DATA SCIENCE LESSON PLAN

STEAM-Powered Careers

DATA SCIENCE
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Subject / Grade Level: Data Science and Math / Lower elementary

Materials:
▶ Attached worksheet with tally chart and blank bar graph

NGSS Essential Standards and Clarifying Objectives:
▶ **Science and Engineering Practices:** Analyzing and Interpreting Data
▶ **Science and Engineering Practices:** Obtaining, Evaluating, and Communicating Information
▶ **Science and Engineering Practices:** Asking Questions and Defining Problems

Lesson Objective:
▶ Students will learn about collecting data, what a graph is, and how to use a graph to compare data.

Differentiation Strategies to Meet Diverse Learner Needs:
▶ Think-pair-share, for students who learn through engaging with others
▶ Visual input, for students who learn through the use of their senses
▶ Numbers and shapes, to provide multiple ways to show quantities
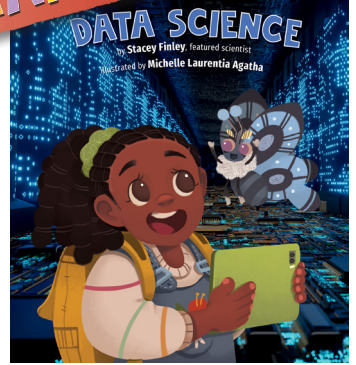
ENGAGEMENT

▶ Watch the following video with the students: https://jr.brainpop.com/math/data/tallychartsandbargraphs
▶ Ask students Q1: "Can you think about data that is interesting to you?" and Q2: "Why would we want to look at data?"
   ▶ Response examples:
      ▶ Q1: The number of toys each student has at home
         ▶ Q2: When we learn who has the least toys, we know with whom we can share our toys.
      ▶ Q1: The number of days it rains each month
         ▶ Q2: When we learn the number of days it rains each month, we know how much we get to play outside during recess.

EXPLORATION

1. **Collect the data**
   a. On the worksheet, use the chart to make tally marks for the number of classmates with birthdays in January, February, etc., in the "Tally Marks" column.
   b. Each student should be sure to add a tally mark for their own birthday month.
   c. Next, in the "Triangles" column, use a triangle to show each classmate with a birthday in each month. The number of triangles in this column should be the same as the number of tally marks in the "Tally Marks" column.
   d. Count the number of triangles and put the number in the "Numbers" column.
   e. You have shown the number of students with birthdays in each month in three different ways: with tally marks, triangles, and numbers!

2. **Explore the data**
   a. What can you learn from this data?

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b. Which row has the most tally marks?

3. **Look at the data**
    a. Teacher: "A graph is a way to show data. This is called data visualization. Graphs help us understand data. Let's make a graph with the data we just collected! Then, we can use it to understand more about our class and see which month has the most birthdays."
    b. Write numbers next to the vertical line, going from 0 (already shown on worksheet) to 10 (already shown on worksheet) for each dashed line going across.
    c. Using the data that you've collected, and going row by row for each month, create a rectangle (or "bar") that starts at 0 and goes up to the corresponding number from the "Numbers" column.
    d. This is a bar graph. The height of the bar shows how many students have birthdays in that month.

4. **Understand the data**
    a. We can compare the heights of the bars to see how the number of birthdays in each month is different.
    b. Which month has the tallest bar? That is the month with the most birthdays!
    c. If we want to throw a class birthday party during the season that has the most birthdays, in which season would we throw the party?

EXPLANATION

▶ Have students discuss the findings from the data, including which months have the fewest number of birthdays or how many students have winter birthdays.
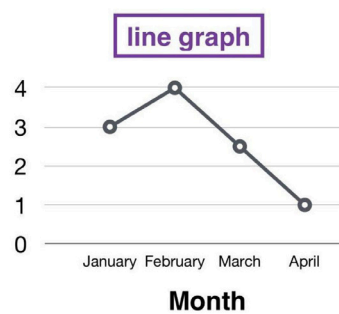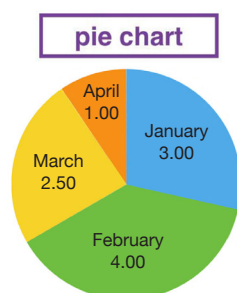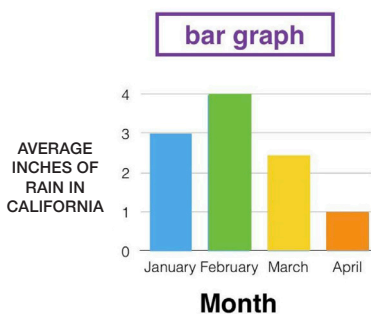
ELABORATION

Vocabulary:

▶ **data:** factual (true) information
▶ **data visualization:** looking at data (information) represented in a chart, graph, or picture
▶ **graph:** a diagram showing a variable (quantity) in comparison with other variables

Activity Summary:

▶ We can collect data and use it to learn more about something.
▶ Visualizing the data using a graph helps us better understand the data.
▶ Seeing and understanding data helps us make decisions.
▶ There are different types of graphs. Some graphs are better than others for visualizing certain types of data.
▶ Today we made a bar graph. Other kinds of graphs include a pie chart or a line graph. A pie chart helps us see parts of a whole. A line graph helps us see relationships between two variables.
▶ The charts below show the number of inches of rain in California in the months of January through April. The same data is shown on three different types of graphs.

bar graph

AVERAGE INCHES OF RAIN IN CALIFORNIA

Month
January February March April

pie chart

April 1.00
January 3.00
March 2.50
February 4.00

line graph

Month
January February March April

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Applications:

▶ We can collect almost any kind of data that we want and use it to understand things and to make decisions. For example, we can keep track of the number of days it rains each month for a year and use that data to know how much we get to play outside during recess.

▶ Sometimes there is so much data, we cannot make a graph with paper and pencils. In that case, we can use a computer to help us visualize and understand the data.

▶ For example, people have collected data about how many cars are driving on every street in our city, 24 hours a day! We can use a computer (including a smartphone!) and programs like Google Maps to look at the traffic and make decisions about which road to take to get to school.
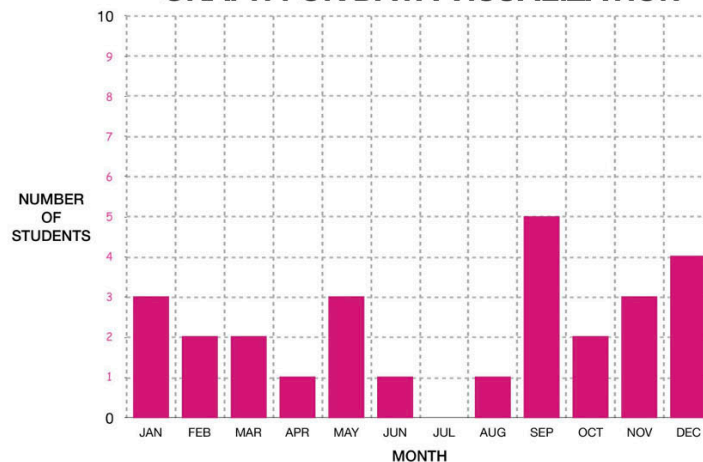
EVALUATION

▶ Make a tally chart and use the data on the chart to create a bar graph.

EXAMPLES

CHART FOR DATA COLLECTION

Month	Tally Marks	Triangles	Numbers
JANUARY	I I I	▲ ▲ ▲	3
FEBRUARY	I I	▲ ▲	2
MARCH	I I	▲ ▲	2
APRIL	I	▲	1
MAY	I I I	▲ ▲ ▲	3
JUNE	I	▲	1
JULY			0
AUGUST	I	▲	1
SEPTEMBER	⤗⤗⤗	▲ ▲ ▲ ▲ ▲	5
OCTOBER	I I	▲ ▲	2
NOVEMBER	I I I	▲ ▲ ▲	3
DECEMBER	I I I I	▲ ▲ ▲ ▲	4

GRAPH FOR DATA VISUALIZATION

- Worksheet -
CHART FOR DATA COLLECTION

Month	Tally Marks	Triangles	Numbers
JANUARY			
FEBRUARY			
MARCH			
APRIL			
MAY			
JUNE			
JULY			
AUGUST			
SEPTEMBER			
OCTOBER			
NOVEMBER			
DECEMBER			

GRAPH FOR DATA VISUALIZATION