-12)

Stars: Physics, Chemical Elements, Groups, Origin

- Stars have locations and appear to move together (K-4)
- The sun is a star (K-4)
- The sun is an average star (5-8)
- The Sun is a major source of energy for the solar system (5-8)
- The Sun formed from a nebular cloud of dust and gas 4.6 billion years ago (9-12)
- Light atoms, hydrogen and helium, clumped together in the early universe by gravitational attraction to form stars. (9-12)
- Clusters of billions of stars, which are gravitationally bound together in galaxies, form most of the visible mass of the universe (9-12)
- Stars produce energy from nuclear reactions (9-12)

Ideas: Origin of Universe, Destiny

- The Sun appears to move across the sky in the same way every day (K-4)
- Gravity governs motions in the universe (5-8)
- The solar system is 4.6 billion years old. The universe is 10-20 billion years old (9-12)
- Early Earth was very different from the planet we live on today (9-12)
- The origin of the universe remains one of the greatest questions in science. (9-12)
- The "big bang" theory says the universe began in a hot dense state. (9-12)
- The "big bang" theory says the universe has been expanding since the beginning (9-12)

Actual Motion: Planetary objects, Small bodies, Gravity

- Position of an object can be described (K-4)
- An object's motion can be described (K-4)
- Change in motion is caused by pushing or pulling (K-4)
- Light travels in a straight line (K-4)
- Motion can be described from an object's position and direction and speed (5-8)
- Objects in the solar system are in regular and predictable motion (5-8)
- Gravity is the force that keeps objects in orbits around the sun and the rest of the motion in the solar system. (5-8)
- Laws of motion can be calculated precisely by knowing the effects of forces on objects (9-12)
- Objects in the universe are in motion and have been since the "big bang" (9-12)

Forces & Motion: Push/Pull, Speed, Acceleration:

- Pushes and pulls can have different strengths (K-4)
- Pushes and pulls cause motion and changes in motion (K-4)
- An object in motion, not subjected to a force will continue to move at a constant speed in a straight line (5-8)
- Many forces can act on an object causing changes in motion (5-8)

- Objects in the solar system are in regular and predictable motion (5-8)
- Gravity is the force that keeps objects in orbits around the sun and the rest of the motion in the solar system. (5-8)
- Gravitation is a universal force that each mass exerts on any other mass and can be calculated (9-12)

Matter: Forms, Nature of, Properties

- Properties can be measured using tools such as rulers, balances and thermometers
- Objects can be sorted by their properties (K-4)
- Materials can exist in different states; solid, liquid and gas. (K-4)
- The atom's nucleus is composed of protons and neutrons. (9-12)
- Atoms interact with one another by transferring or sharing electrons. (9-12)
- Chemical reactions can release or consume energy. (9-12)
- Light can initiate many chemical reactions such as photosynthesis. (9-12)

Energy: Forms, Nature, Properties

- Light travels in straight lines until it is reflected, refracted or absorbed. (K-4)
- Heat can produced in many ways. (K-4)
- Magnets attract and repel each other and other materials. (K-4)
- Energy is a property of many substances. (5-8)
- Energy is transferred in many ways (5-8)
- In most chemical and nuclear reactions, energy is transferred (5-8)
- The sun is a major source of energy for Earth. (5-8)
- Waves can transfer energy such as sound, seismic and light. (9-12)

Life Is: Origins, Organisms, Detection:

- All animals depend of plants (K-4)
- Organisms cause changes in the environment where they live. (K-4)
- Humans and organisms have senses to help detect internal and external cues (K-4)
- Organisms' behavior changes through adaptation to its environment. (5-8)
- Diversity of organisms is a result of 3.5 billion years of evolution (9-12)
- Organisms require a constant input of energy to maintain chemical and physical organizations. (9-12)
- Organisms are complex systems for obtaining, transforming, transporting, releasing and eliminating matter and energy to sustain life. (9-12)

Unit of Life: Cell Parts, Cell Tasks, Communication in Cells

- All organisms are composed of cells (5-8)
- Plants have chloroplasts that conduct photosynthesis (9-12)

Life Needs: Energy, Environment, Nutrition

- Organisms have basic needs (air, water, food, light (plants)) (K-4)
- All organism cause changes in their environment (K-4)
- Humans depend on natural and constructed environments (K-4)
- Patterns of behavior are related to the organism's environment. (K-4)
- All organisms must be able to obtain and use resources (5-8)
- Regulation involves sensing the internal environment (5-8)
- Organisms' behavior evolves through adaptation to its environment (5-8)
- The major source of energy of an ecosystem is sunlight. (5-8)
- Extinction happens when adaptive characteristics are insufficient for survival (5-8)
- Organisms both cooperate and compete (9-12)

- The energy for life primarily derives from the sun. (9-12)

Life Grouping: Structure, Function, Diversity

- Different species may look different but common ancestry shows similarity of internal structure and chemical processes (5-8)
- Diversity develops through gradual processes over many generations (5-8)
- Biological classifications are based on how organisms are related (9-12)

New Life: Reproduction, Heredity, Change

- Heredity information is contained in genes. (5-8)
- Changes in DNA (mutations) occur spontaneously at low rates. (9-12)
- Species evolve over time (9-12)

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