

Hands On! Discovery Center
List of Curriculum Standards Met

Organized by Grade Level and Standard. Exhibits that meet each standard are listed in red.

KINDERGARTEN: ACADEMIC STANDARDS

K.PS1: Matter and Its Interactions

1) Plan and conduct an investigation to describe and classify different kinds of materials including wood, plastic, metal, cloth, and paper by their observable properties (color, texture, hardness, and flexibility) and whether they are natural or human-made.

Make It. Take It.
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground
Art Studio

2) Conduct investigations to understand that matter can exist in different states (solid and liquid) and has properties that can be observed and tested.

Tesla Experience
Air Cars
Air Rockets
Bernoulli Table
Ring Launcher
Sail Cars
Vertical Flyer

3) Construct an evidence-based account of how an object made of a small set of pieces (blocks, snap cubes) can be disassembled and made into a new object.

Air Cars
Air Rockets
Circuit Bench
Make It. Take It.
Ring Launcher
Sail Cars
Shake Table
Keva Planks
Rigamajig
Imagination Playground

K.LS1: From Molecules to Organisms: Structures and Processes

1) Use information from observations to identify differences between plants and animals (locomotion, obtainment of food, and take in air/gasses).

Miocene Exhibit Hall
Wentzscope
Saltville Paleontology Hall

2) Recognize differences between living organisms and non-living materials and sort them into groups by observable physical attributes.

Miocene Exhibit Hall
Wentzscope
Saltville Paleontology Hall

3) Explain how humans use their five senses in making scientific findings.

Pin Wall

Make It. Take It.
PVC Pipe Organ
Quantum Space
Sail Cars
Shake Table
Infinity Mirror
Art Studio

K.LS3.1: Heredity: Inheritance and Variation of Traits

1) Make observations to describe that young plants and animals resemble their parents.

Miocene Exhibit Hall
Saltville Paleontology Hall

K.ESS2: Earth's Systems

1) Analyze and interpret weather data (precipitation, wind, temperature, cloud cover) to describe weather patterns that occur over time (hourly, daily) using simple graphs, pictorial weather symbols, and tools (thermometer, rain gauge).

Miocene Exhibit Hall
Topobox
Tornado Vortex

2) Develop and use models to predict weather and identify patterns in spring, summer, autumn, and winter.

Topobox
Tornado Vortex

K.ESS3: Earth and Human Activity

1) Use a model to represent the relationship between the basic needs (shelter, food, water) of different plants and animals (including humans) and the places they live.

Miocene Exhibit Hall

2) Explain the purpose of weather forecasting to prepare for, and respond to, severe weather in Tennessee.

Topobox
Shake Table

3) Communicate solutions that will reduce the impact from humans on land, water, air, and other living things in the local environment.

Sail Cars
Topobox
Shake Table

K.ETS1: Engineering Design

1) Ask and answer questions about the scientific world and gather information using the senses.

Tesla Experience
Miocene Exhibit Hall
Saltville Paleontology Hall
Pin Wall
Topobox
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ

Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Tornado Vortex
Keva Planks
Rigamajig
Imagination Playground

2) Describe objects accurately by drawing and/or labeling pictures.

K.ETS2: Links Among Engineering, Technology, Science, and Society

1) Use appropriate tools (magnifying glass, rain gauge, basic balance scale) to make observations and answer testable scientific questions.

Tesla Experience
Miocene Exhibit Hall
Wentzscope
Pin Wall
Topobox
Air Cars
Air Rockets
Saltville Paleontology Hall
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Tornado Vortex
Keva Planks
Rigamajig
Imagination Playground
Art Studio

FIRST GRADE: ACADEMIC STANDARDS

1.PS3: Energy

1) Make observations to determine how sunlight warms Earth's surfaces (sand, soil, rocks, and water).

Miocene Exhibit Hall
Topobox

1.PS4: Waves and Their Application in Technologies for Information Transfer

1) Use a model to describe how light is required to make objects visible. Summarize how illumination could be from an external light source or by an object giving off its own light.

Tesla Experience

Quantum Space
Colorful Shadows
Everbright
Infinity Mirror
Art Studio

2) Determine the effect of placing objects made with different materials (transparent, translucent, opaque, and reflective) in the path of a beam of light.

Tesla Experience
Quantum Space
Colorful Shadows
Everbright
Infinity Mirror
Art Studio

1.LS1: From Molecules to Organisms: Structures and Processes

- 1) Recognize the structure of plants (roots, stems, leaves, flowers, fruits) and describe the function of the parts (taking in water and air, producing food, and making new plants).
- 2) Illustrate and summarize the life cycle of plants.
- 3) Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways.

1.LS2: Ecosystems: Interactions, Energy, and Dynamics

- 1) Conduct an experiment to show how plants depend on air, water, minerals from soil, and light to grow and thrive.
- 2) Obtain and communicate information to classify plants by where they grow (water, land) and the plant's physical characteristics.

Miocene Exhibit Hall

- 3) Recognize how plants depend on their surroundings and other living things to meet their needs in the places they live.

Miocene Exhibit Hall
Saltville Paleontology Hall

1.ESS1: Earth's Place in the Universe

- 1) Use observations or models of the sun, moon, and stars to describe patterns that can be predicted.
- 2) Observe natural objects in the sky that can be seen from Earth with the naked eye and recognize that a telescope, used as a tool, can provide greater detail of objects in the sky.
- 3) Analyze data to predict patterns between sunrise and sunset, and the change of seasons.

Gravity Dish

1.ETS1: Engineering Design

- 1) Solve scientific problems by asking testable questions, making short-term and long-term observations, and gathering information.

Tesla Experience
Topobox
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ

Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Tornado Vortex
Keva Planks
Rigamajig
Imagination Playground

1.ETS2: Links Among Engineering, Technology, Science, and Society

1) Use appropriate tools (magnifying glass, basic balance scale) to make observations and answer testable scientific questions.

Miocene Exhibit Hall
Wentzscope
Pin Wall
Topobox
Air Cars
Air Rockets
Saltville Paleontology Hall
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Tornado Vortex
Keva Planks
Rigamajig
Imagination Playground

SECOND GRADE: ACADEMIC STANDARDS

2.PS2: Motion and Stability: Forces and Interactions

1) Analyze the push or the pull that occurs when objects collide or are connected.

Pin Wall
Air Cars
Air Rockets
Circuit Bench
Gravity Dish
Make It. Take It.
Ring Launcher
Shake Table
Vertical Flyer
Keva Planks

Rigamajig
Imagination Playground

2) Evaluate the effects of different strengths and directions of a push or a pull on the motion of an object.

Pin Wall
Air Cars
Air Rockets
Circuit Bench
Gravity Dish
Make It. Take It.
Ring Launcher
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

3) Recognize the effect of multiple pushes and pulls on an object's movement or non-movement.

Pin Wall
Air Cars
Air Rockets
Circuit Bench
Gravity Dish
Make It. Take It.
Ring Launcher
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

2.PS3: Energy

1) Demonstrate how a stronger push or pull makes things go faster and how faster speeds during a collision can cause a bigger change in the shape of the colliding objects.

Pin Wall
Air Cars
Air Rockets
Gravity Dish
Ring Launcher
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

2) Make observations and conduct experiments to provide evidence that friction produces heat and reduces or increases the motion of an object.

Air Cars
Air Rockets
Circuit Bench
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Keva Planks
Rigamajig

Imagination Playground

2.PS4: Waves and Their Applications in Technologies for Information Transfer

1) Plan and conduct investigations to demonstrate the cause and effect relationship between vibrating materials (tuning forks, water, bells) and sound.

PVC Pipe Organ

Shake Table

2) Use tools and materials to design and build a device to understand that light and sound travel in waves and can send signals over a distance.

Colorful Shadows

Everbright

PVC Pipe Organ

Quantum Space

Art Studio

3) Observe and demonstrate that waves move in regular patterns of motion by disturbing the surface of shallow and deep water.

Topobox

2.LS1: From Molecules to Organisms: Structures and Processes

1) Use evidence and observations to explain that many animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air.

Miocene Exhibit Hall

Wentzscope

Saltville Paleontology Hall

2) Obtain and communicate information to classify animals (vertebrates-mammals, birds, amphibians, reptiles, fish, invertebrates-insects) based on their physical characteristics.

Wentzscope

Miocene Exhibit Hall

Saltville Paleontology Hall

3) Use simple graphical representations to show that species have unique and diverse life cycles.

Miocene Exhibit Hall

2.LS2: Ecosystems: Interactions, Energy, and Dynamics

1) Develop and use models to compare how animals depend on their surroundings and other living things to meet their needs in the places they live.

Miocene Exhibit Hall

Saltville Paleontology Hall

2) Predict what happens to animals when the environment changes (temperature, cutting down trees, wildfires, pollution, salinity, drought, land preservation).

Miocene Exhibit Hall

Saltville Paleontology Hall

2.LS3: Heredity: Inheritance and Variation of Traits

1) Use evidence to explain that living things have physical traits inherited from parents and that variations of these traits exist in groups of similar organisms.

Miocene Exhibit Hall

Saltville Paleontology Hall

2.ESS1: Earth's Place in the Universe

1) Recognize that some of Earth's natural processes are cyclical, while others have a beginning and an end. Some events happen quickly, while others occur slowly over time.

Miocene Exhibit Hall

Topobox
Saltville Paleontology Hall
Shake Table
Tornado Vortex

2.ESS2: Earth's Systems

1) Compare the effectiveness of multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

Topobox
Tornado Vortex

2) Observe and analyze how blowing wind and flowing water can move Earth materials (soil, rocks) from one place to another, changing the shape of a landform and affecting the habitats of living things.

Miocene Exhibit Hall
Topobox
Tornado Vortex

3) Compare simple maps of different land areas to observe the shapes and kinds of land (rock, soil, sand) and water (river, stream, lake, pond).

4) Use information obtained from reliable sources to explain that water is found in the ocean, rivers, streams, lakes, and ponds, and may be solid or liquid.

2.ETS1: Engineering Design

1) Define a simple problem that can be solved through the development of a new or improved object or tool by asking questions, making observations, and gather accurate information about a situation people want to change.

Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground

2) Develop a simple sketch, drawing, or physical model that communicates solutions to others.

Air Cars
Air Rockets
Circuit Bench
Colorful Shadows
Everbright
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer

Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground

3) Recognize that to solve a problem, one may need to break the problem into parts, address each part, and then bring the parts back together

Air Cars
Air Rockets
Circuit Bench
Make It. Take It.
Sail Cars
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

4) Compare and contrast solutions to a design problem by using evidence to point out strengths and weaknesses of the design.

Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground

2.ETS2: Links Among Engineering, Technology, Science, and Society

1) Use appropriate tools to make observations, record data, and refine design ideas.

Tesla Experience
Pin Wall
Topobox
Air Cars
Air Rockets
Miocene Exhibit Hall
Saltville Paleontology Hall
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ

Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Tornado Vortex
Keva Planks
Rigamajig
Imagination Playground

2) Predict and explain how human life and the natural world would be different without current technologies.

Tesla Experience
Topobox
Air Cars
Air Rockets
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Tornado Vortex
Keva Planks
Rigamajig
Imagination Playground

THIRD GRADE: ACADEMIC STANDARDS

3.PS1: Matter and Its Interactions

1) Describe the properties of solids, liquids, and gases and identify that matter is made up of particles too small to be seen.

Tesla Experience
Topobox
Bernoulli Table
Circuit Bench

2) Differentiate between changes caused by heating or cooling that can be reversed and that cannot.

Tesla Experience
Topobox
Circuit Bench

3) Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.

Tesla Experience
Pin Wall
Topobox
Bernoulli Table
Circuit Bench
Colorful Shadows

Everbright
Make It. Take It.
Quantum Space
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground
Art Studio

3.PS2: Motion and Stability: Forces and Interactions

1) Explain the cause and effect relationship of magnets.

Tesla Experience
Circuit Bench

2) Solve a problem by applying the use of the interactions between two magnets.

3.PS3: Energy

1) Recognize that energy is present when objects move; describe the effects of energy transfer from one object to another.

Tesla Experience
Pin Wall
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Gravity Dish
Make It. Take It.
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

2) Apply scientific ideas to design, test, and refine a device that converts electrical energy to another form of energy, using open or closed simple circuits.

Circuit Bench

3) Evaluate how magnets cause changes in the motion and position of objects, even when the objects are not touching the magnet.

Tesla Experience
Circuit Bench

3.LS1: From Molecules to Organisms: Structures and Processes

1) Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction

Miocene Exhibit Hall
Wentzscope
Saltville Paleontology Hall

3.LS2: Ecosystems: Interactions, Energy, and Dynamics

1) Construct an argument to explain why some animals benefit from forming groups.

Miocene Exhibit Hall
Saltville Paleontology Hall

3.LS4: Biological Change: Unity and Diversity

1) Explain the cause and effect relationship between a naturally changing environment and an organism's ability to survive.

Miocene Exhibit Hall

Saltville Paleontology Hall

2) Infer that plant and animal adaptations help them survive in land and aquatic biomes.

Miocene Exhibit Hall

Saltville Paleontology Hall

3) Explain how changes to an environment's biodiversity influence human resources.

3.ESS1: Earth's Place in the Universe

1) Use data to categorize the planets in the solar system as inner or outer planets according to their physical properties.

3.ESS2: Earth's Systems

1) Explain the cycle of water on Earth.

Topobox

2) Associate major cloud types (cumulus, cumulonimbus, cirrus, stratus, nimbostratus) with weather conditions.

Tornado Vortex

3) Use tables, graphs, and tools to describe precipitation, temperature, and wind (direction and speed) to determine local weather and climate.

Tornado Vortex

4) Incorporate weather data to describe major climates (polar, temperate, tropical) in different regions of the world.

Topobox

3.ESS3: Earth and Human Activity

1) Explain how natural hazards (fires, landslides, earthquakes, volcanic eruptions, floods) impact humans and the environment.

Topobox

Shake Table

Tornado Vortex

2) Design solutions to reduce the impact of natural hazards (fires, landslides, earthquakes, volcanic eruptions, floods) on the environment.

Topobox

Shake Table

Tornado Vortex

3.ETS1: Engineering Design

1) Design a solution to a real-world problem that includes specified criteria for constraints.

Air Cars

Air Rockets

Circuit Bench

Colorful Shadows

Everbright

Gravity Dish

Make It. Take It.

PVC Pipe Organ

Quantum Space

Ring Launcher

Sail Cars

Shake Table

Vertical Flyer
Infinity Mirror
Tornado Vortex
Keva Planks
Rigamajig
Imagination Playground

2) Apply evidence or research to support a design solution.

3.ETS2: Links Among Engineering, Technology, Science, and Society

1) Identify and demonstrate how technology can be used for different purposes.

Tesla Experience
Pin Wall
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground

FOURTH GRADE: ACADEMIC STANDARDS

4.PS3: Energy

1) Use evidence to explain the cause and effect relationship between the speed of an object and the energy of an object.

Tesla Experience
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Gravity Dish
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

2) Observe and explain the relationship between potential energy and kinetic energy.

Tesla Experience

Air Cars
Air Rockets

Bernoulli Table
Circuit Bench
Gravity Dish
Make It. Take It.
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

3) Describe how stored energy can be converted into another form for practical use.

Tesla Experience
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Make It. Take It.
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

4.PS4: Waves and their Application in Technologies for Information Transfer

1) Use a model of a simple wave to explain regular patterns of amplitude, wavelength, and direction.

Tesla Experience
Gravity Dish
PVC Pipe Organ
Shake Table

2) Describe how the colors of available light sources and the bending of light waves determine what we see.

Tesla Experience
Colorful Shadows
Everbright
Quantum Space
Infinity Mirror

3) Investigate how lenses and digital devices like computers or cell phones use waves to enhance human senses.

Tesla Experience
Quantum Space
Infinity Mirror

4.LS2: Ecosystems: Interactions, Energy, and Dynamics

1) Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.

2) Develop models of terrestrial and aquatic food chains to describe the movement of energy among producers, herbivores, carnivores, omnivores, and decomposers.

3) Using information about the roles of organisms (producers, consumers, decomposers), evaluate how those roles in food chains are interconnected in a food web, and communicate how the organisms are continuously able to meet their needs in a stable food web.

Miocene Exhibit Hall

[Saltville Paleontology Hall](#)

4) Develop and use models to determine the effects of introducing a species to, or removing a species from, an ecosystem and how either one can damage the balance of an ecosystem.

[Miocene Exhibit Hall](#)

[Saltville Paleontology Hall](#)

5) Analyze and interpret data about changes (land characteristics, water distribution, temperature, food, and other organisms) in the environment and describe what mechanisms organisms can use to affect their ability to survive and reproduce.

[Miocene Exhibit Hall](#)

[Saltville Paleontology Hall](#)

4.LS4: Biological Change: Unity and Diversity

1) Obtain information about what a fossil is and ways a fossil can provide information about the past.

[Miocene Exhibit Hall](#)

[Saltville Paleontology Hall](#)

4.ESS1: Earth's Place in the Universe

1) Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.

[Miocene Exhibit Hall](#)

[Topobox](#)

[Shake Table](#)

[Tornado Vortex](#)

2) Use a model to explain how the orbit of the Earth and sun cause observable patterns: a. day and night; b. changes in length and direction of shadows over a day.

[Gravity Dish](#)

4.ESS2: Earth's Systems

1) Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.

[Miocene Exhibit Hall](#)

[Shake Table](#)

2) Interpret maps to determine that the location of mountain ranges, deep ocean trenches, volcanoes, and earthquakes occur in patterns.

[Shake Table](#)

3) Provide examples to support the claim that organisms affect the physical characteristics of their regions.

[Miocene Exhibit Hall](#)

[Saltville Paleontology Hall](#)

4) Analyze and interpret data on the four layers of the Earth, including thickness, composition, and physical states of these layers.

4.ESS3: Earth and Human Activity

1) Obtain and combine information to describe that energy and fuels are derived from natural resources and that some energy and fuel sources are renewable (sunlight, wind, water) and some are not (fossil fuels, minerals).

[Miocene Exhibit Hall](#)

2) Create an argument, using evidence from research, that human activity (farming, mining, building) can affect the land and ocean in positive and/or negative ways.

4.ETS1: Engineering Design

1) Categorize the effectiveness of design solutions by comparing them to specified criteria for constraints.

[Tesla Experience](#)

Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground

4.ETS2: Links Among Engineering, Technology, Science, and Society

1) Use appropriate tools and measurements to build a model.

Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground

2) Determine the effectiveness of multiple solutions to a design problem given the criteria and the constraints.

Tesla Experience
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars

Shake Table
Vertical Flyer
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground

3) Explain how engineers have improved existing technologies to increase their benefits, to decrease known risks, and to meet societal demands (artificial limbs, seatbelts, cell phones).

Tesla Experience
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Colorful Shadows
Everbright
Gravity Dish
Make It. Take It.
PVC Pipe Organ
Quantum Space
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Infinity Mirror
Keva Planks
Rigamajig
Imagination Playground

FIFTH GRADE: ACADEMIC STANDARDS

5.PS1: Matter and Its Interactions

1) Analyze and interpret data from observations and measurements of the physical properties of matter to explain phase changes between a solid, liquid, or gas.

Tesla Experience
Topobox
Bernoulli Table
Circuit Bench

2) Analyze and interpret data to show that the amount of matter is conserved even when it changes form, including transitions where matter seems to vanish.

Tesla Experience
Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Gravity Dish
Ring Launcher
Sail Cars
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

3) Design a process to measure how different variables (temperature, particle size, stirring) affect the rate of dissolving solids into liquids.

Topobox

4) Evaluate the results of an experiment to determine whether the mixing of two or more substances result in a change of properties.

5.PS2: Motion and Stability: Forces and Interactions

1) Test the effects of balanced and unbalanced forces on the speed and direction of motion of objects.

Tesla Experience

Air Cars

Air Rockets

Bernoulli Table

Circuit Bench

Gravity Dish

Make It. Take It.

Ring Launcher

Sail Cars

Shake Table

Vertical Flyer

Keva Planks

Rigamajig

Imagination Playground

2) Make observations and measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Tesla Experience

Air Cars

Air Rockets

Bernoulli Table

Circuit Bench

Gravity Dish

Quantum Space

Ring Launcher

Sail Cars

Shake Table

Vertical Flyer

Keva Planks

Rigamajig

Imagination Playground

3) Use evidence to support that the gravitational force exerted by Earth on objects is directed toward the Earth's center.

Gravity Dish

4) Explain the cause and effect relationship of two factors (mass and distance) that affect gravity.

Air Cars

Air Rockets

Bernoulli Table

Circuit Bench

Gravity Dish

Ring Launcher

Sail Cars

Vertical Flyer

Keva Planks

Rigamajig

Imagination Playground

5) Explain how forces can create patterns within a system (moving in one direction, shifting back and forth, or moving in cycles), and describe conditions that affect how fast or slowly these patterns occur.

Tesla Experience
Air Cars
Air Rockets
Gravity Dish
Circuit Bench
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

5.LS1: From Molecules to Organisms: Structures and Processes

1) Compare and contrast animal responses that are instinctual versus those that are gathered through the senses, processed, and stored as memories to guide their actions.

5.LS3: Heredity: Inheritance and Variation of Traits

1) Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment. Apply this concept by giving examples of characteristics of living organisms that are influenced by both inheritance and the environment.

Miocene Exhibit Hall
Saltville Paleontology Hall

2) Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms.

Miocene Exhibit Hall
Saltville Paleontology Hall

5.LS4: Biological Change: Unity and Diversity

1) Analyze and interpret data from fossils to describe types of organisms and their environments that existed long ago. Compare similarities and differences of those to living organisms and their environments. Recognize that most kinds of animals (and plants) that once lived on Earth are now extinct.

Miocene Exhibit Hall
Saltville Paleontology Hall

2) Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.

Miocene Exhibit Hall
Saltville Paleontology Hall

5.ESS1: Earth's Place in the Universe

1) Explain that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.

2) Research and explain the position of the Earth and the solar system within the Milky Way galaxy, and compare the size and shape of the Milky Way to other galaxies in the universe.

Gravity Dish

3) Use data to categorize different bodies in our solar system including moons, asteroids, comets, and meteoroids according to their physical properties and motion.

4) Explain the cause and effect relationship between the positions of the sun, earth, and moon and resulting eclipses, position of constellations, and appearance of the moon.

Gravity Dish

5) Relate the tilt of the Earth's axis, as it revolves around the sun, to the varying intensities of sunlight at different latitudes. Evaluate how this causes changes in day-lengths and seasons.

6) Use tools to describe how stars and constellations appear to move from the Earth's perspective throughout the seasons.

Gravity Dish

7) Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.

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5.ETS1: Engineering Design

1) Research, test, re-test, and communicate a design to solve a problem.

Air Cars

Air Rockets

Bernoulli Table

Circuit Bench

Colorful Shadows

Everbright

Gravity Dish

Make It. Take It.

PVC Pipe Organ

Quantum Space

Ring Launcher

Sail Cars

Shake Table

Vertical Flyer

Infinity Mirror

Keva Planks

Rigamajig

Imagination Playground

2) Plan and carry out tests on one or more elements of a prototype in which variables are controlled and failure points are considered to identify which elements need to be improved. Apply the results of tests to redesign the prototype.

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Air Rockets

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3) Describe how failure provides valuable information toward finding a solution.

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Imagination Playground

5.ETS2: Links Among Engineering, Technology, Science, and Society

1) Use appropriate measuring tools, simple hand tools, and fasteners to construct a prototype of a new or improved technology.

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PVC Pipe Organ
Quantum Space
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Shake Table
Vertical Flyer
Infinity Mirror
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2) Describe how human beings have made tools and machines (X-ray cameras, microscopes, satellites, computers) to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently.

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Air Rockets
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3) Identify how scientific discoveries lead to new and improved technologies.

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SIXTH GRADE: ACADEMIC STANDARDS

6.PS3: Energy

1) Analyze the properties and compare sources of kinetic, elastic potential, gravitational potential, electric potential, chemical, and thermal energy.

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Bernoulli Table
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Ring Launcher
Shake Table
Vertical Flyer
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Rigamajig
Imagination Playground

2) Construct a scientific explanation of the transformations between potential and kinetic energy.

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Air Rockets
Bernoulli Table
Circuit Bench
Gravity Dish
Ring Launcher
Sail Cars
Shake Table
Vertical Flyer

Keva Planks
Rigamajig
Imagination Playground

3) Analyze and interpret data to show the relationship between kinetic energy and the mass of an object in motion and its speed.

Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Gravity Dish
Sail Cars
Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

4) Conduct an investigation to demonstrate the way that heat (thermal energy) moves among objects through radiation, conduction, or convection.

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Circuit Bench
Ring Launcher
Sail Cars
Vertical Flyer
Tornado Vortex

6.LS2: Ecosystems: Interactions, Energy, and Dynamics

1) Evaluate and communicate the impact of environmental variables on population size.

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Saltville Paleontology Hall
Tornado Vortex

2) Determine the impact of competitive, symbiotic, and predatory interactions in an ecosystem.

Miocene Exhibit Hall
Saltville Paleontology Hall

3) Draw conclusions about the transfer of energy through a food web and energy pyramid in an ecosystem.

4) Using evidence from climate data, draw conclusions about the patterns of abiotic and biotic factors in different biomes, specifically the tundra, taiga, deciduous forest, desert, grasslands, rainforest, marine, and freshwater ecosystems.

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Tornado Vortex

5) Analyze existing evidence about the effect of a specific invasive species on native populations in Tennessee and design a solution to mitigate its impact.

6) Research the ways in which an ecosystem has changed over time in response to changes in physical conditions, population balances, human interactions, and natural catastrophes.

Miocene Exhibit Hall
Saltville Paleontology Hall

7) Compare and contrast auditory and visual methods of communication among organisms in relation to survival strategies of a population.

6.LS4: Biological Change: Unity and Diversity

1) Explain how changes in biodiversity would impact ecosystem stability and natural resources.

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2) Design a possible solution for maintaining biodiversity of ecosystems while still providing necessary human resources without disrupting environmental equilibrium.

6.ESS2: Earth's Systems

1) Gather evidence to justify that oceanic convection currents are caused by the sun's transfer of heat energy and differences in salt concentration leading to global water movement.

2) Diagram convection patterns that flow due to uneven heating of the earth.

3) Construct an explanation for how atmospheric flow, geographic features, and ocean currents affect the climate of a region through heat transfer.

4) Apply scientific principles to design a method to analyze and interpret the impact of humans and other organisms on the hydrologic cycle.

5) Analyze and interpret data from weather conditions, weather maps, satellites, and radar to predict probable local weather patterns and conditions.

Topobox

Shake Table

Tornado Vortex

6) Explain how relationships between the movement and interactions of air masses, high and low pressure systems, and frontal boundaries result in weather conditions and severe storms.

Topobox

Tornado Vortex

6.ESS3: Earth and Human Activity

1) Differentiate between renewable and nonrenewable resources by asking questions about their availability and sustainability.

2) Investigate and compare existing and developing technologies that utilize renewable and alternative energy resources.

Air Cars

Air Rockets

Bernoulli Table

Circuit Bench

Ring Launcher

Sail Cars

Vertical Flyer

3) Assess the impacts of human activities on the biosphere including conservation, habitat management, species endangerment, and extinction.

6.ETS1: Engineering Design

1) Evaluate design constraints on solutions for maintaining ecosystems and biodiversity.

2) Design and test different solutions that impact energy transfer.

Pin Wall

Air Cars

Air Rockets

Bernoulli Table

Circuit Bench

Gravity Dish

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Sail Cars

Shake Table

Vertical Flyer

Keva Planks

Rigamajig

Imagination Playground

SEVENTH GRADE: ACADEMIC STANDARDS

7.PS1: Matter and Its Interactions

- 1) Develop and use models to illustrate the structure of atoms, including the subatomic particles with their relative positions and charge.
- 2) Compare and contrast elemental molecules and compound molecules.
- 3) Classify matter as pure substances or mixtures based on composition.

Tesla Experience

- 4) Analyze and interpret chemical reactions to determine if the total number of atoms in the reactants and products support the Law of Conservation of Mass.
- 5) Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter.

Tesla Experience

- 6) Create and interpret models of substances whose atoms represent the states of matter with respect to temperature and pressure.

Tesla Experience

7.LS1: From Molecules to Organisms: Structures and Processes

- 1) Develop and construct models that identify and explain the structure and function of major cell organelles as they contribute to the life activities of the cell and organism.
- 2) Conduct an investigation to demonstrate how the cell membrane maintains homeostasis through the process of passive transport.
- 3) Evaluate evidence that cells have structural similarities and differences in organisms across kingdoms.
- 4) Diagram the hierarchical organization of multicellular organisms from cells to organism.
- 5) Explain that the body is a system comprised of subsystems that maintain equilibrium and support life through digestion, respiration, excretion, circulation, sensation (nervous and integumentary), and locomotion (musculoskeletal).
- 6) Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.
- 7) Evaluate and communicate evidence that compares and contrasts the advantages and disadvantages of sexual and asexual reproduction.
- 8) Construct an explanation demonstrating that the function of mitosis for multicellular organisms is for growth and repair through the production of genetically identical daughter cells.
- 9) Construct a scientific explanation based on compiled evidence for the processes of photosynthesis, cellular respiration, and anaerobic respiration in the cycling of matter and flow of energy into and out of organisms.

7.LS2: Ecosystems: Interactions, Energy, and Dynamics

- 1) Develop a model to depict the cycling of matter, including carbon and oxygen, including the flow of energy among biotic and abiotic parts of an ecosystem.

7.LS3: Heredity: Inheritance and Variation of Traits

- 1) Hypothesize that the impact of structural changes to genes (i.e., mutations) located on chromosomes may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
- 2) Distinguish between mitosis and meiosis and compare the resulting daughter cells.
- 3) Predict the probability of individual dominant and recessive alleles to be transmitted from each parent to offspring during sexual reproduction and represent the phenotypic and genotypic patterns using ratios.

7.ESS3: Earth and Human Activity

- 1) Graphically represent the composition of the atmosphere as a mixture of gases and discuss the potential for atmospheric change.

Topobox

Tornado Vortex

2) Engage in a scientific argument through graphing and translating data regarding human activity and climate.

[Topobox](#)

7.ETS2: Links Among Engineering, Technology, and Applications of Science

1) Examine a problem from the medical field pertaining to biomaterials and design a solution taking into consideration the criteria, constraints, and relevant scientific principles of the problem that may limit possible solutions.

EIGHTH GRADE: ACADEMIC STANDARDS

8.PS2: Motion and Stability: Forces and Interactions

1) Design and conduct investigations depicting the relationship between magnetism and electricity in electromagnets, generators, and electrical motors, emphasizing the factors that increase or diminish the electric current and the magnetic field strength.

[Tesla Experience](#)

[Circuit Bench](#)

[Gravity Dish](#)

2) Conduct an investigation to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

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[Circuit Bench](#)

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3) Create a demonstration of an object in motion and describe the position, force, and direction of the object.

[Tesla Experience](#)

[Pin Wall](#)

[Air Cars](#)

[Air Rockets](#)

[Bernoulli Table](#)

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4) Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

[Tesla Experience](#)

[Pin Wall](#)

[Air Cars](#)

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5) Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.

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Air Cars
Air Rockets
Bernoulli Table
Circuit Bench
Gravity Dish
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Sail Cars
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Vertical Flyer
Keva Planks
Rigamajig
Imagination Playground

8.PS4: Waves and Their Applications in Technologies for Information Transfer

1) Develop and use models to represent the basic properties of waves including frequency, amplitude, wavelength, and speed.

PVC Pipe Organ
Sail Cars
Shake Table

2) Compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.

Tesla Experience

3) Evaluate the role that waves play in different communication systems.

Tesla Experience
PVC Pipe Organ
Shake Table

8.LS4: Biological Change: Unity and Diversity

1) Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.

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2) Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.

3) Analyze evidence from geology, paleontology, and comparative anatomy to support that specific phenotypes within a population can increase the probability of survival of that species and lead to adaptation.

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4) Develop a scientific explanation of how natural selection plays a role in determining the survival of a species in a changing environment.

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Saltville Paleontology Hall

5) Obtain, evaluate, and communicate information about the technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.

8.ESS1: Earth's Place in the Universe

1) Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies and composition of stars.

Gravity Dish

2) Explain the role of gravity in the formation of our sun and planets. Extend this explanation to address gravity's effect on the motion of celestial objects in our solar system and Earth's ocean tides.

Gravity Dish

8.ESS2: Earth's Systems

1) Analyze and interpret data to support the assertion that rapid or gradual geographic changes lead to drastic population changes and extinction events.

Shake Table

2) Evaluate data collected from seismographs to create a model of Earth's structure.

Shake Table

3) Describe the relationship between the processes and forces that create igneous, sedimentary, and metamorphic rocks.

4) Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and sea-floor spreading.

Shake Table

5) Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for A) the distribution of fossils on different continents, B) the occurrence of earthquakes, and C) continental and ocean floor features (including mountains, volcanoes, faults, and trenches).

Miocene Exhibit Hall

Shake Table

8.ESS3: Earth and Human Activity

1) Interpret data to explain that earth's mineral, fossil fuel, and groundwater resources are unevenly distributed as a result of geologic processes.

Miocene Exhibit Hall

2) Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots.

Shake Table

8.ETS1: Engineering Design

1) Develop a model to generate data for ongoing testing and modification of an electromagnet, a generator, and a motor such that an optimal design can be achieved.

2) Research and communicate information to describe how data from technologies (telescopes, spectrosopes, satellites, and space probes) provide information about objects in the solar system and universe.

Topobox

Air Rockets

Bernoulli Table