

Project 2.4 Properties of Matter: Hardness, Flexibility, Absorbency, and Strength

Introduction

Engineers think about the properties of matter when choosing what material to use for a design. We have learned that matter is anything that has mass and takes up space. Things in the natural world such as plants and flowers are matter. Human-made objects are also matter.

Matter can be described by its properties. You have already learned about properties of matter such as color and texture. Now we will look at hardness, absorbency, and strength.

Hardness is how solid or firm to the touch an object is.

Flexibility is how much an object can bend without breaking.

Absorbency is how much heat, light, or moisture an object can take in.

Strength is the ability to resist forces or stress.

In this project you will identify observable properties of common materials such as wood, stainless steel, nylon, marble, silicon, and cloth. In the design problem, you will need to use what you learn about these properties to choose the best materials for your seed spreading device.

Equipment

- Launch Log
- iPad® tablets
- Eye droppers, 6
- Small container with water, 6
- Sponges, 8
- Nylon kitchen utensils, 8
- Stainless steel utensils, 8
- Wood kitchen utensils, 8
- Cloth oven mitt, 2
- Silicone oven mitt, 2
- Marble coaster set, 2

Procedure

Part 1: Flexibility, Hardness, and Strength

1. Follow your teacher's directions to fill in the chart in your Launch Log for the kitchen utensils.
2. You will make observations but not damage the utensils during testing. For example, when testing flexibility you may try to bend the utensil, but do not bend it so far that it remains bent forever.
3. As you explore the utensils, fill out the chart by ranking the objects for each property.
4. After you complete the rankings, fill out the second chart. Draw a picture of the utensil showing its form in the first column and describe the function of the utensil or how the utensil is used in the second column.
5. Think about what evidence you used to rank the materials by property.
6. Follow your teacher's directions to discuss the evidence.

Part 2: Absorbency

7. Follow your teacher's directions to fill in the chart in your Launch Log for the absorbency testing.
8. Think about when you would want a material to absorb water and when you would not want it to absorb water.
9. Follow your teacher's directions to discuss the observations you made to determine whether a material is absorbent.

Conclusion Questions

1. Do you think any of the kitchen items you observed were designed from an idea that came from nature? Explain.

2. Think about something that you could design to make catching a ball or hanging up your jacket easier. What properties of matter would you want for flexibility, hardness, absorbency, and strength? Explain.