WEEK 4 Lesson 1

Science and Engineering: Matter and Its Interactions

Exploring properties of materials: Strength and Flexibility

Big Ideas	Materials have observable properties. The properties of materials impact how they are used for specific purposes.
Guiding Questions	How do different materials react when we apply weight on them?
Content Objectives	I can collect data about the flexibility of different materials when weight is applied to them.
Language Objective	I can talk with my partner about what each of us notices during an experiment. (SL.2.2.b)
Vocabulary	**flexibility**: the capacity to bend without breaking **strength**: how much force is needed to break a material
Materials and Preparation	Cut apart the directions and templates along the dotted line, or provide scissors for the children to do this as the experiment begins. ● directions and template for experiment, one for each pair of children ● masking, packing, or other strong tape ● 1-gallon ziplock plastic bags, one for each pair of children (reused from previous weeks) In each bag, prepare an identical kit of materials: from Week 3 (each measured 6”x1”), one for each pair of children: ● large index cards or cover stock, cut to 6”x1”, one for each pair of children ● pennies, 20 for each pair of children ($4.00-$5.00 worth) ● Science and Engineering packets ● writing and drawing tools Bring one bag of materials to the whole group for demonstration, along with one set of directions and template and the tape. Have a stable, hard surface such as a chair or small table in or very close to the meeting area to demonstrate the experiment setup.

Opening 10 minutes	Remind children about the work they have been doing in previous lessons. *When we built the dolls' chairs, one thing we discovered is that materials have specific properties. We saw how certain materials worked well for this task, and others did not. Then we began to look more closely at the properties of materials and how people use them to build and design all kinds of objects, like ones we use every day in school or at home.* Introduce the work for the week. *This week we will continue to explore properties of materials. Just like professional scientists do, you will conduct an experiment to observe and record what happens when we apply weight to different materials: metal, wood, plastic, and paper. We will concentrate on how flexible these materials are. When we say that a material is flexible we mean that it can bend easily without breaking. What does it mean when we say that our bodies are flexible?* Invite children to experiment with this idea by reaching for their toes or bending at the waist from side to side. *When we talk about a material being flexible, we are thinking about how far it can bend, without breaking, when we put force or weight on it.* Model the experiment set up. *Our experiment today requires a precise set-up.* Follow the directions to set up the experiment: Tape the paper template to the edge of the hard surface, and then tape each material securely in its place according to the template (so that half of each material is positioned to jut out from the edge). *To do this experiment, you will place pennies, one at a time, on the end of one material. You can choose any material to start with. Observe carefully for the moment when the material starts to bend. When that happens, count the pennies.* Demonstrate with the piece of plastic. *After you have counted the pennies that made the material bend, put an x in that many boxes under the name of the material. Repeat the experiment with each material, and record your results each time.* Model recording data on the corresponding page of the model Science and Engineering packet. *Talk with your partner about what you notice as you conduct your experiment. Are you noticing the same things? Do your results surprise you? Why or why not?*
Investigation 20 minutes	Send children to set up and conduct this experiment. Children will need help to set the experiment up precisely. As they work, prompt them to have productive conversations with their partners.

	Are you noticing the same things? *Do your results surprise you? Why or why not?* Remind children to record their findings in their packets.
Closing 10 minutes	Give children ample time to clean up their work spaces and store their materials, including the templates, in the materials bags.
Standards	**MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **SL.2.2.b** Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
Assessment	Take note of how carefully children work and what help they need reading, interpreting, and following the directions. What is the quality of children's conversation about what they find? How do children record their findings? Are their predictions reasonable? What do they reveal about children's prior experiences with and knowledge about materials? What words do children use to describe the properties of these materials? Use this information to facilitate discussion at the end of the next session.

Notes