



Curriculum Guide for 3rd Grade SDP Science Teachers



Please note: Pennsylvania & Next Generation Science Standards as well as Instructional Resources are found on the SDP Curriculum Engine

3rd Grade Science Curriculum Term 1 (9/5-11/13/17)

Topic: Rocks and Minerals



Duration: 9-10 Weeks

Performance Objectives

SWBAT:

- Differentiate between rocks and minerals **IOT** classify them by their properties.
- Relate the physical properties of rocks **IOT** determine their potential uses.
- Identify the environmental conditions during the formation of rock **IOT** identify them as sedimentary, igneous, or metamorphic rock.
- Observe the physical changes that occur in rocks and minerals **IOT** describe the results of weathering and erosion.

Key Terms and Definitions

cleavage: The process by which a mineral splits along a definite line.

conglomerates: A type of rock formed from rounded pieces of other rock

erosion: Wear away (soil, rock, or land).

geologist: A scientist who studies rocks and minerals to learn more about the history of our earth

glassy: Shiny and smooth

hardness: Property of a mineral. Hardness is tested by scratching a mineral sample with different objects. The harder a mineral, the more difficult it is to scratch.

identifying color: The color of a mineral in powder form; determined by performing a streak test

igneous: A type of rock that forms when melted rock cools

lodestone: A form of the mineral magnetite; contains iron and acts as a magnet

luster: A property of a mineral. Luster is described by how the mineral reflects light.

magma: Melted rock that is underground

rock cycle: The process by which rocks change to form new rocks. The changes in rocks are caused by many things, including heat, rain and snow, and underground pressure

sedimentary: A type of rock formed from sediments that are carried by wind or water, dropped, and cemented or packed together.

weathering: To age and break down as a result of the effects of wind, rain and ice.

Essential Questions

How is inquiry used to investigate our environment?

How do rocks and minerals cycle through our environment?

What are the similarities and differences between rocks and minerals?

How are rocks and minerals used?

What story of Earth's history can we gather from rocks and minerals?

How is weathering the preparation for erosion?

How does the study of rocks give us clues about the composition of the earth?

Starting Points

Many students are interested in rocks. Start by brainstorming and class discussions to allow them to share their ideas and questions about rocks.

Studying properties of the Earth's materials follows a pattern in which students observe, describe, record and discuss their findings. Student should have the opportunity to solve problems, conduct experiments, or interpret and organize data using samples of various rocks and minerals in the classroom. Have them explore a sample of rocks and discuss their similarities and differences. As they do the teacher can assess the student's observing, describing and recording skills.

3rd Grade Science Curriculum Term 2 (11/18-1/29/18)

Topic: Weather and Climate



Duration: 9-10 Weeks

Performance Objectives

SWBAT:

- describe and record daily weather conditions **IOT** relate seasonal weather patterns to climate.
- record observations using instruments **IOT** describe weather in terms of temperature, wind speed, wind direction, precipitation and cloud cover.
- classify clouds as stratus, cumulus, cirrus, or "other" **IOT** compare results with others, and recognize results may vary.
- differentiate between weather and climate **IOT** explain how weather affects climate.
- record and communicate information **IOT** describe climates in different regions of the world.
- examine the causes of natural disasters **IOT** explain the connection between weather, climate, and natural disasters.

Key Terms and Definitions

air pressure: Weight of air pressing down on the earth due to gravity, (the heavier the weight of the air, the more air pressure on the earth's surface)

anemometer: An instrument for measuring the speed of the wind

atmosphere: The gases the surround the earth

Beaufort Scale: A measure of wind speed

climate: The weather conditions prevailing in an area in general or over a long period.

collection: Water that falls as precipitation comes together in bodies of water such as oceans, rivers, lakes, and streams, or underground

condensation: Water changes from a gas to a liquid; occurs when water vapor gets cold

equator: An imaginary line drawn around the earth equally distant from poles, dividing the earth into northern and southern hemispheres and constituting the parallel of latitude 0°.

evaporation: Water changes from a liquid to a gas; occurs more rapidly at warmer temperatures

hail: Is a large frozen raindrop produced by intense thunderstorms where snow and rain can coexist. As the snowflakes fall, liquid water freezes onto them forming ice pellets that will continue to grow as more and more droplets are accumulated. The hailstone reaches the ground as ice because it is not in contact with the warm air below the thunderstorm long enough to melt before reaching the ground.

humidity: A quantity representing the amount of water vapor in the atmosphere or a gas

polar regions: The polar regions of earth, also known as earth's frigid zones, are the regions of earth surrounding its geographical poles

precipitation: Water falling to the earth in the form of rain, hail, mist, sleet, or snow

sleet: Is frozen raindrops that bounce when they hit the ground or hit something else. Sleet begins as snow high in the atmosphere and then partially melts in warmer layers of air but then refreezes in colder areas of air as it falls.

snow: Is ice crystals that form into flakes. Snow forms at temperatures below freezing. For snow to reach the earth's surface the temperature in the troposphere needs to be at or below freezing. It can be slightly above freezing in some layers if the layer is not warm or deep enough to melt the snowflakes too much.

temperate climate zone: A climate that is warm in the summer, cold in the winter and moderate in the spring and fall.

tropics: A region of the earth surrounding the equator.

Water Pollution: Is anything that gets in water that can make it unclean. Ask students to give examples of pollution.

weather vanes: A device that measures the direction of the wind. The weathervane is usually combined with the anemometer. Wind direction is the direction from which the wind is blowing.

wind speed: The measure of the motion of the air.

Essential Questions

How does weather affect humans?

Why does the weather change?

What is a season?

How does the weather change in each season?

How does the weather affect what we wear?

How does the weather affect what we do?

How do you measure the weather?

Starting Points

Explain that weather is the condition of the atmosphere and results from the interaction between the sun, the air, water and the earth. Weather involves heat or cold, wetness or dryness, calm or storm, and clearness or cloudiness.

Explain that climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years

Meteorology is the study of weather patterns and making weather predictions and meteorologists use specific tools to help them measure the weather.

Students should understand that scientists/meteorologists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.

3rd Grade Science Curriculum Term 3 (1/30-4/9/18)

Topic: Energy



Duration: 9-10 Weeks

Performance Objectives

SWBAT:

- identify types of energy such as light, heat, sound and mechanical energy **IOT** explain how energy can exist in many forms.
- make observations **IOT** provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- ask questions and predict outcomes **IOT** explain the changes in energy that occur when objects collide.
- safely conduct a series of descriptive investigations **IOT** observe how energy can move from one object or material to another object or material
- investigate light traveling in straight lines from its source **IOT** observe how light may be absorbed, blocked, or reflected.
- research examples of mechanical energy **IOT** described mechanical energy as physical movement and the potential for more action.
- safely conduct a series of descriptive investigations **IOT** describe how sound is transmitted, reflected and/or absorbed by different materials.

Key Terms and Definitions

chemical energy: Energy that holds particles of matter together.

electrical energy: Energy that can pass through wires made of special metals and change into forms that run appliances at home.

electricity: Electrical energy that moves through wires.

energy of motion: Energy that moving objects have.

energy: The ability to do work or cause change; ability to make things move, stretch, or grow.

friction: When rubbing between objects changes energy of motion into heat energy.

fuel: A material used to produce heat or power by burning.

generate: To make.

light energy: Energy from the sun.

particles: The smallest possible amount of something.

stored energy: Energy that can be changed into a form that can do work

substance: Physical material from which something is made

temperature: Degree of hotness or coldness measured on a scale

thermal energy: Energy that makes particles of matter move faster; you feel this energy as heat.

transfer: To pass from one to another.

vibrate: To move back and forth.

waves: The way energy is carried from one place to another.

wires: A metal in the form of a very flexible thread or slender rod.

Essential Questions

What are sources of energy?

What are some ways energy changes form?

How is energy transferred from place to place?

What are some ways energy moves?

How is energy converted from one type to another?

How do humans harness energy for everyday use?

Starting Points

(background information excerpts from SEDL Mosaic)

The study of energy is abstract for elementary students. To increase their understanding of energy, provide concrete experiences that enable students to connect different types of energy to their everyday lives. As students experience increasingly complex interactions between energy and matter, they will begin to understand that many of the changes they observe occur in predictable patterns for each form of energy. The study of energy also fosters a student's ability to observe, describe, and predict patterns in both a qualitative and quantitative manner.

Energy

Grade 3 students need multiple opportunities to experience different forms of energy. The U.S. Department of Energy defines energy as the ability to do work or the ability to move an object. At the start of this unit, check to determine students' definition of energy. Then at the end of the unit, revisit the concept to refine and deepen students' operational definition of energy.

Light

Light travels through air and space as waves of energy. The waves we can detect are called visible light. There are many sources of light, but the initial energy for all light sources comes from the sun. Patterns in the behavior of light are very predictable because light moves away from its source in straight lines in the form of waves until it comes in contact with an object or material that changes its direction. Light can pass through, reflect or bounce off, or be blocked by different materials as it moves in a straight line from its source.

Light rays can reflect or bounce off a surface or an object in much the same way that a thrown rubber ball bounces off a wall. The texture of the surface determines how much light will be reflected or absorbed. Mirrors have smooth, shiny surfaces that absorb very little light, so they reflect light in almost exactly the same pattern as it hits the mirror, which allows us to see a complete reflected image of objects.

Without light, we cannot see. Our eyes are built to detect a portion of the electromagnetic spectrum known as the visible spectrum. Each eye contains a lens that refracts, or bends, the light waves so they travel to the retina at the back of the eyeball. The retina then sends signals to the brain, which interprets them as an image.

Heat

Temperature and heat are not the same thing! Temperature is a measurement of how hot or cold a substance is; heat is the amount of energy contained in a substance or material. This heat energy can pass or transfer to other cooler objects. Adding heat energy often causes changes in matter, such as melting chocolate. Taking away heat energy can also lead to changes in matter, such as a freezer changing liquid water to ice.

Mechanical Energy

Mechanical energy is the energy an object or material has because of its motion or position and is the sum of potential energy (stored) and kinetic energy (energy in motion). The movement of a car or the stretching of a spring scale are examples of mechanical energy.

Sound

All sounds are caused by vibrations, or rapid back-and-forth movements. Vibrations can be heard and often felt when they travel through the air to our ears as sound waves. Sounds can also travel through other materials, like liquids and solids.

We hear sounds with our ears. The outer ear collects sound waves and funnels them to the eardrum, causing it to vibrate. The three tiny bones in our middle ear pick up the vibrations, which then pass on to the cochlea in the inner ear. The vibrations cause the little hairs on the cochlea to vibrate, and these vibrations in turn are sent to the brain. This process is why you cannot hear well when you have an ear infection—fluid in the middle ear prevents the eardrum and cochlea from vibrating properly.

Musical instruments produce specific sounds by making air vibrate at different rates called frequencies. Frequency can be measured by how many times one part of the sound wave moves back and forth in a second.

Different notes are produced on a guitar or violin by increasing the tension on the strings, causing them to vibrate faster, or with a greater frequency. For example, a guitar player turns the tuning pegs at the end of the fingerboard to increase the tension on the strings. Likewise, a guitar player presses a string on the fingerboard to raise the pitch of a note by allowing only a section of the string to vibrate.

3rd Grade Science Curriculum Term 4 (4/10-6/15/18)

Topic: Inheritance and Traits



Duration: 9-10 Weeks

Performance Objectives

SWBAT:

- analyze structures and characteristics of plants and animals **IOT** identify similarities and differences between parents and offspring.
- identify patterns in traits of plants or animals **IOT** explain how parents can pass some of their traits on to their offspring.
- find evidence in nature **IOT** show that some of a plant or animal's traits can be influenced by the environment.
- differentiate between inherited and acquired traits **IOT** explain how some traits are passed on from parents while others are influenced by the environment.
- identify the needs of living things **IOT** explain what characteristics are necessary for survival.
- use evidence **IOT** make an argument that some characteristics help animals gain an advantage in surviving, reproducing, and finding mates.
- identify adaptations of plants and animals (e.g., protective coloration, mimicry, leaf sizes and shapes, ability to catch or retain water) **IOT** describe how adaptations help these organisms to survive.
- describe the characteristics needed to survive in a given environment **IOT** explain why only certain plants and animals can live in an environment.

Key Terms and Definitions

heredity: The passing of traits from parent to offspring

trait: A genetically determined characteristic

inherit: To receive a quality or characteristic from one's parent

inherited traits: Traits that are coded in your DNA and that are passed on from your parents

acquired traits: Traits that you are not born with and that develop during your life; they are not in your DNA

adaptation: A change that improves an organism's chance to survive

offspring: The young of a living organism, such as a plant or animal

mimicry: A defense in which one organism resembles another which is dangerous or poisonous

evolution: A change in the characteristics within a population from one generation to the next; the development of new types of organisms from preexisting types of organisms over time

DNA: The material that contains the information that determines inherited characteristics

mutation: A change in a gene or DNA molecule or an organism

natural selection: The process where organisms better adapted to their environment survive and produce more offspring while others die off

Essential Questions

What patterns can be found in characteristics of parent animals and their offspring?

How can the environment influence or change an organism's traits?

How do traits help determine which animals will survive and which won't?

How might an animal adapt to survive in its environment?

Starting Points

Upon beginning this unit, students will have had multiple introductions to living things in grades K-3. In the last unit, students studied energy in different forms: electrical, magnetic, heat, wave, and solar. This unit uses the general concept of energy to springboard to how energy supports life. It then segues to inheritance. How does it do this?

Plants and animals need air, water, and food to survive. Energy is stored in food (so, there's the connection). All energy to make food (plants) that we eat to stay alive comes from the sun. The sun's energy is trapped in plants and the sun's energy also 'makes weather' [the uneven heating of the Earth]. Thus, solar energy is a large factor in plants' and animals' capacities to survive. In essence, weather and availability of energy define environments and environments impact which plants/ animals live or die. The flow of concepts is listed below:

- **S4.B.1.1.3:** Describe basic needs of plants and animals (e.g., air, water, food).
- **S4.B.2.1.1:** Identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest).
- **S5.B.2.1.2:** Explain how inherited traits help organisms survive and reproduce in different environments.
- **S5.B.2.1.3:** Explain how certain behaviors help organisms survive and reproduce in different environments.
- **S5.B.2.1.4:** Identify changes in environmental conditions that can affect the survival of populations and entire species.

By the end of the unit, students will be able to explain that certain traits are passed from parents to offspring and give examples of what those traits might be. They will also be able to identify patterns in plants and animals that are a result of the passing of traits from one generation to the next. Students will understand that some traits can be changed by environmental factors, and they will be able to give examples of some of these traits. Lastly, students will understand that some structures and characteristics make it easier for an animal to survive in their environment. In some situations, organisms will either need to adapt their characteristics to their environment or risk death. Those organisms that can adapt (or that are born with favorable characteristics) are more likely to survive and continue to reproduce than others.