Cross-Curricular Activities Connected to Physical Science, Grade 2

The following activities from ***Matter,*** integrate math, social studies, English Language Arts (ELA), art, and more into physical science topics. These cross-curricular connections help students see how science is related to their lives, and the world they live in. These activities reinforce and extend ideas making connections between materials and how they are used and are perfect for learning-from-home lesson plans. Permission is granted to incorporate these activities into teacher and parent lesson plans.

Structures in Math or Math in Structures (Math)

Numbers are the building blocks of mathematics. Every positive number except for 1 is made up of other whole numbers added together. The number 3? It's 1 and another 1 and one more 1 all added together. The number 341? It's 341 different 1s added together. And it doesn't stop with 1s, either. Some numbers can be broken down by 2s, or 3s, or 10s, or more. Two 5s add up to 10, but each 5 is also made up of five different 1s. So, although 100 can be broken into two different 50s, or four different 25s, or five different 20s, or ten different 10s, all of these numbers can be broken down into their most basic part: 1. The number 1 is where all the other whole numbers start from. Explore some numbers with the class and the different parts that make up each whole number.

Language as a Structure (ELA)

Language is the most important way that people communicate. Help students explore language as a whole structure by taking a closer look at sentences, words, and letters. Like whole structures, sentences are made up of smaller parts called words. Words are made up of even smaller parts called letters. Letters from one word can be rearranged to form other words. Combinations of words form sentences. Combinations of sentences form paragraphs. Paragraphs form even bigger structures, such as poems or books. Changes in any of the combinations result in the communication of different ideas. Have each student write a sentence with at least five words in it. Direct them to draw a box around each individual word and then to draw a line between each letter of each word. Ask:

- How many words did you use in your sentence?

Ask each student to write out the alphabet. Have them go through their sentence and place a checkmark under each letter of the alphabet that appears in their sentence. If a letter was used more than once, they should place more than one checkmark beneath it. After some time, ask:

- Which letters did you use most?
- Which letters did you not use at all?

Challenge students to use the letters in their original sentence to form different words. Further challenge them to use these new words to form a new sentence.

Graphing Solids (Math)

Provide an assortment of solids and liquids (at least two of each type). Challenge students to sort and then create a bar graph to show the quantity of each type of matter in the assortment. Ask students to write a story problem to go with their bar graph. Allow pairs of students to solve each other's problems.

What Is the World Made Of? (ELA)

Read aloud to the class What Is the World Made Of? All About Solids, Liquids, and Gases (Let's- Read-and-Find-Out Science, Stage 2) by Kathleen Weidner Zoehfeld. Discuss the reasons the author gives for what makes a solid, a liquid, and a gas. Have students imagine real-life situations in which it would be silly to use a liquid instead of a solid or a solid instead of a liquid. Invite students to draw and then write to describe what that would look like.

What's Smaller than a Pygmy Shrew? (ELA)

Read aloud to the class What's Smaller than a Pygmy Shrew? (Wells of Knowledge Science Series) by Robert E. Wells. It features engaging illustrations and a great glossary to explain tiny particles, molecules, atoms, and microscopes.

While reading, point out the illustrations and graphics and ask students how these text features may help them understand the ideas better. After reading, address students' questions or comments. Ask each student to share one piece of information about atoms, particles, molecules, or microscopes that they did not know before.

Old Faithful (Social Studies)

Yellowstone National Park is home to many hot springs and geysers. Both are examples of water being heated underground and erupting through the surface of the earth as a result. Students can view animations of how geysers work and can view webcam video of the park's most famous geyser, Old Faithful. Have students visit and explore the National Park Service website for Yellowstone National Park.

Move Like a Particle (Movement Education)

Have students act out the ways the molecules are arranged in solids, liquids, and gases. In small groups or as a whole class, model the following particle arrangements:

- Solid: Huddle close together so that it is difficult to move.
- Liquid: Link arms and walk around to model the chain-like arrangement in a liquid.
- Gas: Move around each other freely.

A Grain of Sand (Science and ELA)

Ask students to recall Investigation B of this lesson, in which they examined a single grain of sand. Tell students that scientist Dr. Gary Greenburg has photographed grains of sand using a special microscope that he invented. Have available one or more copies of A Grain of Sand— Nature's Secret Wonder by Dr. Gary Greenburg.

Explore the different photos of grains of sand, including Sand Grains, Moon Sand, and the photographs Sugar Crystals #1, #3, and #5 in Food. Have students write a descriptive paragraph about the grains of sand and the crystals that they saw, using as many descriptive words and adjectives as possible, and then share their paragraphs with the class.

Steam Will Spout Song (Music)

Explain that teapots whistle when steam escapes through the small hole while the water is boiling. As the water boils, it evaporates into a gas, which rises inside the teapot and is forced out of a small hole in the lid. It is the escape of water vapor and steam from the small hole in the teapot that makes a loud whistling sound. Teach the class a song about steam. Teach the melody from the song "I'm a Little Teapot" and any movements you know that may go with it. You may create your own lyrics to the melody or use the lyrics below. Have students create motions to go with the lyrics.

Steam Will Spout

I'm a hefty teapot, full and hot.

Soon I'll be boiling, and steam will spout.

Then I'll have a liquid and a gas.

When the vapor escapes, I'll shout!

Comparing States of Matter (Literacy)

Read aloud States of Matter by Suzanne Slade (Book 1) and States of Matter: A Question and Answer Book (Book 2) by Fiona Bayrock. Draw a Venn diagram on the board, and label the left section "Book 1," the right section "Book 2," and the middle section "Both Books." Have students determine where topics discussed in the texts belong on the diagram. Once the diagram is complete, have students review the topics presented on the Venn diagram for each book. Ask:

- Which book explored more topics?
- Do you think one book did a better job explaining states of matter based on the number of topics mentioned?
- Why do you think so?

Liquid Lava (Geography)

Explain that lava is rock that is heated to such an extremely high temperature that it flows as a liquid from active volcanoes. Some volcanoes have thick, pasty lava that moves slowly, while other volcanoes have thinner lava that flows quickly. Point out that quick flowing, runny lava is mainly found deep under the ocean where Earth's crust is being formed. One rare location on land where fluid lava can be found is Iceland. Display a world map and show students where Iceland is located.

Rusting Metal (Science)

Metal is a strong and durable material that provides the framework for many large buildings and bridges. Because it is so strong, metal can support the weight of large amounts of concrete if the framework is designed correctly. Yet, some metals do have weaknesses. One weakness is rust. Rust, also known as iron oxide, occurs when iron or steel comes into contact with oxygen and moisture. Over time, a chemical reaction between the oxygen, the moisture, and the metal results in oxidization, a type of corrosion. The metal turns a reddish-brown color and begins to flake. If left unchecked, the process can deteriorate parts of a metal framework. This often affects older cars; when the paint that protects the metal body wears off, oxidization occurs rapidly.

Students can observe rusting by placing a small piece of steel wool in a clear plastic cup with a small amount of water. Over a two-week period, allow students to observe the changes in the appearance of the steel wool in the cup.

Burning Wood (Science)

In this lesson, students learned that wood is an insulator, or a material that helps keep heat outside in the summertime and inside in the wintertime. Identify wood as a common source of heat energy. Although wood insulates against low levels of heat, it is combustible when high levels of heat are applied to it. Just as important, when wood burns, a chemical reaction occurs that cannot be undone. Energy is released from the wood as heat, and the physical properties of the wood change, releasing smoke (a colloid), ash, and chemicals such as carbon monoxide. Show students a video of a fire and ask them to identify physical changes and chemical changes. Discuss how the energy in the system causes phase changes. Challenge students to think about why fires are used for warmth or to cook food.

Spongy Measurements (Math)

Sponges are porous materials that, like paper, absorb liquids. Provide small groups or pairs with rulers and a variety of colors and lengths of dry sponge. Ask students to measure the length of each sponge and then use those measurements to create an addition or subtraction word problem for another group to solve. Each group should solve its own word problem and record the correct answer before giving it to another group.

Cooking Up New Identities (Science)

Chemical changes can occur in a couple of ways. In one way, energy is added to the matter, which results in the matter breaking down into its more basic parts. These parts are not the same as the whole. They have their own identities, and therefore a chemical change has taken place. In another way, the energy added to the matter causes individual substances to combine, resulting in a new identity. Either way, the new substances are different from the old. Many of these concepts can be connected to cooking or baking. Ask students to list foods they enjoy eating and how each food is prepared. Encourage students to describe which state and identity changes occur during the preparation of each food.

Candles in the Wind (Science)

Burning candles are examples of matter undergoing physical and chemical changes that are both the result of heat energy. The physical change occurs when the candle's paraffin wax melts from the heat energy of the flame. The wax changes from a solid state into a liquid state. Some of the melted wax will return to its original state once the candle is extinguished and the heat energy is removed. The heat also causes a chemical change, and this cannot be undone. Wax is a petroleum product that contains hydrocarbon. When heated, the hydrocarbon reacts with oxygen, causing part of the wax to separate into water and carbon dioxide gas. Light a candle in your classroom and allow it to burn throughout the day. Allow students to make observations before and after the candle has been burned, and then facilitate a discussion about the changes that occurred.