

### **3.C.2 Properties of Materials**

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*Exploring the properties of various materials*

<b>Grade Level</b>	3
<b>Sessions</b>	(1): 1 at 50-70 minutes
<b>Seasonality</b>	Suggested beginning of school year – basic technology/engineering concepts
<b>Instructional Mode(s)</b>	Whole Class
<b>Team Size</b>	N/A
<b>WPS Benchmarks</b>	03.SC.TE.01, 03.SC.TE.04, 03.SC.PS.02
<b>MA Frameworks</b>	3-5.TE.1.1, 3-5.TE.2.1, 3-5.PS.1.1
<b>Key Words</b>	Flexibility, Hardness, Man-made, Natural, Properties

#### **Summary**

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This lesson expands students' knowledge of material properties by familiarizing them with different types of materials and their applications in real-world situations.

#### **Learning Objectives**

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*2002 Worcester Public Schools (WPS) Benchmarks for Grade 3*

1. 03.SC.TE.01 Identify materials used to accomplish a design task based on a specific property, e.g., weight, strength, hardness, and flexibility.
2. 03.SC.TE.04 Describe different ways in which a problem can be represented, e.g., sketches, diagram, graphic organizers, and lists.
3. 03.SC.PS.02 Gather a variety of solid objects. Collect data on properties of these objects such as origin (man-made or natural), weight (heavy, medium, light), length, odor, color, hardness, and flexibility.

*2001 Massachusetts Frameworks for Grade 3*

1. 3-5.TE.1.1 Identify materials used to accomplish a design task based on a specific property, i.e., weight, strength, hardness, and flexibility.
2. 3-5.TE.2.1 Describe different ways in which a problem can be represented, e.g., sketches, diagrams, graphic organizers, and lists.
3. 3-5.PS.1.1 Differentiate between properties of objects (e.g., size, shape, weight) and properties of materials (e.g., color, texture, hardness).

### **Additional Learning Objectives**

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1. Students will differentiate between man-made and natural materials.
2. Students will learn and use vocabulary appropriate to discussing “properties” of materials.
3. Students will improve writing and organizational skills.
4. Students will consider the suitability of various materials with respect to the engineering concepts of “design”, “structure”, and “build”.

### **Required Background Knowledge**

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None

### **Essential Questions**

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1. What are man-made materials?
2. What are some examples of man-made materials?
3. What are natural materials?
4. What are some examples of natural materials?
5. List some important properties of materials.

### **Introduction / Motivation**

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The instructor may begin the lesson by discussing with students the differences between “man-made” and “natural” materials (see Vocabulary with Definitions). Students may give examples from both categories.

### **Procedure**

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The instructor will:

1. Ask each student to collect three different “materials”: one from home, one from outdoors, and one from inside their classroom (examples include: wood, plastic, rocks, wool, cloth, and cotton,).
2. Lead students through the attached worksheet (Properties of Materials); they should use the three materials on their desks.
3. If students require prompting, the following instructions/questions may be used:
  - a. Write the name of each collected object on the chart.

- b. Is the “material” from which each object is made “man-made” or “natural”?
  - c. Is the object heavy, medium, or light in weight?
  - d. What shape is the object?
  - e. Does the material from which the object is made have an odor?
  - f. What color(s) do(es) is the material?
  - g. Is the material flexible? If so, how flexible?
  - h. Is the material hard, soft, or semi-pliable (see Vocabulary with Definitions)?
4. Lead students through the second worksheet, Materials – Building a House.

### **Materials List**

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<b>Materials per student</b>	<b>Amount</b>	<b>Location</b>
<u>Properties of Materials</u> Worksheet	One	End of lesson plan – print or photocopy
<u>Materials – Building a House</u> Worksheet	One	End of lesson plan – print or photocopy
Material from Home	One	Student’s home
Material from Outdoors	One	School playground
Material from Classroom	One	Classroom

### **Vocabulary with Definitions**

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1. *Man-Made* – manufactured, created, or constructed by human beings.
2. *Natural* – created without human care.
3. *Pliable* – easily bent or shaped.

### **Assessment / Evaluation of Students**

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The instructor may assess the students in any/all of the following manners:

1. Collect student worksheets to determine the level of understanding of materials, their properties, and the correct use of a chart or graphic organizer.
2. Use class discussion to evaluate how well students understand the difference between “man-made” and “natural” materials.

### **Lesson Extensions**

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1. Consider using this lesson in conjunction with 3.C.1 – Materials to Build.

### **Attachments**

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1. Properties of Materials
2. Materials – Building a House

### **Troubleshooting Tips**

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1. The objects that are found in the classroom may be made of several materials or be synthetic, which may be created to look like natural materials. To minimize confusion, suggest that students chose items made of a single, non-synthetic material.

### **Safety Issues**

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1. Ensure the students do not choose dangerous materials, such as broken glass, sharp objects, litter, or soiled items.

### **Additional Resources**

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None

