Ohio Science - Extended Learning Standards

Grade 5

Earth and Space Science

1 The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics. The distance from the sun, size, composition, and movement of each planet are unique. Planets revolve around the sun in elliptical orbits. Some of the planets have moons and/or debris that orbit them. Comets, asteroids, dwarf planets, and meteoroids also orbit the sun. 5.ESS.1

Complexity a

a1 Compare different celestial bodies including composition and size. 5.ESS.1.A1

a2 Explain what would happen to orbits if there was no gravitational force. 5.ESS.1.A2

a3 Compare the composition and sizes of the major planets. 5.ESS.1.A3

Complexity b

b1 Match a set of descriptions to the corresponding set of celestial bodies. 5.ESS.1.B1

b2 Identify examples of celestial objects that are being affected by a gravitational force resulting in an orbit. 5.ESS.1.B2

b3 Match the composition of the major planets as related to their position in the solar system (e.g., rocky planets are close to the sun, gas giants are further from sun). 5.ESS.1.B3

Complexity c

c1 Identify celestial bodies in our solar system. 5.ESS.1.C1

c2 Identify a representation of an orbital path within our solar system. 5.ESS.1.C2

c3 Identify Earth's place in our solar system. 5.ESS.1.C3

Learning Progression

- Build a model of a comet. (e.g., Freeze muddy water in a paper cup, use it to depict a comet and to show what happens when it orbits near the hot sun by letting it sit out for a short time (some melts off the outside and it gets smaller)). 5.ESS.1.LP.A
- Recognize that gravity holds the planets in orbit (e.g., roll a marble around a paper plate with a wedge cut out that has a dab of paint right before the cut out. Use the paint trail as the marble leaves the plate to see that a planet would fly away in a straight line if gravity was not causing it to orbit the sun.) 5.ESS.1.LP.B
- Demonstrate the movement of planets around the sun in an orbit (e.g., Twirl a plastic ball on a string in a circle on the table, understand that this is how planets and moons orbit, indicate that the string exerts a force towards your hand just like gravity pulls on planets.). 5.ESS.1.LP.C
- Match pictures of the planets in our solar system with descriptions of them (e.g., for Jupiter made of gas, largest planet, 5th planet from sun, has a giant red spot hurricane) 5.ESS.1.LP.D

- Compare the size of the inner and outer planets. 5.ESS.1.LP.E
- On a graphic of the solar system, recognize that rocky planets are near the sun and gas planets are further away. 5.ESS.1.LP.F
- Identify the composition of outer planets (gaseous). 5.ESS.1.LP.G
- Identify the composition of Earth and inner planets (rocky planets). 5.ESS.1.LP.H
- Trace the path that the moon follows around Earth on a diagram. 5.ESS.1.LP.I
- Trace the path that Earth follows around the sun on a diagram. 5.ESS.1.LP.J
- Identify other celestial bodies (asteroids, dwarf planets, meteoroids) of the solar system. 5.ESS.1.LP.K
- Recognize a graphic representation or drawing of the solar system. 5.ESS.1.LP.L
- Identify the celestial body (Earth) where we live. 5.ESS.1.LP.M
- Recognize a photo of the moon. 5.ESS.1.LP.N
- Recognize a photo of the sun. 5.ESS.1.LP.O
- Recognize a photo of Earth. 5.ESS.1.LP.P
- Engage in activities that demonstrate gravity as a force (dropping a ball, jumping, etc.). 5.ESS.1.LP.Q
- Engage in the movement of celestial bodies (planets, moons, comets, asteroids) in the solar system. 5.ESS.1.LP.R
- Engage with structural materials that make up celestial bodies (rocky materials, ice, water, gases) 5.ESS.1.LP.S
- Engage with visual or tactile models of celestial bodies and/or the solar system. 5.ESS.1.LP.T

2 **The sun is one of many stars that exist in the universe. The sun appears to be the largest star in the sky because it is the closest star to Earth. Some stars are larger than the sun and some stars are smaller than the sun.** 5.ESS.2

Complexity a

a1 Compare the Sun to stars beyond our solar system. 5.ESS.2.A1

a2 Explain how a constellation can be used for navigation. 5.ESS.2.A2

a3 Compare the characteristics of different stars (e.g., size, brightness, age). 5.ESS.2.A3

Complexity b

b1 Explain the relationship of our Sun to our solar system and to our universe. 5.ESS.2.B1

b2 Explain that the pattern of stars within a constellation stays constant. 5.ESS.2.B2

b3 Describe the characteristics of the Sun that make it a star. 5.ESS.2.B3

Complexity c

c1 Identify that the Sun is a star and that the Sun is the only star in our solar system. 5.ESS.2.C1

c2 Identify a visual representation of a constellation. 5.ESS.2.C2

c3 Identify the characteristics of the Sun that make it a star. 5.ESS.2.C3

Learning Progression

- Explain that our sun is brightest because it is closest to Earth. 5.ESS.2.LP.A
- Recognize that stars in the universe can be close or far away similar to everyday objects (e.g., Look at the same object (cup) when it is near you body, measure it with you thumb and index finger, see how its size changes when it is across the room), use this to understand that giant stars look tiny to us on Earth because they are very far away (you could also look at houses or trees out the window and discuss that the house is not actually only 1 inch high). 5.ESS.2.LP.B
- Recognize that the sun is one of many stars in the universe. 5.ESS.2.LP.C
- Identify our sun as a medium star. (Look at pictures, charts, graphs or videos to compare sizes of stars.) 5.ESS.2.LP.D
- Identify groups of stars as constellations (Can discuss how people could use the star patterns to tell time and navigate before we had modern technology). Watch videos of the movement in the night sky, recognize that the stars always move in the same pattern . 5.ESS.2.LP.E
- Enrichment: Given several pictures of groups of stars, choose one and tell what it looks like (tree, bear, snake, cloud, etc). Tell an imaginary story about the object, use this to understand that people made up constellations and stories about them.) 5.ESS.2.LP.F
- Recognize that the sun is the only star in our solar system. 5.ESS.2.LP.G
- Identify the sun as the star, celestial body, of our solar system. 5.ESS.2.LP.H

- Identify the sun as our primary source of energy. 5.ESS.2.LP.I
- Recognize that the sun is our closest star. 5.ESS.2.LP.J
- Identify the sun as a star. 5.ESS.2.LP.K
- Engage in and compare in various visual representations of stars (e.g., 5 point star versus a NASA picture of the sun). 5.ESS.2.LP.L
- Understand that stars (including the sun) give off heat and light. 5.ESS.2.LP.M
- Feel the heat of the sun on a sunny day. (Set a thermometer in a cup of water in the sun and watch the temperature rise.) 5.ESS.2.LP.N

3 **Most of the cycles and patterns of motion between the Earth and sun are predictable. Earth's revolution around the sun takes approximately 365 days. Earth completes one rotation on its axis in a 24-hour period, producing day and night. This rotation makes the sun, stars, and moon appear to change position in the sky** 5.ESS.3

Complexity a

a Explain the difference between Earth's revolution and Earth's rotation. 5.ESS.3.A

Complexity b

b Sort patterns into those that result from Earth's revolution and those that result from Earth's rotation. 5.ESS.3.B

Complexity c

c Identify patterns that result from Earth's revolution and rotation. 5.ESS.3.C

Learning Progression

- Use data of daylight hours to show how the number of daylight hours changes season-to-season. 5.ESS.3.LP.A
- Track and record sunrise, sunset times throughout the year and calculate the number of daylight hours. 5.ESS.3.LP.B
- Observe images of the night sky at different seasons to witness the change in visible constellations. 5.ESS.3.LP.C
- Match seasonal characteristics to number of daylight hours and a visual representation of the positions of the Earth and sun. 5.ESS.3.LP.D
- Identify the year can be broken down into seasons (summer, fall, winter, spring) 5.ESS.3.LP.E
- Recognize that Earth makes one revolution every 365 days (or one year). 5.ESS.3.LP.F
- Use a model to show that Earth orbits the sun, recognize that this is called revolution. 5.ESS.3.LP.G
- Identify "revolution" as movement around another object in a path. 5.ESS.3.LP.H
- Model revolution of an object moving in an orbital pattern around another object (Earth and sun). 5.ESS.3.LP.I
- Map the position of the sun across the sky throughout the day. (Watch the shadow of an object throughout the school day to illustrate the movement of the sun, use a stick or pole in the sun and draw a line (chalk on pavement, or paper placed under the stick) for the shadow each hour of the school day.) 5.ESS.3.LP.J
- Describe differences between day and night (dark at night). 5.ESS.3.LP.K
- Make a model representing the sun and Earth's rotation to illustrate the difference between day and night.(e.g., Turn off the lights in the room, turn on a

lamp, bulb or flashlight on one side of the room, turn in a circle, explain that you only see the lamp when you are facing it.) 5.ESS.3.LP.L

- Recognize that Earth makes one rotation every 24 hours. 5.ESS.3.LP.M
- Identify “rotation” as a spinning around a given point. 5.ESS.3.LP.N
- Identify that Earth’s rotation causes day and night. (Show videos to illustrate the movement of the stars in the night sky.) 5.ESS.3.LP.O
- Model day and night onwith Earth with a ball and a flashlight. 5.ESS.3.LP.P
- Engage in movement of models of the Earth, moon, and sun (e.g., spinning and moving around other objects). 5.ESS.3.LP.Q

Life Science

1 Organisms perform a variety of roles in an ecosystem. Populations of organisms can be categorized by how they acquire energy. Food webs can be used to identify the relationships among producers, consumers, and decomposers in an ecosystem. 5.LS.1

Complexity a

a1 Explain the role of a producer, consumer, or decomposer in a food web. 5.LS.1.A1

a2 Trace the flow of energy through a food web. 5.LS.1.A2

Complexity b

b1 Given a set of organisms, match them to their roles in a food web. 5.LS.1.B1

b2 Sequence components of a food web. 5.LS.1.B2

Complexity c

c1 Identify a producer, consumer, and decomposer. 5.LS.1.C1

c2 Sequence components of a simple food chain. 5.LS.1.C2

Learning Progression

- Choose pictures to illustrate the various symbiotic relationships;, mutualism, parasitism and commensalism. (Show a picture of bees and flowers and describe the relationship between the two organisms. Bees pollinate flowers and the bee gets energy. Both roles are important for survival.) 5.LS.1.LP.A
- Match pictures of consumers and producers with their roles (herbivores, carnivores, omnivores, decomposers). 5.LS.1.LP.B
- Recognize that organisms interact and depend on one another. 5.LS.1.LP.C
- In an ecosystem determine who eats who and show the energy flow using arrows (e.g., a food chain illustrating deer eating grass, wolves eating deer etc.). 5.LS.1.LP.D
- Identify living things as producers (plants) or consumers (animals). 5.LS.1.LP.E
- Given a picture of an ecosystem, identify all the living things. 5.LS.1.LP.F
- Engage in following a path of energy on a food web (e.g., trace arrows on a food chain). 5.LS.1.LP.G
- Engage with pictures of various organisms (plants and animals). 5.LS.1.LP.H

2 **All of the processes that take place within organisms require energy. For most ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transformed by producers through the process of photosynthesis. That energy is used or stored by the producer and can be passed from organism to organism as illustrated in food webs.** 5.LS.2

Complexity a

a Use a food web to explain how an organism can get a constant flow of energy. 5.LS.2.A

Complexity b

b Identify that producers transform sun energy into energy it uses to grow and that consumers get their energy to grow by a transfer of energy from another organism. 5.LS.2.B

Complexity c

c Identify ways that organisms can obtain energy. 5.LS.2.C

Learning Progression

- Construct a model of a food web showing the sun with arrows illustrating the flow of energy. 5.LS.2.LP.A
- Recognize that the sun's energy gets transformed into energy for plants which gets consumed by other organisms. 5.LS.2.LP.B
- Recognize that most organisms depend on the sun's energy. 5.LS.2.LP.C
- Identify that vitamin D is produced in the body with 10-15 minutes of sun exposure on arms, legs, or torso. 5.LS.2.LP.D
- Feel the heat and see the light from the sun on a sunny day. 5.LS.2.LP.E
- Identify the organisms that make up our food choices. (If it is an animal source, ask students where that animal got its energy from. If it is a plant, where did the plant get its energy?. Use this information to build a simple food chain/ web.) 5.LS.2.LP.F
- Demonstrate the use of energy by moving parts of the body. 5.LS.2.LP.G
- Engage in discussions about foods and what you eat. 5.LS.2.LP.H

Physical Science

1 **The amount of change in movement of an object is based on the mass* of the object and the amount of force exerted. Movement can be measured by speed. The speed of an object is calculated by determining the distance (d) traveled in a period of time (t). Any change in speed of an object requires a force and is affected by the mass of the object and the amount of force applied. Note: Differentiating between mass and weight is not necessary at this grade level.** 5.PS.1

Complexity a

a Given a change in mass or force, explain the effect that change will have on the speed of an object. 5.PS.1.A

Complexity b

b Identify a change that can be made to an object to change its speed (e.g., add more mass, use more force). 5.PS.1.B

Complexity c

c Demonstrate how the speed of an object can be changed by adding mass or exerting a force. 5.PS.1.C

Learning Progression

- Predict ways to change the movement of a given model (e.g., add bricks to a cart, push with more/less force, etc.). 5.PS.1.LP.A
- Manipulate a given model to demonstrate the force required to move various masses. 5.PS.1.LP.B
- Using manipulatives, identify which objects require more force (push or pull) to move. 5.PS.1.LP.C
- Recognize objects in motion. 5.PS.1.LP.D
- Move objects of varying masses. 5.PS.1.LP.E
- Engage with objects of varying masses. 5.PS.1.LP.F

2 Light and sound are forms of energy that behave in predictable ways. Light travels and maintains its direction until it interacts with an object or moves from one medium to another and then it can be reflected, refracted, or absorbed. Sound is produced by vibrating objects and requires a medium through which to travel. The rate of vibration is related to the pitch of the sound. Note: At this grade level, the discussion of light and sound should be based on observable behavior. Waves are introduced at the middle school level. 5.PS.2

Complexity a

a1 Given an object, explain how it would change the path of light (e.g., a mirror will reflect light, a dark cloth will absorb light, etc.). 5.PS.2.A1

a2 Given an object, explain how you could make a change that would change its pitch. 5.PS.2.A2

Complexity b

b1 Identify objects that will change the path of light. 5.PS.2.B1

b2 Identify properties that affect pitch (e.g., a large bell makes a deeper sound than a smaller bell). 5.PS.2.B2

Complexity c

c1 Demonstrate the observable characteristics of how light travels. 5.PS.2.C1

c2 Match objects/tools/ instruments to examples of sounds of various pitch. 5.PS.2.C2

Learning Progression

- Sound: 5.PS.2.LP.A
- Listen to sounds at various pitches, describe them as high or low. 5.PS.2.LP.B
- Pluck a tight string and listen to it, shorten the string and pluck it again, describe the differences. 5.PS.2.LP.C
- Recognize that objects (strings, drums) vibrate when they make sound. 5.PS.2.LP.D
- Use a variety of objects to make sound (plucking, drumming, blowing). 5.PS.2.LP.E
- Light: 5.PS.2.LP.F
- Sort objects by whether they reflect, refract or absorb light. 5.PS.2.LP.G
- Given a group of objects (or pictures) choose the ones that light can pass through (e.g., shine a flashlight or laser pointer onto a mirror, trace the path of the light that is reflected. Shine a flashlight onto black cloth and onto white cloth, describe the differences you see). 5.PS.2.LP.H
- Recognize changes in light as a result of interactions with various objects that have differing results. 5.PS.2.LP.I
- Use a variety of objects to make sound (plucking, drumming, blowing). 5.PS.2.LP.J
- Engage in light play from various sources. 5.PS.2.LP.K