LESSON PLAN #1
1ST AND 2ND GRADES

Learning Objectives

Students will be able to collect and organize data, represent data with bar and picture graphs, and answer questions about graphs. Students also learn addition (count) by 5.

Materials and Preparation

This lesson plan follows a *simplified* version of the chocolate-impact experiment performed in Engineering Superheroes Episode #1. The simplified version is a vertical drop experiment.

Materials: 2-3 bars of Milk chocolate, Dark chocolate, and a Crunchy chocolate (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.

Preparation: Take 10 pennies and wrap them with the paper sheet, then use the tape to create a paper tube, not too tight as you'll need to add more pennies later. Seal one of the sides with tape. At the other end,

Separately, make four piles with 4 pennies each and tape them individually. Break the chocolate into blocks of four if you're using Lindt. If you are using another chocolate, just make sure you are cutting it to leave about 2in in one or more directions. Place the four penny piles on a table, arranging so that they match the corners of each chocolate bar, like in the figure. Make sure there is some room at the bottom of the chocolate.
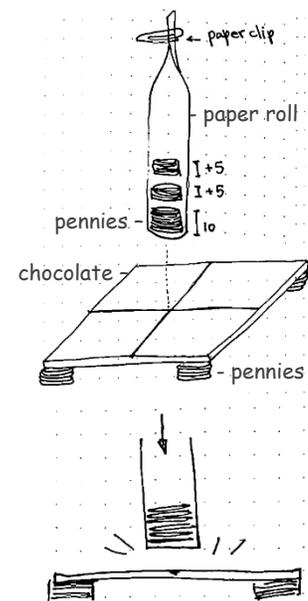
Introduction (5 minutes)

- Gather the students and display the chocolates. Tell the students they will help you today with a task: find out which chocolate is the strongest.
- Show the chocolates and ask them to vote in which will be the strongest out of the three options: milk, dark, crunchy. Draw tally marks for the voting of each student, making a rudimentary bar graph.

Explicit Instruction/Teacher modeling (5 minutes)

- Explain to the students they will learn about **bar graphs**.
- Ask the students if they know what those words mean.
- Display the tally marks you did for the 'the strongest chocolate contest'. Explain that data is information and that the tally marks are the data for your classroom opinion.
- Explain that bar graphs organize data using heights to show. Longer bars, means more students think the dark chocolate is stronger, shorter bars mean fewer students think the milk chocolate is the strongest (for example). Then, explain that the line that goes up and down and has numbers is the **y-axis**, and the line which goes sideways is the **x-axis**.
- Ask students to look at the bars and tell you which chocolate go more votes. Have them do the same for the least votes.

Guided Practice (35 minutes)

- Tell the students it is now time to figure out if their guess is right.
- Tell the students you will now break each of the chocolates to see which one is the strongest.
- For this, you will drop weights on them, and see which breaks first. The weights will be pennies. The more pennies, the heavier.
- Tell them you will use a bar graph to count how many pennies you need to break them.
- Ask them to get the Worksheet 1. Ask them to draw a tally for each penny that gets dropped.
- Show that you have 10 pennies inside your paper tube, and this is not too heavy. You'll drop it at the chocolate and see if they break. If they don't, you'll add five more pennies.
  - *When performing the test:* using a ruler, lift the paper roll with the 10 initial pennies about 12in high, right at the center of the chocolate. Aim at the chocolate and let it go. You will notice that the chocolate may or may not break. If not, increase the weight of the paper tube by introducing 5 pennies more and try again. Before each addition of 5, ask the students to mark on their Worksheet tallies for each penny.
- Once the chocolate breaks, you take note on the board using numbers: (e.g. Milk chocolate: 10+5+5). Then, repeat the experiment for the other chocolate, starting again with only 10 pennies, until it breaks, and take note on the board (e.g. Dark chocolate: 10+5+5+5+5).
- Ask the students to sum with you the total of pennies needed for each chocolate. You can say they have the option of adding by 5, or counting all tallies. For instance, for Milk chocolate, we have 10+5+5 pennies. How many are there? Ask them to count the number of tallies if they need or add by 5's. Then, write down 10+5+5=20.
- Do the same for the other two chocolates.
- Once done with all chocolates, ask students to get Worksheet 2.
- Now ask them to complete the bar graph in Worksheet 2 with the sum numbers. Guide them in the process.

Independent working time (10 minutes)

- The students should work independently practicing adding by 5. Refer to Worksheet #3.
- Connect the practice with the experiment performed with the groups of pennies.
- Go over the worksheet as a class.

Assessment (10 minutes)

- Instruct students to complete the Worksheet #4.

Closing and Review (5 minutes)

- Gather the students
- Recall the fun chocolate experiment and explain that bar graphs can be used to show data for fun activities as well, but other simple things.
- Ask the students to share what they think they could do with this new tool?
- Suggest that next time they get candies with different colors, they could sort them by colors and count them out, or other fun relatable examples.

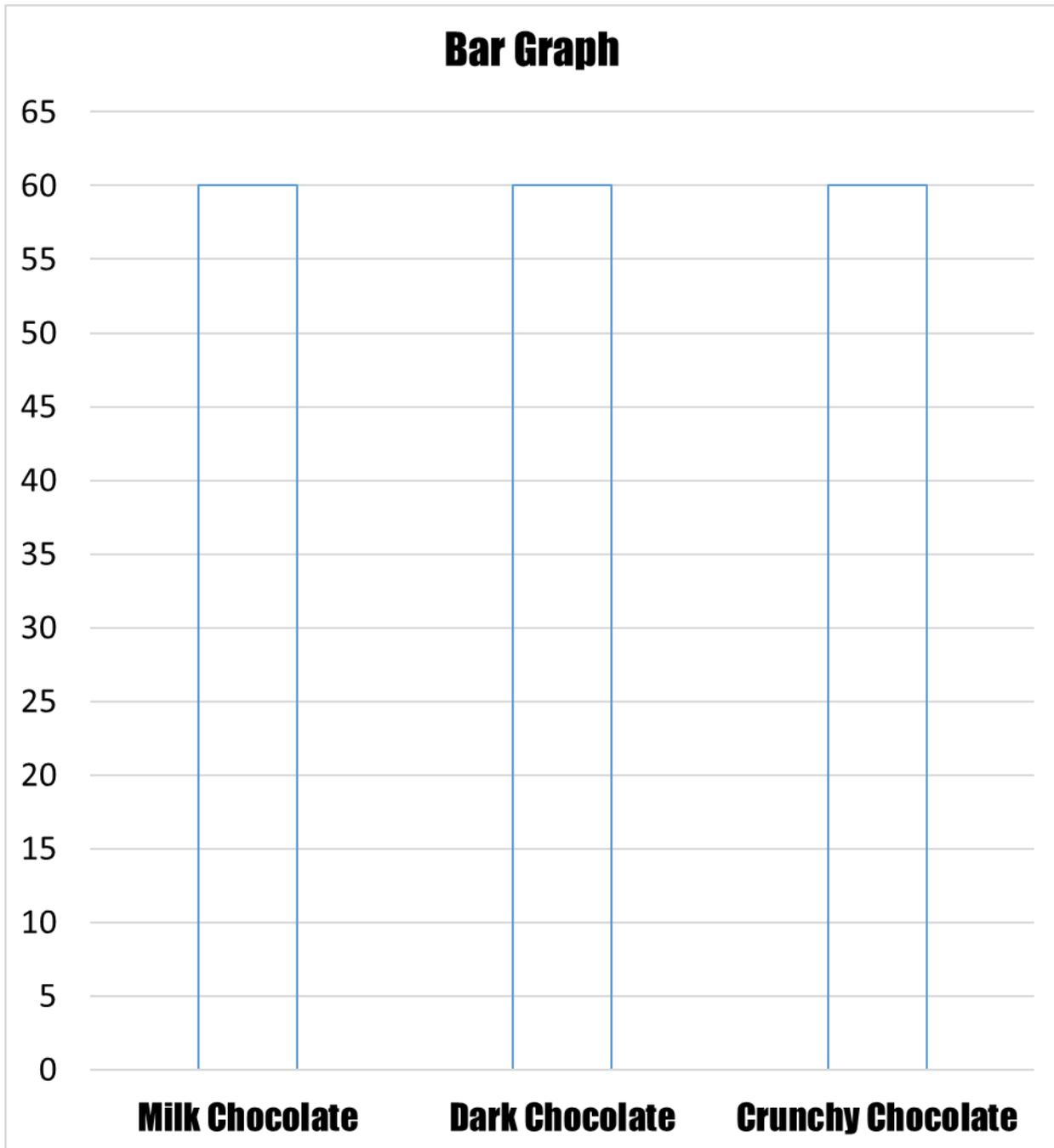# ENGINEERING SUPERHEROES – Lesson #1

Worksheet #1 – 1st/2nd grades

Use this worksheet to a draw tally for each penny

Milk Chocolate	**Dark Chocolate**	**Crunchy Chocolate**

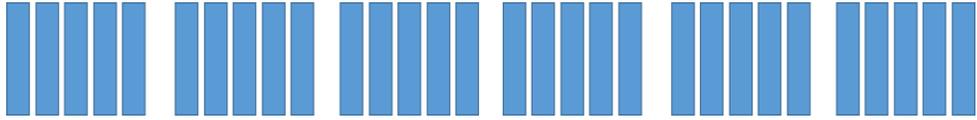# ENGINEERING SUPERHEROES – Lesson #1

Worksheet #2 – 1st/2nd grades

Use this worksheet to color the bar up to the total number of pennies used to break each chocolate bar. Use a different color for each chocolate.
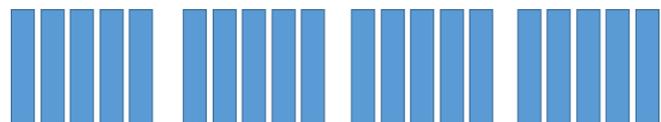
Bar Graph

	Milk Chocolate	Dark Chocolate	Crunchy Chocolate

(Empty bar graph with y-axis values: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65)
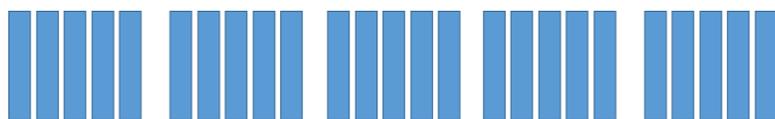
Worksheet #3 – 1ˢᵗ/2ⁿᵈ grades

Write down how many 'fives' are needed to form the number to the right. Write it down in the equation and put the number of 'fives' needed in the row in your right side.
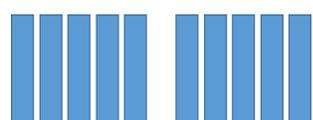
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Worksheet #4 – 1st/2nd grades

You poll your friends about their favorite superheroes. Fill in the bar graph using the information provided.

Favorite Superheroes

(Bar graph showing values: 8, 5, 7, 3. Labeled bars: Iron Man, Captain America. Y-axis from 0 to 9.)
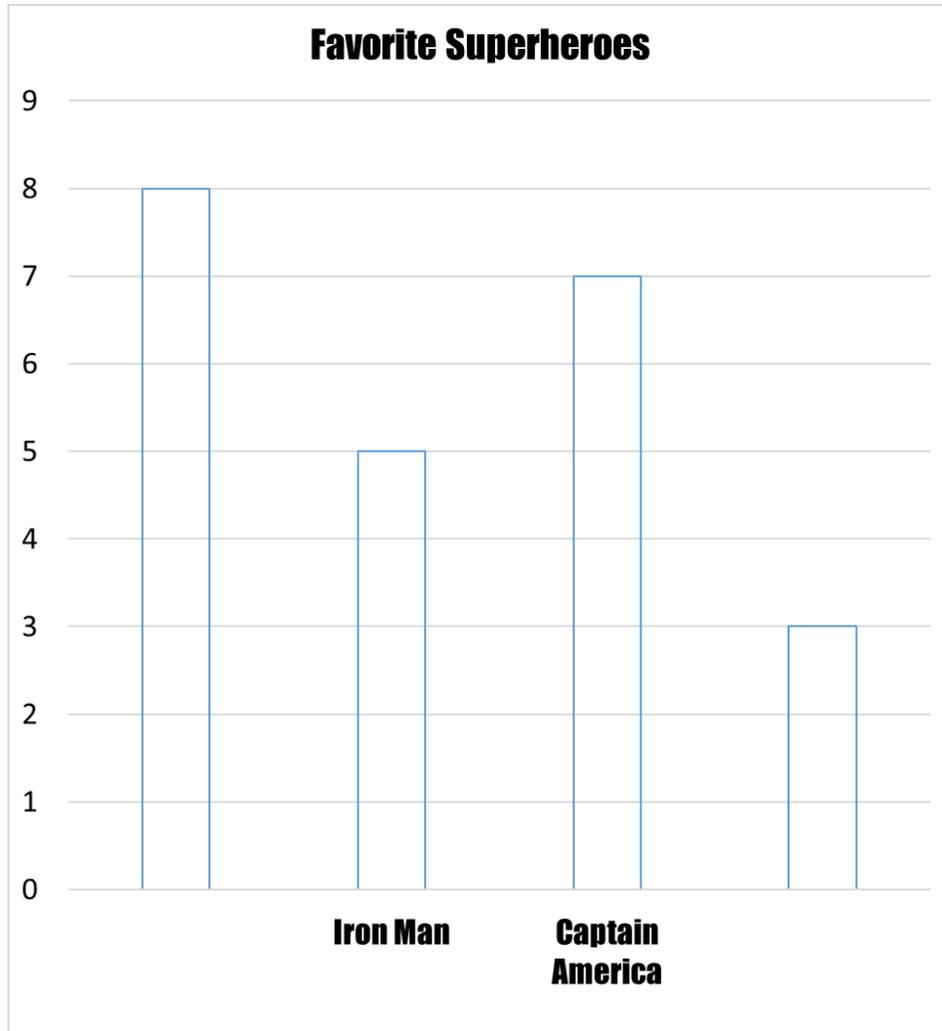
1. Eight students like Spiderman the best. Find that bar and label it "Spiderman".

2. Three students like Thor the best. Find that bar and label it "Thor"

3. Color the most popular superhero using red and blue.

4. Color the least popular superhero with light blue.

5. How many people like Captain America the best?