Children's Museum of Houston

Pre/Post Classroom Activities

Matter, Matter, What's the Matter?

How to use these materials:
This unit on matter is designed to enhance students' understanding and experience with properties of matter. It correlates with the fundamental concepts explored at The Children's Museum of Houston's Matter Factory exhibit. The four main activities in this unit can be used all together as a complete unit, or individually as they fit into your lesson schedule. They can be used before or after your class trip to the museum. When used in advance, they provide an in-depth, hands-on introduction to matter's most basic properties that can then be further investigated at the Matter Factory exhibit. When used after your museum visit, the activities reinforce and serve as practical applications of the concepts explored at the exhibit. It may be helpful to break up the unit and do part before your trip (such as the Introduction on Matter), and part after (Stranded on a Desert Island is a great application activity for afterwards).

Objectives:
Provide students with hands-on opportunities to construct a fundamental understanding of matter. This understanding includes the ideas that everything is made of matter, different matter has different properties that make them unique and useful in different ways, material can be sorted and described by their properties, and matter is made of smaller parts called molecules and atoms. The specific properties explored include: magnetism, opacity, density, elasticity, conductivity, and buoyancy.

TEKS:

§112.7.b. Science, Grade 5.

(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to:

> (A) collect and analyze information using tools including calculators, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, compasses, balances, hot plates, meter sticks, timing devices, magnets, collecting nets, and safety goggles; and
>
> (B) demonstrate that repeated investigations may increase the reliability of results.

(7) Science concepts. The student knows that matter has physical properties. The student is expected to:

> (A) classify matter based on its physical properties including magnetism, physical state, and the ability to conduct or insulate heat, electricity, and sound;

(8) Science concepts. The student knows that energy occurs in many forms. The student is expected to:

> (C) demonstrate that electricity can flow in a circuit and can produce heat, light, sound, and magnetic effects;

Key Words and Concepts:
Matter- The substance, or stuff, that makes up physical objects. Everything is made of matter, whether it is a solid, liquid, or gas. All matter is made of smaller particles called molecules, or atoms.

Magnetic- The ability of matter to be attracted to a magnet. If something is magnetic, it will be attracted or stick to a magnet.

Opacity- The ability of matter to obstruct the transmission of light or other radiant energy; how much light a material can block. Something is very opaque if no light or energy can get through it.

Density- The amount of mass an object has per unit of volume. Or in other words, how much stuff is inside an object, and how tightly it's packed in. Density = Mass/Volume

Elasticity- The property of matter that describes how much something can be expanded or stretched and still return to its original shape afterwards.

Conductivity- The ability of matter to act as a medium for transmitting an electrical charge. Matter that is a good conductor allows electricity to flow easily through it.

Buoyancy- The ability of matter to float when placed in fluid. In order for an object to float, it must be less dense than the fluid it is placed in.

Unit Activities:
Activity 1: Introduction to Properties of Matter (40 minutes)

Activity 2: Description and Demonstration of Specific Properties of Matter (40 minutes)

Activity 3: Stranded on a Desert Island (90 minutes)

Activity 4: But what I really needed was… (30 minutes)

Evaluation:
Activities 1 and 2 consist of the teacher setting up an enriching learning discussion that facilitates the students constructing concepts of the properties of matter. Consequently, evaluation of these activities includes observation and attention to the ideas the students construct. Look for the main properties of magnetism, opacity, density, elasticity, conductivity, and buoyancy to come forward as evidence of students' learning.

Activities 3 and 4 are best evaluated by reviewing the students' work as recorded in the research labs, plans and explanations for their three structures on the island, and the invention of their new material.

Activity 1: Introduction to Properties of Matter (40 minutes)

Objective:
This serves as a basic introduction to students on matter and its properties. Students practice describing objects according to their properties and practice grouping, or classifying, properties according to what aspect of the object they describe.

Materials Needed:
• Several different objects of varying physical properties for students to handle and describe. You'll need enough for each student to have their own. (*Examples: block of wood, rubber band, orange, bell, Styrofoam ball, leaf, fabric, crayon, wheel,* plastic cube, metal pipe, etc.)
• Strips of Paper

Procedure:
• Hand out one object to each student.

• Have the students spend time studying and handling the objects. Encourage them to use all their senses to explore how their objects look, feel, smell, and sound. Have them roll, drop, and slide their objects to see how they moves.

• Ask questions to stimulate their exploration, particularly in a direction that will get the students thinking about *magnetism, conductivity, density, opacity, buoyancy, and elasticity*:
Do you think you could shine a light through this object?
How can your object move?
What do you think would happen if you put your object in a tub of water?
What is the most distinct characteristic your object has that sets it apart from other things?
What would happen if your object was put close to something very hot?
Do you think anything about your object would change if it got very cold?
Would your object be attracted to a magnet?
Can your object stick to things or is it slippery?
If you stretch or bend your object will it go back into its original shape afterwards or break?
Do you think your object weighs a lot or a little for its size?

• Have the students write down their observations and descriptions of their objects on a piece of paper. Encourage them to be as detailed and thorough as possible.

• Begin a class discussion on matter by explaining that matter is the substance, or stuff, that makes up all physical objects, whether it is a liquid, solid, or gas. Matter has many different properties, which are descriptions of what something is like. Ask the students to look at their list and share some of the descriptions, or properties, of their matter with the class.

• As students share their objects' properties, write the descriptions on a strips of paper and tack them to the chalk board. Continue until there are a wide variety and number of descriptions on the board. Encourage descriptions that are related to the properties of *magnetism, conductivity, density, opacity, buoyancy, and elasticity* by asking leading questions (ex: Does anyone have a description of how something moves if it is stretched out?)

• With all the descriptions on the board, ask the class if any of the properties have anything in common, or could be grouped according to similarities.

• Have students take turns coming up to arrange the descriptions into groups according to similarities.

• Look at the final groupings and encourage the students to find an appropriate label for the groups. Encourage the students to group and recognize the properties of *magnetism, conductivity, density, opacity, buoyancy, and elasticity.* They will need help finding a name for many of these groups. For example, they might have a group of things that would stick to magnets, but need help to know that *magnetic* is a word that describes this characteristic.

• Explain that the groups' labels represent different properties of matter. Take the labels for *magnetism, conductivity, density, opacity, buoyancy, and elasticity* and set them aside on the board, explaining that the class is going to look more closely at these specific properties.