MA.4.DP.1.3

Overarching Standard: *MA4.DP.1 Collect, represent and interpret data and find the mode, median and range of a data set.*

Benchmark of Focus

MA.4.DP.1.3: Solve real-world problems involving numerical data.

Examples: Given the data of the softball team's hat size represented on a line plot, determine the fraction of the team that has a head size smaller than 20 inches.

Benchmark Clarifications

Clarification 1: Instruction includes using any of the four operations to solve problems.

Clarification 2: Data involving fractions with like denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. Fractions can be greater than one.

Clarification 3: Data involving decimals are limited to hundredths.

Related Benchmark/Horizontal Alignment
- MA.4.NSO.1.5
- MA.4.NSO.2.7
- MA.4.AR.1.2/1.3

Vertical Alignment

Previous Benchmarks	Next Benchmarks
MA.3.DP.1.2	MA.5.DP.1.2

Terms from the K-12 Glossary
- Numerical Data

Purpose and Instructional Strategies

The purpose of this benchmark is to use data sets as real-world context for doing arithmetic with whole numbers, fractions and decimals beyond finding measures of center and spread.

- Instruction includes having students solve one- and two-step problems from a given data set or by comparing two data sets in the same units.
- Instruction includes problems that involve addition, subtraction, multiplication, or division.
- This benchmark should be taught with MA.4.DP.1.1 and MA.4.DP.1.2 (collecting and representing data). Students should have a strong command of creating and interpreting line plots and stem-and-leaf plots to be successful with the interpretation these data displays.

Common Misconceptions or Errors

- Students can make errors when writing equations used to solve problems with numerical data. During instruction, expect students to justify their equations and solutions.

Strategies to Support Tiered Instruction

- Instruction includes visualizing word problems. The Three-Reads Protocol is a strategy to help students conceptualize what the question is asking. Students draw pictures or models to represent what is happening in the word problem. These pictures and models are used to help students write equations for the problem they are solving.
- Instruction includes breaking down word problems into smaller parts. Students use a highlighter to emphasize the important information in the word problem. Also, students paraphrase the word problem so the teacher can determine if the student understands what the question is asking.

Questions to ask students:
- **Ask students to generate a question that can be answered by analyzing data on a given line plot.**
- **What kinds of data makes sense to display on a line plot?**

- **Point to an "X" on a line plot. Ask students what the "x" represents in the given situation.**
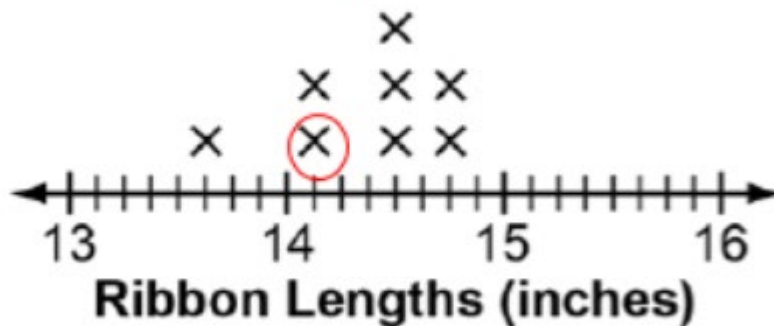
- Sample answer that indicates understanding: The X represents the length of one of ribbons that was 14 and 1/8 inches. There were two ribbons with a length of 14 and 1/8 inches. I know the X is at 14 and 1/8 because it is between 14 and 15 inches and each tick mark represents one-eighth of an inch. There are 8 equal spaces between 14 and 15 inches.

- **Use the line plot above: What is the difference between the longest ribbon and the shortest ribbon? How do you know what data to use?**
- Sample answer that indicates understanding: I know I need to subtract because I am looking for the difference. I need to look at the measurements on the x-axis of the line plot and find the ribbon that is the longest (the "x" that is furthest to the right) and the ribbon that is shortest (the "x" that is furthest to the left). To solve I would subtract $13\frac{5}{8}$ from $14\frac{6}{8}$. The difference would be $1\frac{1}{8}$ inches.

- **How can we create a line plot to represent the amount of time each of our students spent outside in the last week?**

- Sample answer that indicates understanding: Have students say how much time they spent outside. Determine the range to create a scale on the line plot. Plot amounts of time using an X for each student.

Instructional Tasks

Instructional Task 1 Collect 10 used pencils from people in your class. Measure the length of each pencil to the nearest $\frac{1}{8}$ inch and record the lengths on a line plot. What is the difference in length of the longest pencil and the shortest pencil?

Instructional Items

Instructional Item 1

The last 5 putt lengths, in feet, for the 18th hole of a golf tournament are shown below on a stem-and-leaf plot.

Stem	Leaf
1	$\frac{1}{2}$ $\frac{1}{2}$
3	$\frac{0}{2}$
4	$\frac{1}{2}$ $\frac{1}{2}$

What is the sum of the 5 putt lengths?

- A. 8 feet
- B. 9 feet
- C. 12 feet
- D. 15 feet

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
MA.4.DP.1.3 Solve real-world problems involving numerical data. Example: Given the data of the softball team's hat size represented on a line plot, determine the fraction of the team that has a head size smaller than 20 inches. Clarification 1: Instruction includes using any of the four operations to solve problems. Clarification 2: Data involving fractions with like denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. Fractions can be greater than one. Clarification 3: Data involving decimals are limited to hundredths.	Real-World	Items that contain fractions greater than one may be represented as mixed numbers. Numerical data sets will not be presented using braces.
ALD 2	ALD 3	ALD 4	ALD 5

solves real-world problems involving numerical data including fractions less than one with denominators of 2, 4, 5, 10, and 100, and decimals to the tenths.	solves real-world problems involving numerical data including fractions less than one and decimals to the hundredths.	solves real-world problems involving numerical data.	solves real-world, multistep problems and draws conclusions when analyzing numerical data.

Additional Resources:
CPALMS Resources

Khan Academy: Interpreting line plots with fractions

Khan Academy: Reading a line plot with fractions

Resources/Tasks to Support Your Child at Home:
Get a can of mixed nuts. Have your child measure various nuts to the nearest 1/8 and then create a line plot with the data.

IXL: Create and Interpret Line Plots With Fractions