GRADE 6 SCIENCE EXPLORATIONS TO DO AT HOME

One of the three core principals of *Each Child, Our Future*, Ohio's strategic plan for education, is partnerships. The plan recognizes the collaboration between teachers and parents as the most important partnership. This document provides activities for students to complete in a home environment, allowing parents to be more closely involved in each child's mastery of science concepts. The investigations are written for a home setting using limited resources and are specifically targeted to each of *Ohio's Learning Standards for Science*.

The resources listed in this document are provided to enhance planning, instruction and learning about science. They are not mandatory. Local districts are responsible for establishing the local curriculum and identifying appropriate instructional resources. The at-home projects are intended to provide activities that can be used by teachers to assign as homework or share with parents to supplement classroom instruction. Teachers should feel free to adapt the activities to align with the local curriculum. The projects are designed with the intent that technology is not necessary; although in many cases, the activities could be extended with additional components. When possible, data can be shared in small groups or with the entire class, analyzed and discussed to deepen understandings that students uncover during these activities.

It is important to build a strong foundation in science in the early elementary years so students are prepared for understanding more complex material in the intermediate and middle grades. It is equally important to continue students' science instruction by offering more advanced courses at the high school level. This allows students to be better prepared to compete for admission to college or other postsecondary programs, as well as for increasingly technical jobs. Advanced science courses in high schools also help produce a more scientifically literate public.

6.ESS.1 Minerals have specific, quantifiable properties.

Outside option: Collect rocks from the yard, field or natural area. Test the rocks to see if they leave marks when scratched on tile, whether they break easily and whether they are attracted to a magnet. Organize a way to record your results. In your data table, describe the shape and size of the crystals, if any are visible. Is the rock shiny or dull? If you can, use the data you collect, along with online resources or your textbook to try to determine what mineral(s) make up each rock.

Inside option: Research the characteristics and formation of various minerals. Your textbook should have information. Choose one and write a narrative story or illustrate a cartoon strip describing how the mineral formed.

6.ESS.2 Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification.

Outside option: Gather a variety of rocks from the yard, field or natural area. Determine a way to sort them. Write a description for each category. Use an online guide or your science textbook to try to identify the rocks. Which are sedimentary? Igneous? Metamorphic? How was your method of classification similar to or different from the igneous, metamorphic, sedimentary classification system geologists use?

Inside option: Design an informational pamphlet explaining igneous, metamorphic and sedimentary rocks. Include information about locations where each is common in Ohio and how each is formed.

6.ESS.3 Igneous, metamorphic and sedimentary rocks form in different ways.

Outside option: If there is an exposed rock surface (road cut, cliff) nearby, examine the layers to see what types of rock appear. Is there a coal layer? Sedimentary rock? What do these types of layers indicate about the past environment in your part of Ohio?

Inside option: Use shavings from crayons to model the processes in the formation of igneous, metamorphic and sedimentary rocks. Think about the ways these rocks form and how you can put your crayon shavings through similar processes. Be sure to check with an adult about any heat sources you plan to use. Describe the appearance of the individual shavings in the "rocks." Identify ways your model "rocks" are similar and different from real igneous, metamorphic and sedimentary rocks.

6.ESS.4 Soil is unconsolidated material that contains organic matter and weathered rock.

Outside option: Dig a hole and look inside to see the layers of soil. What do you see in the top layer that isn't found deeper? How do colors or textures change? Is there evidence of living organisms? In which layers? Draw a diagram showing your findings. Repeat in a different location. Are the soil horizons (layers) the same in both locations? If not, what could explain the differences? Be sure to pack dirt back into your holes for safety when you have finished.

Inside option: Read about the dust bowl. You can find books to download (*Out of the Dust*) or online articles. How did agricultural practices contribute to the dust bowl? What natural causes contributed? How were people's lives affected?

6.ESS.5 Rocks, minerals and soils have common and practical uses.

Outside option: Play geology sleuth, look inside and outside your home for examples of ways humans use Earth materials. Identify as many places as you can that rocks, soil or minerals are used.

Inside option: Make a list of ways that rocks, minerals and soils are used by people. Be sure to think about construction, energy, transportation, agriculture, jewelry, dyes and technology. If resources are available, research which type of Earth material is most appropriate for each use. Create a project (poster, slide deck, video) that showcases the many ways we depend on Earth materials for human activities.

6.PS.1 Matter is made up of small particles called atoms.

Outside option: Find the volume of irregular objects. Put a container large enough to fit your objects on top of a tray with edges or a larger pan. Fill the container exactly to the top with water. Carefully, to avoid splashing, put one of your objects into the water. If it sinks, great. If it floats, push it gently with your finger until it is just under the water, then let go. You can now measure how much water flowed out of your container. Use a measuring cup or spoon to see how much volume your object displaced. Test your other objects. Display the volumes on a column graph. Be sure to title and label the graph.

Inside option: See how many elements from the periodic table you can identify in your home. Be sure to read labels on products to see if you find any there. Researching online to find the uses of various elements may help you find more. Be sure to check with a parent before examining any products that may be harmful (cleaning supplies, workshop chemicals, medications).

6.PS.2 Changes of state are explained by a model of matter composed of particles that are in motion.

Outside option: Take ice cubes outside on a sunny day. Design an investigation about changes of state using your ice cubes and heat from the sun. Describe the question you are trying to answer and how you plan to set up the investigation. Conduct your tests and record your observations. Think about the best way to organize and analyze your data. What did you discover? Write a conclusion describing how evidence from your tests supports your claim.

Inside option: Be sure to get adult permission. Heat a pan of water on a stove burner. Time how long it takes to reach a certain temperature or to boil. You will have to decide on an observation to use to determine it has reached that point (thermometer, bubbling, steam). Empty and cool the pan. Repeat using twice as much water. Write an explanation for your observations.

6.PS.3 There are two categories of energy: kinetic and potential.

Outside option: Explore the relationship between height and gravitational potential energy by dropping a rock onto a pile of sand or loose dirt and comparing the size of the craters it makes. Want more fun? Drop water balloons from various heights and measure the size of the splash zone. No balloons? Baggies might work. Be sure to control for variables such as the amount of water you use. Don't worry if you don't have a ruler. You can measure with any object. Record your findings and describe the relationship you found.

Inside option: Set up a ramp using anything around the house. Mark a starting line and release an object to roll or slide down the ramp. Measure how far it travels. Change the height of your ramp and repeat the test. Look for a relationship between the height and distance traveled.

6.PS.4 An object's motion can be described by its speed and the direction in which it is moving.

Outside option: Fill a baggie with water and make a tiny hole in the bag (so it can drip slowly). Walk at a steady pace along a sidewalk or driveway. Examine the pattern in the drips. Try this again walking slower or faster and then running. What changes? Try it again starting from a standstill and slowly going faster and faster. What pattern do you see now? Use your observations to write a paragraph describing your personal definition of the word "speed."

Inside option: Design a drip cart out of household materials. Your cart should be able to slowly drip a substance (washable paint, food coloring, syrup, water). It needs to be able to roll or slide and drip on the space beneath it. Pull your drip cart at a slow, steady pace across paper (tape together notebook paper, newspaper or junk mail). Examine the pattern in the drips. Try this again pulling slower or faster. What changes? Try it again starting from a standstill and then slowly pulling faster and faster. What pattern do you see now? Use your observations to write a paragraph describing your personal definition of the word "speed." Water also could be dripped directly on a tile floor. Water-based paint or syrup could be dripped in a bathtub. Be careful not to drip anything that could stain directly on a surface.

6.LS.1 Cells are the fundamental unit of life.

Outside option: Construct a cell model out of materials you find in the local environment. Consider the structure and function of the cell organelle when choosing the materials to represent each. Take a video of yourself explaining each organelle.

Inside option: Are viruses alive? Research to come up with an answer. Justify your answer with evidence from reliable sources.

6.LS.2 All cells come from pre-existing cells.

Outside option: Sprout seeds to observe the stages a plant goes through as it reproduces. Open the sprouting seeds at different stages and observe the changes. Notes, sketches and photographs are all good record-keeping methods. Once plants begin to grow, observe similarities and differences between the seedlings and later the mature plants.

Inside option: Research how viruses, such as coronaviruses, reproduce. Compare this to mitosis, which happens in plants and animals.

6.LS.3 Cells carry on specific functions that sustain life.

Outside option: Explore the functions of leaves. Experiment with leaves on a plant by exposing them to a variety of conditions and recording observations of each leaf over time. Be sure to organize your data carefully so you can identify what happened to each leaf day by day. Some suggestions to try are coating the leaf with different substances, enclosing the leaf in a baggie, breathing on it, shining extra light on it, exposing it to light 24 hours a day or shielding it from the sun with a paper bag. You can think of others. Record changes to each leaf each day and record anything you see happening inside the coverings. What can you conclude from your investigations? Support your claims with evidence from your tests.

Inside option: Get a parent's permission to make bread to investigate how yeast reacts under various conditions. Vary the temperature, amount of sugar or type of flour. You can even split your bread recipe into fractions (good math practice) and make rolls so you can test several conditions in smaller batches. Compare the density of the bread that results to see which conditions are best for yeast. Hint — active yeast makes fluffy bread! Be sure to keep accurate records of the conditions you use. If you don't have a favorite bread recipe, use the one below, no bread machine needed, just bake in any greased pan.

Basic bread recipe: (the basic recipe can be your control)

Scald 1 cup of milk. Dissolve ½ cup of sugar and 1 tablespoon of salt in the warm milk. Let this cool. Dissolve 1 packet of yeast in one cup of warm water. When the milk has cooled, add the yeast water to it. Mix in 3 cups of flour. Add 6 tablespoons of melted butter. Add three more cups of flour. Knead it all together and leave it to rise in a greased bowl. When it has doubled in size, shape it into loaves, rolls or braids. Let it rise again. Bake at 350° for about 20 minutes.

6.LS.4 Living systems at all levels of organization demonstrate the complementary nature of structure and function.

Outside option: Choose a flowering plant to examine. Make a careful scientific drawing of the plant. Annotate each part with a description of the function it performs. Which parts are organs? What different types of tissues can you find in your plant? Does your plant exhibit symmetry? Choose another plant. In what ways is the second plant different? Try to identify some characteristics that all plants have in common.

Inside option: Choose two fruits or vegetables. Examine each. What part of the plant did the items come from? Is the fruit or vegetable symmetrical? Carefully sketch each item. Label your sketches telling whether each part is a tissue or an organ and describing its function.