LESSON 3.1: DATA DAYS

CAN A WATER FOUNTAIN SAVE THE WORLD?
Interpreting Data in a Table

OVERVIEW

LEARNING INTENT: Students will use a table to analyze and model data in order to make predictions for the number of disposable water bottles eliminated from entering landfills.

SMPs:
- Construct viable arguments and critique the reasoning of others.
- Attend to precision.
- Make sense of problems and persevere in solving them.
- Model with mathematics.

LENGTH OF ACTIVITY: One day (approximately 45 minutes)

PROBLEMS: 3-1 through 3-3

MATERIALS:
- Lesson 3.1A Resource Page, one per team OR Lesson 3.1 Stoughton Water Fountain slideshow (see Resources)
- Lesson 3.1B Resource Page, reveal image for whole class display

NOTES TO SELF:

LAUNCH

Launch today’s lesson with a personal narrative check-in, outlined in problem 3-1. Ask students to read and reflect on their narratives to this point. To assist students with reflections you can pose the following questions, “What progress have you made towards your personal narrative goal?” “Do you need to make any revisions to your goal?” and “Is there anything getting in the way of achieving your goal?” After students have had time to attend to their goals, have them think about the following question, “How has working on your goal impacted your learning, your attitude, or even enjoyment during class?” After allowing thinking time, ask students to first journal about this question and then discuss it within their teams. You will need to assess whether or not your students are ready to share personal information such as this before asking them to share within their teams. You may notice some students are more willing than others and that can be used as a starting place. The intent is to have students hear about others’ goals, successes, and challenges, so that they may be able to grow along with their peers. In the next personal narrative check-in, students will choose another short-term goal to work towards as well as a big, long-term goal.
LESSON

Today, you begin with the first of many Data Days lessons. Data Days provide opportunities for you and your teammates to model and interpret data so that you can make justified conclusions.

3-1. PERSONAL NARRATIVE JOURNAL
Take a moment to read your personal narrative, reflect on what you read, and make any revisions to your narrative if necessary.

When you are done, consider how working on your goal has impacted your learning, your attitude, or even enjoyment during class. Write a reflection addressing this in your journal. Include the date and the problem number in your journal.

3-2. STOUGHTON WATER
In the hallway, next to the library at Stoughton High School in Stoughton, WI, exists a water fountain doing its part to make the world a better place. This fountain provides a constant reminder for the students and staff at Stoughton High School to be mindful of plastic waste. Since its installation, over 90,000 disposable plastic water bottles have been eliminated from entering landfills. To honor its outstanding service, a slideshow of the water fountain’s 2017 achievements has been created. (Answers will vary.)

How will you honor student questions and their curiosities?

a. Your teacher will present a slideshow to the class. As you watch the slideshow think about what questions you have. What do you notice in the images? What do you wonder?

In what ways do you anticipate students making their predictions? How will you support students or teams who are struggling to make a table? If you were to do this problem, how would you set up the table?

b. Make a table of the data from the images. Use the data in the table to make three predictions for how many plastic water bottles will be eliminated from entering landfills by December 14, 2017 at 8:29 a.m. Make one prediction that is too low, another that is too high, and a third prediction that you believe to be close to the actual amount.

How will you have students share their thinking so that everyone is engaged?

c. How did you make your predictions? Explain your thinking clearly and be prepared to discuss your thoughts with the class.

d. Predict when the water fountain was installed at Stoughton High School.
3-3.
Your teacher will reveal the actual amount of plastic water bottles eliminated from entering landfills by December 14, 2017 at 8:29 a.m. [Answers will vary.]

a. How does this number compare to your prediction?

b. Revise your thinking from parts (c) and (d) of problem 3-2 and adjust your current model so that it fits the most recent data.

c. Use your new model to review and revise your predictions as to when the water fountain was installed. Does this date seem plausible?

CLOSURE

Ask students to think about how they used a table today. What are the benefits of only using a table? What are the drawbacks? Why? Begin with individual thinking time and then have students share their thinking with their teams. Follow team discussions with a Whiparound to share student responses with the class.

AUTHORS’ VISION

This is the first Data Days lesson in the course. In this activity students will use a table as a model to make predictions. Other than explicitly telling students to make a table, there are no specific instructions as to how the table should be set up. As you prepare for this lesson it is important to do this activity on your own before you have students attempt it in class. Future Data Days lessons will focus on other data models, such as graphs and equations.

Begin the lesson with a personal narrative check-in with problem 3-1. Depending on the comfort level of your students you can ask teams to discuss how working towards their goal has impacted their learning, attitude, and enjoyment in school.

After the Launch, have a volunteer read problem 3-2 to the class. Allow the story to lead into part (a), where you will show the water fountain slideshow to the class. Expect students to notice that the numbers in the images are increasing, as well as the date each picture was taken. You may also have students recognize things such as the type of phone used to take the pictures. Although things like this are not pertinent, students should not be discouraged from sharing or noticing anything; do not let these things dominate the conversation. To honor the ideas that are shared, you can write them on the board for future consideration. If you have time at the end of class or the following day you might address one or more of these noticings.

In part (b) of problem 3-2 students are asked to create a table from the data on the Lesson 3.1A Resource Pages (or the Lesson 3.1 Stoughton Water Fountain slideshow). It is largely left up to the students to determine the best way to set up their tables. As you circulate, ask, “How do you plan to start your table?”, or “What are the columns/rows labeled?” Allow students to pursue a path that you know may end up less desirable in the end. For instance, if students choose to make the independent variable the time of day rather than a date, this may cause problems predicting long-range data. Let them eventually run into this but plan your questioning accordingly for a situation like this to occur. Consider using an I Spy or a Swapmeet to share table set-up strategies. Some teams may use April 6th as day 0, day 1, or possibly day 96. Some students may choose to omit certain data. Again, this is up to them and it is up to you to support their choices as best as possible. The eventual goal is for students to understand how to use a table to analyze and model data; with this there are benefits and drawbacks that you want students to experience as well.
When the class is ready, begin by having students share their predictions from part (c). This can be done as a Proximity Partner activity so that everyone is responsible to share his or her thinking with someone. Emphasize that you value students’ thinking and reasoning about how the predictions were made over what they actually predicted. The data is fairly linear so it is likely many of the explanations will be similar.

In part (d), students are asked to determine when the water fountain was installed. This will lead to many challenges depending on how the tables were set up. For your convenience, if you prefer students to be as exact as possible, 2008, 2012, and 2016 were leap years.

In problem 3-3 you will reveal the actual number of plastic water bottles that have been eliminated from entering landfills. The Lesson 3.1B Resource Page can be used to reveal this number. Depending on how students made their initial predictions, they will likely be about 10,000 bottles too high. This is probably because the students and staff at Stoughton High School are off for summer break from mid-June to early September. Part (b) of problem 3-3 asks students to update their model based on the actual December 14\textsuperscript{th}, 2017 data. New models may have tables that show how many bottles are eliminated per month instead of the actual amount eliminated at that time. A model like this can be used to predict future or past values by multiplication or division of sums of bottles in the year. Students may also try to work backwards from December 14\textsuperscript{th} until the beginning of September, and forwards from May 23\textsuperscript{rd} to mid-June. Then the remaining difference between mid-June and September gets distributed in the summer months. If students do not arrive at the idea that few people are in the school in the summer months, you may need to make this clear to them.

Closure today is a reflection about how tables can be used to help analyze and model data. Students are asked to consider the benefits as well as drawbacks of only using a table. Students may not consider using other representations but still can discuss their experiences with just using a table in this activity. A possible drawback may be that the linearity is not as visible in a table as it is on a graph but a benefit is the ability to accurately calculate the growth.

**RESOURCES**

**LESSON 3.1A RESOURCE PAGE**
URL: https://tinyurl.com/y6vayprf

**STOUGHTON WATER FOUNTAIN SLIDESHOW**
URL: https://tinyurl.com/ycqrhnvb

**NOTES TO SELF**