Unit 2 (Materials):
Properties of Material-- Elasticity

Concept
Some materials bend and some do not.

Content Objective
Students test and sort objects that bend.

Language Objectives
Students will access prior knowledge by discussing with a partner about different kinds of materials, their characteristics, and their uses.

Students will draw conclusions about the properties of materials using high-frequency and subject-specific vocabulary.

Students will draw objects and their corresponding symbols related to elasticity in order to compare and contrast the different levels of elasticity between different objects.

Students will use high-frequency English words necessary for describing their objects to the class such as: *bends, breaks, elastic, flexible, property, wood, metal*, and *plastic*.

Standards
- **NGSS:**
  - **K-PS2-1.** Conduct investigation comparing strengths and directions of pushes and pulls on motion of object.
- **TEKS:**
  - **2B** plan and conduct simple descriptive investigations such as ways objects move (investigate movement)
  - **2C** collect data and make observations using simple equipment such as hand lenses, primary balances, and non-standard measurement tools (collect data with tools)
  - **2D** record and organize data and observations using pictures, numbers, and words (organize data)
  - **5A** observe and record properties of objects, including relative size and mass, such as bigger or smaller and heavier or lighter, shape, color, and texture (prop of objects)
- **ELPS:**
  - **LLS 1A:** Use prior knowledge and experiences to understand meanings in English
  - **LLS 1C:** Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary.
  - **Speaking 3B:** Expand and internalize initial English vocabulary [Oral Lexical Development]

Suggested Literature Connections:
“The Three Little Pigs”

Materials:
Samples of materials from last lesson (eg., wooden, glass, china, plastic, aluminum, and paper plates or spoons, cinder block, T-shirt, grass, steel nail, old sneaker shoe, pencil, paper clip, cookie, old glue stick, cereal box, foil, wooden popsicle sticks, hand lenses)

Suggested Activity Centers

- **Sorting:** Students sort various materials into bendable/not bendable categories and make up their own, in-between categories.
- **Collage:** Students cut out pictures from magazines and catalogs of items that bend.

Day 1: Engage/Explore/Explain *Materials: Elasticity*

Teacher Says/Does	Student Says/Does	Language requirements
1. Connect to students' prior knowledge by showing them some of the objects that they analyzed during the previous module.		Vocabulary: *force, properties, elasticity, bends, breaks, elastic, flexible, property, wood, metal,* and *plastic*
2. Ask students to recall in pairs what they learned about materials during previous activities, e.g. *Which materials do we find in the classroom or on the playground? How does that material feel, look, sound, or smell?* Ask students what they may have noticed about materials in the world outside the school, e.g. *Did they see any objects made of wood at home? Any objects made of plastic? How did it feel, look, sound, or smell? Which objects appeared to be comprised of two or more materials?*	Students talk with their partners and then share responses with the whole group.	
3. Introduce key vocabulary. Start by explaining that we use the word, "FORCE" to mean pushing and pulling things. Provide a visual, e.g. use the "Visuals for Forces and Elasticity" handout (**K.2.1**). One-minute optional video about force: https://www.youtube.com/watch?v=AC0fgExu0A4	Students watch video. They can perform hand motions to mimic pushing and pulling forces.	
4. Explain that we use the word, "PROPERTIES" to mean something that we can observe with our senses about a material/object. Provide a visual, e.g. use the "Visuals for Forces and Elasticity" handout (**K.2.1**).		I predict that _________ will ________________ because ________________.
5. Model properties experiment (one object): Ask students to make predictions in pairs about the object's properties of strength and flexibility when force is used on it, e.g. *If you hold either end of the object and pull in opposite directions, what will happen? (It may stretch.) If you try to flex the object, what will happen? (It may bend.)* Ask a student to	Student pairs predict how strong and/or flexible an object will be.	

Teacher Says/Does	Student Says/Does	Language requirements
come up and apply force to the object after predictions are shared. Hold up a second object that is quite different from the first. Ask students to predict if it will have the same property of bending/flexibility as the first object.	Individual students push or pull as part of the whole group demonstration.	
6. *Partner Experiment*: Provide each pair of students with a few objects (e.g. play dough, pencil eraser, soft toy, building blocks), and send them to experiment at tables. Remind them to first share predictions about the properties of each object, and then to apply force by pushing and pulling on objects to discover properties of flexibility and strength.	Students work in pairs to predict and then test the flexibility and strength of each object.	
7. *Guided questions during experiment: Which materials bend one way but won't bend back? Which materials stretch? Which materials don't change when you put a force on them? Which materials seem strong? Which seem weak?*		When I pushed/pulled the ______, it ____________. I predicted that _________.
8. *Whole Group*: Come together to share and complete a chart (similar to "Properties of Elasticity" handout **K.2.2**) of what students discovered about the property of elasticity with the different objects they experimented with. Using materials from Unit 1, explain that we use the word "ELASTICITY" to describe whether or not a material is bendable/flexible. You may also provide a visual, e.g. use the "Visuals for Forces and Elasticity" handout (**K.2.1**). Hold up some different objects that they experimented with and brainstorm as a class their observations about the elasticity of each object. When they applied force either through pushing or pulling, *did it bend, did it break, or was it inflexible*?	Students share their observations from the experiment.	When I applied force, _______________________.

Teacher Says/Does	Student Says/Does	Language requirements
For objects that are more complicated such as plastic that may bend and then break, put a question mark and tell students you will revisit these objects next lesson. Do they notice any patterns with elasticity and the type of material? *E.g. Objects made of rubber tend to bend.*		

Day 2: Elaborate/Evaluate *Materials: Elasticity*

Teacher Says/Does	Student Says/Does	Language requirements
1. *Review* concept of elasticity and “Properties of Elasticity” chart (similar to handout **K.2.2**) with students. Create a gesture together with students that matches the definition of elasticity, e.g. a rubber band/wavy arm. Have students chorally repeat the word elasticity and mirror the gesture back at you. This *elasticity gesture* can be used throughout these lessons as transition signals for active engagement and building academic vocabulary.	Students create and perform the gesture representing elasticity.	
2. *Turn & talk- whole group work.* Pair students up and have them look around the classroom with clipboards to find objects made of materials that do and do not bend. Using the “Properties of Elasticity” handout (**K.2.3**), have each pair draw a sketch of 2-3 objects that they found and draw the symbol that corresponds with each object’s property of elasticity: An upside down U for flexible, a broken line for breaks, a straight line for inflexible, and a question mark symbolizing a complex property of elasticity that is difficult to categorize. See the graphic organizer in **Figure 2** below for guidance.	Student pairs record their observations of objects from around the room.	
3. *Come back together.* Ask each pair to share out an object that they found and its property of elasticity. Add to the chart created in Unit 1>Day 1. Invent some in-between categories for objects that may be difficult to categorize. For example, “*bends then breaks*,” “*won’t bend back*,” etc.	Student pairs share their observations with the whole group.	We tested a ___________. When we pulled / pushed / applied force, the ___________________.
4. *Discuss* the reasons for elasticity and flexibility in materials. Pose questions such as: *Why is it important for “x” material to bend/not bend?*	Students discuss their responses.	

Teacher Says/Does	Student Says/Does	Language requirements
5. *Connect* to other properties observed in earlier lessons. *What other properties besides elasticity did we observe about these materials in earlier lessons?* Write the students' words on the word chart for materials (See example in **Figure 3** below for guidance). 6. Teacher might help students create a graphic organizer that allows students to connect types of materials with different properties: e.g., *Which of these properties applies to each type of material?*	Students share their thoughts about elasticity, strength, and flexibility, etc.	

Figure 2 *Materials: Elasticity*

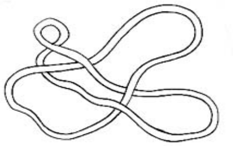
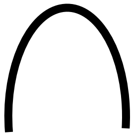
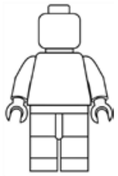
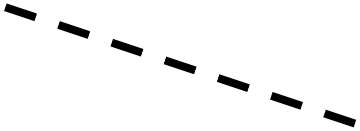
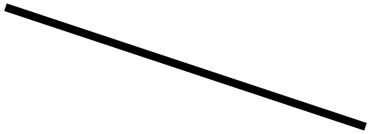
DRAW OBJECT/MATERIAL	PROPERTY OF ELASTICITY
	
	
	

Figure 3 *Materials: Elasticity*

Types of Materials	Properties
Glass	Breaks Strong Pings Bends Flexible Elastic (Stretches)
Wood	
Plastic	
Metal	

Name: ______________________________ **Date:** ________________

Visuals for Forces and Elasticity

Force

Properties

Elasticity

Properties of Elasticity (Example for Teacher Chart)

OBJECT/MATERIAL	PROPERTY OF ELASTICITY
E.g. Paperclip (metal)	 Bends
	 Breaks
	 Inflexible

Name: _________________________________ Date: __________________

Properties of Elasticity

DRAW OBJECT/MATERIAL	PROPERTY OF ELASTICITY