

The Nature of Science

Grade 4	Grade 8	Grade 11
<p>S4A1.1.2a Identify common technologies that benefit society.</p> <p>Intent: Identify familiar tools (e.g., pencils, cell phones, scissors, refrigeration) that help people.</p>		
<p>S4A1.3.1a Identify changes to objects and living things.</p> <p>Intent: Determine the change to an object (e.g., ice cube to water, cookie whole and one with a bite out of it) and a living thing (e.g., snowshoe rabbit-color changes brown to white, seed to plant).</p>	<p>S8A1.3.2a Identify the results of a specific change to a stable system (e.g., food webs, biological systems, electrical systems).</p> <p>Intent: Determine what happens when something is introduced or removed from a system (e.g., the lights go out after a cord is unplugged, a plant dies after not receiving water).</p>	<p>S11A1.3.2a Identify the variable that causes a specific change to a stable system (e.g., human body, food webs).</p> <p>Intent: Determine what causes the change to a system (e.g., rain causes flooding, egg cooks when heat is applied).</p>
<p>S4A2.1.4a Recognize the observation that supports a scientific fact.</p> <p>Intent: Identify the evidence that supports a scientific claim (e.g., claim: not all apples are red - data shows apples of different colors; claim: not all balls are round - data shows balls of different shapes).</p>	<p>S8A2.1.1a Use observations (limited to duration, weight, volume, distance, or temperature) to identify relationships (e.g., bigger/smaller, faster/slower, higher/lower).</p> <p>Intent: Use evidence to determine how changes affect outcomes (e.g., speed of marble changes when a ramp is adjusted to different heights).</p>	<p>S11A2.1.1a Identify the experimental design that tests a specific scientific question.</p> <p>Intent: Determine how evidence will be collected to investigate a scientific claim (e.g., to identify what changes the speed of a marble, alter the height of the ramp and test).</p>
		<p>S11A2.1.3a Interpret graphs or charts to make inferences or predictions or to draw conclusions (limited to line graph, bar graph, pie chart and tables).</p> <p>Intent: Use graphs or charts to support a claim (idea).</p>

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<p>S4A2.2.1a Select appropriate tools to perform basic measurement tasks (limited to length, weight, volume, and temperature).</p> <p>Intent: Determine the appropriate tool (e.g., metric ruler, balance-triple beam, flask, thermometer with Celsius) when given a measuring task to complete.</p>	<p>S8A2.2.1a Identify the appropriate instrument and unit of measure to accurately record time, weight, distance, volume, or temperature.</p> <p>Intent: Determine the appropriate tool and unit to make a measurement (e.g., triple/beam balance for metric grams, thermometer for Celsius, metric ruler for meters, stopwatch for minutes/seconds, flask for milliliters).</p>	<p>S11A2.2.1a Choose the appropriate method, instrument, and scale for precise quantitative or qualitative observations.</p> <p>Intent: Determine how to measure, what tool to use and the appropriate unit to make an accurate observation (e.g., measuring weight of fruit, choose from doctor's scale, hanging balance, triple beam balance - unit is grams).</p>
<p>S4A2.2.1b Select appropriate tools for making observations (limited to hand lens, binoculars, microscope, and telescope).</p> <p>Intent: Determine the appropriate tool when making an observation (e.g., when observing live birds, use binoculars, microscope or telescope)?</p>		
	<p>S8A2.2.3a Identify ways a specific technology enhances human abilities or senses (e.g., computer, microwave).</p> <p>Intent: Determine the effects that familiar tools provide to improve people's capabilities (e.g., eyeglasses to see clearly, AAC devices to communicate, wheelchairs to move around, digital thermometers to determine temperature, calculators to solve math problems).</p>	<p>S11A2.2.2a Identify how a specific technology extends human abilities and enhances precision (limited to GPS, x-ray, microscope, telescope).</p> <p>Intent: Determine the effects that familiar tools provide and how they can improve accuracy.</p>

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<p>S4A3.1.1a Identify whether a system is natural or human-made (e.g., plants vs. electrical systems).</p> <p>Intent: Given a combination of parts that form a whole, determine if the system is natural or human made (e.g., forest vs. railroad; ocean vs. highways).</p>	<p>S8A3.1.5a Identify the components of a simple human-made system based on function (e.g., electrical system, transportation system).</p> <p>Intent: Determine the parts of a human made system based on the role the part has in the system (e.g., railroad – tracks are where the train runs, stations are where people get on and off, signals direct the trains).</p>	<p>S11A3.1.2a Predict the results of a specific change to one part of a system on the system as a whole (e.g., organ systems, ecosystems, electrical systems).</p> <p>Intent: Given a specific change to a system, determine what might happen when the change occurs (e.g., what happens to the railroad system if there is a break in the tracks? What happens to dinner in the microwave if it is unplugged?).</p>
	<p>S8A3.1.5b Identify how the components or processes of natural systems affect one another (e.g., water cycle, weather systems, organ systems).</p> <p>Intent: Determine how one part of a natural system impacts another part (e.g., How is the air temperature affected if the wind comes from the north? How is evaporation affected on a sunny day? What happens to a puddle on a warm sunny day? What happens to lungs if the nose and mouth are covered?). Organ systems should be familiar.</p>	
<p>S4A3.3.1a Identify patterns, cycles or trends seen in nature (e.g., seasonal, day/night, life cycles).</p> <p>Intent: Determine a pattern in nature (e.g., day to night and night to day; life cycle of a plant is seed to plant to flower to seed).</p>	<p>S8A3.3.2a Sequence recurring patterns, cycles or trends found in nature (e.g., water cycle, lunar phases, organ systems).</p> <p>Intent: Determine the order of steps in a pattern or cycle found in nature (e.g., in respiration, air enters lungs, oxygen goes into the blood, carbon dioxide is exhaled through the mouth/nose; in digestion, food goes into the stomach, nutrients are removed, and waste is released; in the water cycle, there is evaporation, precipitation, condensation).</p>	<p>S11A3.3.3a Use observations about recurring patterns, cycles or trends in nature to make predictions or draw conclusions (e.g., solar system, weather systems, organ systems).</p> <p>Intent: Determine what is likely to happen next or make an inference after experiencing/observing a pattern, cycle or trend in nature (e.g., day length changes from fall to winter to spring to summer; rain is likely to follow when dark clouds fill the sky on a warm, humid day).</p>

Biological Sciences

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<p>S4B1.1.3a Identify basic needs of plants or animals (limited to air, water, nutrients, sun, and shelter).</p> <p>Intent: Determine the things that plants or animals need to live.</p>	<p>S8B1.1.3a Categorize plants or animals based on characteristic structures (e.g., seeds, leaves, fruits; mammals, invertebrates, birds).</p> <p>Intent: Group plants or animals based on parts [e.g., fish have scales, birds have feathers, and mammals have fur; fish, bears and human have a spine (vertebrates); ants, flies, and cockroaches do not have a spine (invertebrates)].</p>	<p>S11B1.1.2a Compare how different animals use different structures for the same or similar functions.</p> <p>Intent: Determine how different animals use different parts for the same activity (e.g., to move, birds use wings, fish use fins, and cats use legs; to capture food, birds use talons, humans use hands, and fish use mouths).</p>
<p>S4B1.1.4a Identify how parts of plants or animals work together to meet basic needs (e.g., roots and leaves or appendages and coverings).</p> <p>Intent: Determine the parts of plants or animals and how that part helps them live (e.g., roots and stem of a plant help get water; bird uses beak to crack seeds and stomach digests food to turn seed into energy).</p>		
<p>S4B1.1.5a Recognize the stages of development of an organism (limited to butterfly, ladybug, frog, grasshopper, and seed-producing plant).</p> <p>Intent: Determine the stages of life for a living thing (e.g., egg, tadpole, frog; plant starts as seed, plant grows, flowers, makes fruit, makes seed, plant dies).</p>		

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<p>S4B2.1.1a Identify plants or animals that live in different environments (limited to grasslands, tundra, desert, aquatic, forest, and rainforest).</p> <p>Intent: Determine plants or animals that live in different places (e.g., cactus lives in desert, fish lives in water, bear lives in the forest, reindeer in the tundra).</p>	<p>S8B2.1.1a Identify structures or behaviors that enable plants or animals to survive in their environment (e.g., size of plant, leaf shape or appendages, coverings, nocturnal behavior).</p> <p>Intent: Determine the parts or behaviors of a plant or animal that make it able to live in a certain place (e.g., gills allow fish to live in water; fur/hair allows reindeer to live in tundra; needles allow a cactus to live in desert).</p>	
<p>S4B3.1.1a Categorize the parts of an ecosystem as either living or non-living (e.g., forest, city, park).</p> <p>Intent: Group the living and the nonliving parts of a location (e.g., in a city, trees are living, birds are living, buildings are nonliving, roads are nonliving).</p>	<p>S8B3.1.1a Sequence the flow of energy through a food chain or a food web.</p> <p>Intent: Determine the movement of energy through a food chain* or food web** (e.g., In a food chain, sun grows grass, cow eats grass, person eats cow; In a food web, field mice, birds and chipmunks eat nuts, fruits, and insects and foxes eat mice, birds, chipmunks).</p> <p>*food chain: single path as living things are consumed in hierarchical order **food web: how plants and animals are connected by different paths</p>	<p>S11B3.1.3a Identify the interactions among living components of an ecosystem (limited to competition, predation, and mutualism).</p> <p>Intent: Determine how different living things exist together in a location (e.g., competition is when cow and sheep both eat grass in field or eagle and hawk both eat mouse; predation is when eagle eats mouse, or when lion eats deer; mutualism is when bees use flowers and flowers use bees).</p>

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	<p>S8B3.1.2a Recognize the association between different environments and their characteristics (e.g., climate, precipitation, vegetation).</p> <p>Intent: Determine that different places have different features. Environments have different combinations of precipitation, temperature, humidity, plants and animals (e.g., Florida is hot and has hurricanes; the north pole is cold and has snow and no trees).</p>	<p>S11B3.1.4a Compare the similarities and differences in the Earth’s major biomes (e.g., tropical rain forest vs. tundra, tundra vs. desert).</p> <p>Intent: Determine what is the same and different between ecosystems/biomes (places) and note that these are found around the world (e.g., desert and rainforest both are hot, but desert is dry, and rainforest is wet; desert and tundra are dry, but desert is hot, and tundra is cold; deserts are found in Africa and in North America).</p>
	<p>S8B3.1.3a Identify the role of different organisms in an ecosystem (limited to producers, consumers, predator, and prey).</p> <p>Intent: Determine the role of a living thing within a food chain or food web (e.g., a lion is a predator; a deer can be prey or a consumer of a plant; a plant is a producer).</p>	<p>S11B3.1.4b Identify the similarities and differences in animals or plants that inhabit the major biomes (e.g., tropical rain forest, tundra, desert).</p> <p>Intent: Determine the similarities and differences of animals or plants in the ecosystems across the earth (e.g., a deer can live in the forest, savannah or the tropical rain forest; a rabbit can live in the tundra and forest; plants live in the tundra and in the rain forest but plants in the tundra are small while plants in the rain forest can grow large).</p>
<p>S4B3.2.3a Identify how seasons affect trees or animals (e.g., temperature, migration, hibernation).</p> <p>Intent: Determine what happens to plants or animals when there is a change of season (e.g., moving from summer to fall to winter, the temperature gets colder and animals like birds move away from the cold, a bear hibernates; leaves fall off of trees).</p>	<p>S8B3.2.1a Recognize the impact that humans have on habitats and the animals or plants living there (e.g., deforestation and deer habitats).</p> <p>Intent: Determine the impacts people have on a place (e.g., humans cut down trees which takes away homes of animals; humans can plant a seed to grow a garden or a forest; humans can pollute the air and water through choices made about electricity or food).</p>	<p>S11B3.2.3a Recognize the result of catastrophic events on habitats and the animals or plants living there (e.g., forest fire, volcanic eruption, tornado).</p> <p>Intent: Determine the impact of a catastrophic natural or manmade event on a location (e.g., a natural catastrophe like a hurricane can rip down trees and take away the homes of plants or animals; manmade or naturally occurring fire can burn down a forest or a building, taking away homes of plants and animals).</p>

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<p>S4B3.3.5a Identify the impact of one type of pollution on a community.</p> <p>Intent: Determine how pollution can harm a community (e.g., trash can make a location unsafe; water can become polluted by an oil spill and hurt the plants and animals that live in the water; air can become polluted by burning fossil fuels or trash).</p>	<p>S8B3.3.3a Identify ways to reduce pollution through waste management (e.g., recycling, composting).</p> <p>Intent: Determine how to reduce pollution (e.g., put trash in the recycling or trash can to decrease the amount on the ground; use electronic waste recycling to reduce the number of toxins put back into the environment).</p>	

Physical Sciences

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<p>S4C1.1.1a Identify solid or liquid states of matter.</p> <p>Intent: Determine if an object is a solid or liquid (e.g., if water is poured into a container, it will take the shape of that container. A solid in that same container will not take the shape of the container).</p>	<p>S8C1.1.2a Use physical observations or measurements to compare density or phase changes of substances (limited to sinking/floating or freezing, melting or boiling points).</p> <p>Intent: Observe differences in density between objects (e.g., wood floats in water but a nail sinks) or phase changes in an object (e.g., ice melts, and water turns to steam).</p>	<p>S11C1.1.1a Recognize that matter is made of particles.</p> <p>Intent: Identify that physical substance is made of smaller and smaller parts (e.g., at a macro scale, could use Legos or blocks to show that a building is made up of lots of different pieces; use a micro scope to look at a leaf and the leaf cells that make up the leaf).</p>
<p>S4C1.1.2a Compare objects by shape, size, weight, or texture.</p> <p>Intent: Identify similarities or difference in objects (e.g., examine an orange, banana and grape: oranges and grapes are round while a banana is oblong, each object has a different size and mass and each object feels different).</p>		
	<p>S8C2.2.3a Identify energy sources as either renewable (limited to wind, solar, and hydroelectric) or non-renewable (limited to coal, oil, and natural gas).</p> <p>Intent: Determine if an energy source can or cannot be depleted (e.g., wind will not be depleted, but coal and gas are in limited supply).</p>	<p>S11C2.2.3a Identify the impact of using renewable or non-renewable energy sources on the environment (e.g., impact of solar power, coal).</p> <p>Intent: Determine the positive and negative impacts of using energy sources on the earth (e.g., coal causes air pollution and mining harms plants and animals but produces inexpensive energy; solar power requires mining of precious metals which disrupts plants and animals but does not cause air pollution).</p>

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<p>S4C3.1.1a Identify the relationship between force and motion (limited to push and pull).</p> <p>Intent: Determine what happens to an object when it is pushed or pulled (e.g., push a ball and it moves away or pull a ball by a string and it moves closer).</p>	<p>S8C3.1.1a Compare the impact of one or more forces acting on an object (limited to friction, gravity, balanced, and unbalanced).</p> <p>Intent: Determine what happens when one or more forces is applied to an object (e.g., because of friction, a ball will roll faster and further on smooth surface vs. rough surface).</p>	<p>S11C3.1.1a Identify the outcome in a common, real-world situation based on an understanding of forces (limited to push, pull, friction, and gravity).</p> <p>Intent: Determine what happens in a real-life application when forces are applied to an object (e.g., a crane swings a wrecking ball and the building crumbles to the ground).</p>
<p>S4C3.1.3a Identify the position of an object relative to another object (limited to in front of, behind, above, below, to the right, and to the left).</p> <p>Intent: Determine a reference point or perspective by considering the place of an object in comparison to another object.</p>		<p>S11C3.1.3a Determine the relative speed, distance, or time of an object as it travels.</p> <p>Intent: Compare the difference in speed, distance or time that an object moves on two trials (e.g., find the difference in distances travelled by two cars going at different speeds).</p>

Earth and Space Sciences

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<p>S4D1.1.1a Identify prominent Earth features (limited to mountains, valleys, beaches, oceans, lakes, and rivers).</p> <p>Intent: Identify specific characteristics on Earth.</p>	<p>S8D1.1.2a Identify natural processes that change the Earth’s surface (e.g., landslides, earthquakes, weathering).</p> <p>Intent: Determine the natural processes that change the features of the Earth (e.g., a flood can change the land, or an earthquake can change the land).</p>	<p>S11D1.1.3a Determine the relationship between natural processes and the resulting changes to the Earth’s surface (e.g., volcanic eruptions and mountain building, erosion and coastline changes).</p> <p>Intent: Identify a natural process and its impact on the earth’s surface (e.g., hurricanes can cause changes in beaches; floods can change the flow of rivers; volcanoes can make brand new landscapes).</p>
<p>S4D1.2.1a Identify food or clothing products that come from plants or animals.</p> <p>Intent: Determine a food or clothing product that comes from living things (e.g., cotton T-shirts are made from plant fibers).</p>	<p>S8D1.2.1a Identify products that are made from different renewable or non-renewable sources (e.g., lumber from trees, cans from metal, gasoline from oil).</p> <p>Intent: Determine the products humans make from renewable or non-renewable sources (e.g., trees are cut down and used for paper and fuel; coal is used for fuel)</p>	<p>S11D1.2.2a Identify the impact of human-made processes on the Earth’s resources (e.g., manufacturing and pollution).</p> <p>Intent: Determine how humans change, use, and/or hurt the Earth (e.g., humans using cars increases the need for gasoline; humans need for shelter leads to the cutting of forest for lumber; humans need for food leads to the changing of the landscape from forest to fields).</p>
<p>S4D1.2.2a Identify products that can be recycled or reused (e.g., paper, plastic, cans, fabrics, lumber).</p> <p>Intent: Determine that products can be reused for other purposes (e.g., newspapers can be made into more paper; lumber from a house could be used to build another house; plastic bottles can be used to make phone cases).</p>	<p>S8D1.3.1a Recognize processes in the water cycle (limited to evaporation, condensation, precipitation, transpiration, runoff, and infiltration).</p> <p>Intent: Identify the steps in the water cycle.</p>	

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<p>S4D2.1.2a Identify weather conditions using symbols or pictures (limited to temperature, types of precipitation, visibility, and sunlight).</p> <p>Intent: Use pictures to describe the weather (e.g., snowflakes mean it is snowing, rain drops mean it is raining, blue sky means no cloud cover).</p>	<p>S8D2.1.3a Identify how wind direction or cloud types (limited to cumulus, cirrus, stratus, nimbostratus, cumulonimbus) are associated with weather patterns.</p> <p>Intent: Determine that wind direction and cloud type give clues to the type of weather outside (e.g., winds from the north may cause colder temperatures; cumulonimbus clouds/big, dark clouds, could indicate that a rainstorm is coming).</p>	<p>S11D2.1.4a Interpret weather data and predict weather events (e.g., temperature, wind direction, precipitation).</p> <p>Intent: Read weather data and determine the outcomes of weather and predict possible weather events that may occur in the future (e.g., a lot of rain could mean flooding; high humidity with cold temperatures could mean snow; winds from the north could mean cooling temperatures).</p>
<p>S4D2.1.3a Select the appropriate tool to measure the weather (limited to temperature, wind direction, and precipitation).</p> <p>Intent: Determine the best tool to measure rain, sleet, snow, temperature or wind (e.g., thermometer measures temperature; a rain gauge or graduated cylinder measures rain; a ruler measures snow; a weather vane measures wind direction).</p>		