

LESSON PLAN #1

3RD AND 4TH GRADES



Engineering Superheroes

Learning Objectives

This is an Engineering challenge lesson format. Students will be able to create a device to measure strength of materials. Students will be able to work in groups to create a device, analyzing and redesigning their design as necessary.

Materials and Preparation

Materials: Milk chocolate, Dark chocolate, and a Crunchy chocolate bars (we recommend Creamy Milk, 85% Cocoa and Crunchy Caramel by Lindt, but you can have different brands, as long as they have both the same dimensions). Sheet of paper, tape, and about 40 pennies, paper clips, rulers, craft sticks, items to inspire student creativity.

Introduction (5 minutes)

- Tell students about the importance of measuring the strength of a material. Use concrete examples, such as: (a) when you're building a house, you need to know if the wood floor will hold the person's weight; (b) when building a window, it has to be strong enough to resist bumps or even birds hitting it; (c) or in Captain America's Shield.
- Ask volunteers to share examples where the strength of the material matters.
- Tell students they will be working in groups to complete the activity today.
- Explain the challenge: Chocolates also need to be strong, for taste, or even for transport. The big question is, how can you measure the strength of a chocolate? Or how can you measure the strength of any material?
- Tell students to form groups of 3.
- Give the Engineering Superheroes Lesson #1 materials to groups of 3 students.

Explicit Instruction/Teacher modeling (10 minutes)

- Re-state the problem: How to measure strength of a chocolate. How do I know if the dark chocolate is stronger than the milk chocolate? Or would the crunchy caramel one be the strongest?
- Explain that this is an "Engineering" problem, and Engineers need a way to measure 'strength'.
- Ask the question to the student: What is strength?
- Write the answers on the board.
- Explain there are different kinds of strength: For example: Impact strength is different than compression strength. We have to pick one.
- Say that today we will measure Impact strength, because it is more fun as it can teach us more how Captain America's shield works. We can measure impact strength, but dropping weights.

Guided Practice (5 minutes)

- Tell students to discuss within their groups to discuss questions they have about the problem.
- Ask the class to share some of the questions discussed.

Independent working time (35 minutes)

- Instruct the students to find the design page and sketch out their solution on how to measure impact strength.
- Encourage the students to take 5 minutes to discuss a plan for their impact testing “machine” and improve it.
- Give each group 20 minutes to create their testing machine prototype with the provided materials. Once they’ve finished, let them test it with the chocolates provided.
- Go over the Lab Reflection Sheet with the students. Ask them to fill it out and Re-Design.

Assessment (5 minutes)

- Construction of the ‘impact tester’
- Success of the construction.
- Original design
- Redesign
- Group work
- Group Discussion
- Final question assessment.

Closing and Review (5 minutes)

- Ask your students to reflect with their group on the following questions: Were you successful in this challenge? Why or why not? What was the most difficult part of this challenge? Why? If you were to do this again, what would you change?

ENGINEERING SUPERHEROES – Lesson #1

Worksheet #1 – 3rd/4th grades

Create a device to compare which chocolate is the strongest.



Team Name:

Group Members:

ENGINEERING SUPERHEROES – Lesson #1

Worksheet #1 – 3rd/4th grades

Student Directions

Materials:

- Milk chocolate bar,
- Dark chocolate bar,
- Crunchy caramel bar
- Sheet of paper
- Tape
- 40 Pennies,
- Paper clips,
- Rulers,
- Craft sticks,
- Items to inspire student creativity.

Directions:

Create a structure that can measure the impact strength of a chocolate bar. The structure should support the chocolate for the test with your help.

Constrains:

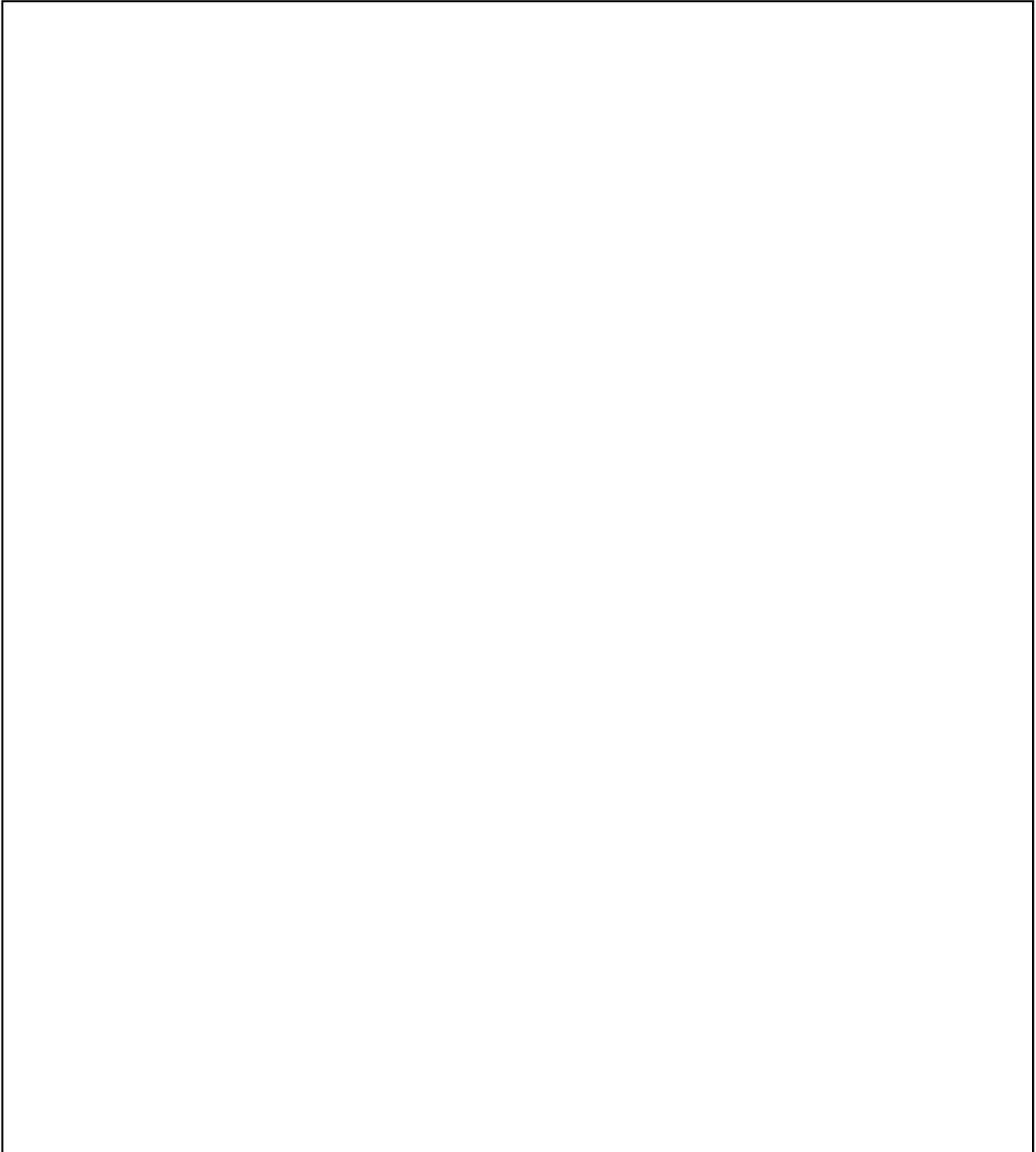
Must be made out of the materials provided.

You should be able to tell with chocolate is stronger and by how much, like: the dark chocolate is twice as strong as the milk chocolate.

ENGINEERING SUPERHEROES – Lesson #1

Worksheet #1 – 3rd/4th grades

Draw and label your design here.



ENGINEERING SUPERHEROES – Lesson #1

Worksheet #1 – 3rd/4th grades

Student Lab Reflection Sheet Team Name _____

Were you successful in this challenge? Why or why not?

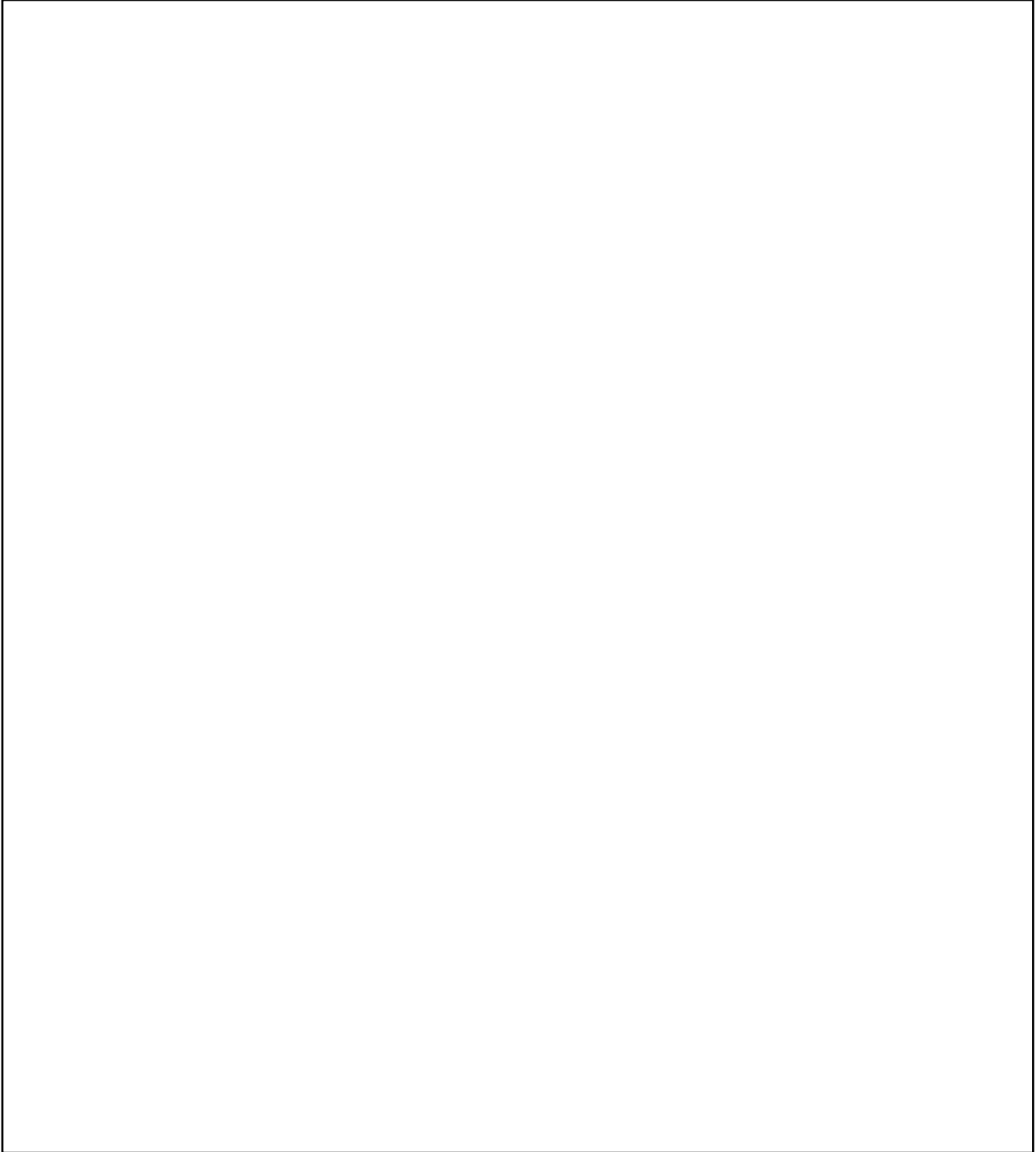
What was the most difficult part of the Challenge? Why?

How can you improve it?

ENGINEERING SUPERHEROES – Lesson #1

Worksheet #1 – 3rd/4th grades

Draw and label your re-design here.

A large, empty rectangular box with a thin black border, intended for students to draw and label their re-design. The box occupies most of the page below the instructions.

