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 4: But What I Really Needed on the Island Was… (35 minutes)

Objective:
Students have the opportunity to take their application of the properties of matter to the next level of thinking and creativity as they theoretically create a new material with a unique set of physical properties to solve one of the difficulties they encountered when building their structures in the Desert Island Scenario.

Note:
This activity is dependent upon the completion of Activity 3: Stranded on a Desert Island

Materials Needed:
Activity 4 Worksheet: "But what I really needed on the island was…"- Student Packet

Procedure:
• Brainstorm as a class what difficulties they encountered when trying to build their shelter, path, and boat on the desert island. Which natural elements did they find challenging? What materials did they wish that had that weren't on the island? Did some groups find after their question/answer session with the class that some of their materials weren't sufficient for the elements or challenges of the island?

• Have each student choose a problem or challenge that either they encountered, or the class brainstormed, to solve. Explain that they are to find a solution to their problem by creating a new material that has never been invented. It can be a material that combines any number of physical properties they have learned about (example: wood that conducts electricity, that you can see through, or is sticky enough that you don't have to use nails when building things, etc.). Encourage the students to be as creative as possible, thinking outside normal physical limitations.

• Students will draw a sketch of their new material, and a sketch of how the new material would be used to solve their problem on the island (which structure it would be a part of, why, where, etc.). Have the students include a description of their new material in terms of its magnetism, conductivity, density, opacity, buoyancy, and elasticity.

• Students share their new material ideas with the class, or display the sketches where students have a chance to check out their friends' new materials!

But What I Really Needed on the Island Was…

My New Material: _____

_____

My New Material's Description:

Magnetism: _____

Conductivity: _____

Elasticity: _____

Opacity: _____

Density: _____

Buoancy: _____