THE BUS PROJECT

TODAY'S EXPLORATION: Identifying Materials to Make a Door Knocker

Grade Level : 1

Overview: After investigating materials, students will choose a material or object to construct a door knocker.

NGSS: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

NGSS: K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Practices

- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions

Crosscutting Concepts

- Cause and Effect

Materials:

- Variety of materials - rocks, spoons, sticks, toys, etc. (anything that could vibrate when struck or make noise when struck).
- Knocker Data Collector (COMPLETED in the previous lesson)
- Knocker Discussion Questions (COMPLETED in the previous lesson)
- Adhesives: glue, tape, rubber bands, etc
- Additional Construction Materials: string, yarn, and other materials that students can hang stuff from.
- Scissors
- Videos of different door knockers - Video 1, Video 2, Video 3, and (just for fun, not required) Video 4.

Investigation:

1. After the first lesson Investigating Materials, revisit the Knocker Discussion Questions.
2. Have a class discussion about which items made the best noise and why they made the best sound.
3. After the discussion, the students chose the item that made the most noise. They will be

using this to design a door knocker.
4. Show them Videos 1 - 3 (4 is an optional funny knocker video) so that they can understand what a door knocker is.
5. After the videos, allow each group to gather additional materials they might want to make their knocker hang on a door. They can use string, yarn, tape, etc.
6. Give students a chance to construct a knocker that can hang on the classroom door.
7. Have each group hang their knocker on the door.
8. Once the knockers are hung, have a member from each group test their knockers while the class is on the other side.
9. Discuss as a class which knockers worked well, which knockers looked the best, and which one you might be able to use on the bus door.
10. At the conclusion of the lesson, have the teacher take a picture of each group with their knocker and send the photos to the Bus Project to be shared. The class and teacher can also write a joint email explaining their findings.

Product or Artifact Possibilities:

- A constructed door knocker per group
- Photo documentation of project completion
- A class email explaining their findings

Guiding Questions:

1. Which designs work better than others?
2. Which designs look better than others?
3. What makes a good design?
4. If you could make another door knocker what would you change next time?

What Are We Discovering?

Some materials vibrate more and therefore make more noise when struck against a surface. When designing a solution of a problem some solutions work better, some solutions look better, and a combination of those two things can make something the best design to choose. We can learn from our designs to improve designs in the future.

Acknowledgments:

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Mark the box that matches what you hear

Item	**1** **I can't really hear it.**	**2** **I can hear it.**	**3** **Wow, that is loud.**
Example - Hulk Action Figure	X		

1. Which item knocked the best?

2. What do you think the item is made out of?

3. Did the item vibrate or shake when you knocked it?

4. Did the items that made more noise shake more or less?