Performance Task: What's the Story?

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.MD.1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36)

MCC4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

MCC4.MD.4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students need a good understanding of the different ways to represent data in a graph in order to choose the most appropriate graph for the data presented. The data presented above are most appropriate for a bar graph or circle graph. Data for a line graph would need to be given as an ordered pair or with two pieces of information (in a t-chart for example) for each data point. Line graphs are frequently used to display data over time.

Be sure students understand that the bars in bar graphs should not be attached to one another. A small space must be placed between each bar within the graph. Histograms are similar to bar graphs in that they use bars, but represent continuous data; therefore they do not have spaces between each bar. (This will be discussed in sixth grade.)

Know how to create a bar graph.

Students use whole-number names when counting fractional parts on a number line. The fraction name should be used instead. For example, if two-fourths is represented on the line plot three times, then there would be six-fourths.

Specific strategies may include:
Create number lines with the same denominator without using the equivalent form of a fraction. For example, on a number line using eighths use 48 instead of 12. This will help students later when they are adding or subtracting fractions with unlike denominators. When representations have unlike denominators, students ignore the denominators and add the numerators only.
Have students create stories to solve addition or subtraction problems with fractions to use with student created fraction bars/strips.

ESSENTIAL QUESTIONS

- How are data collected?
- How do we determine the most appropriate graph to use to display the data?
- How will we interpret a set of data?
- How do graphs help explain real-world situations?

MATERIALS

- Set of data that is teacher or student generated or "What's the Story" Recording Sheet (one per student)
- Markers, colored pencils, or crayons
- Graph paper or chart paper
- Ruler

GROUPING

Individual/Partner Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will be working with graphs and data sets. Given a set of data, students will create a graph, describe a context for the data, explain a possible collection method, and report what they learn from the data. The set of data used can be student or teacher created.

Comments

You may want to demonstrate this type of activity as a whole class before assigning this task. The students should have graph paper or chart paper available in case they choose to use it. Students should also have the opportunity to share their solutions. The set of data can be determined by the teacher so that the data set can apply to different learning levels, and degrees of difficulty. The teacher also has the option of allowing students to create their own data set.

A sample set of data could be as follows: 1/8, 1/8, 2/8, 2/8, 3/8, 3/8, 3/8, 3/8, 3/8, 4/8, 4/8, 5/8, 5/8, 5/8, 5/8, 6/8, 6/8, 7/8, 7/8, 7/8, 7/8, 8/8, 8/8, 8/8, and 8/8.

For the sample data given, there are many possible situations students may come up with. The following are some sample stories for the given data:

- We sampled sets of 8 m&m's checking for the number of red in each set. The first sample we took had 7 reds out of 8 m&m's or 7/8, the second sample had only 3 out 8 m&m's red or 3/8 . . .
- I measured my sunflower plant every three days to check its growth. After the first 3 days (the first sample), I noticed it grew 7/8 of an inch. After the second 3 days (the second sample), I noticed it grew 3/8 of an inch . . .

Task Directions

Have students follow the directions below:

Use your set of data to:

- Display the data on a line plot
- label your line plot appropriately
- create a situation that would fit the set of data given
- explain how the set of data was/might have been collected
- give at least five real-world interpretations from the given set of data on your Recording Sheet

FORMATIVE ASSESSMENT QUESTIONS

- How did you decide what kind of situation would be appropriate to describe the data in your line plot?
- What are ways in which these data could have been collected?
- Would the data be appropriate on another type of graph? If so which graph(s)?
- Is there another way that your data could have been collected?
- Are there other interpretations you can make from your line plot?
- Have you labeled your line plot appropriately?

DIFFERENTIATION

Extension

- Have students repeat the activity using data that they collect.
- Have students display their data in an appropriate graph.
- Have students research and describe situations in which data are collected and displayed routinely.

Intervention

- Have students work with a smaller data set for the task.
- Allow students to collect or create data for their project.
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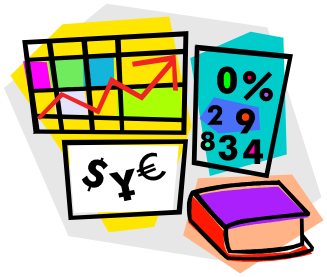
Name _____ Date _____

What's the Story?



Using the set of data below:

- Display the data on a line plot
- label your line plot appropriately
- create a situation that would fit the set of data given
- explain how the set of data was/might have been collected
- give at least five interpretations from the given set of data

Data:

Sample	1	2	3	4	5	6	7	8	9	10	11	12
Length (in)	7/8	3/8	6/8	5/8	8/8	2/8	5/8	3/8	7/8	1/8	4/8	8/8

Sample	13	14	15	16	17	18	19	20	21	22	23	24	25
Length (in)	1/8	7/8	3/8	4/8	8/8	2/8	5/8	3/8	8/8	7/8	5/8	3/8	6/8

Line Plot:

What's your story for a real-life situation for this set of data?_____

How might this set of data have been collected? _____

What does the data tell us? Explain at least 5 things that we can learn from this set of data.

1._____

2. _____

3._____

4._____

5._____