Unit 3, Lesson 14

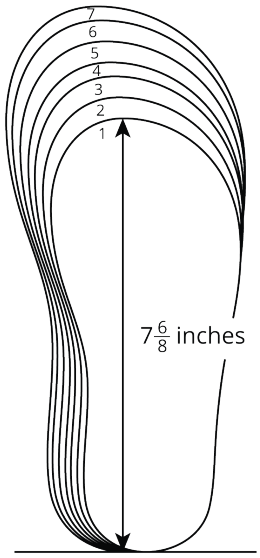
Problems about Fractional Measurement Data

Let’s solve problems involving measurement data on line plots.

Warm-up

Notice and Wonder: Shoe Sizes

U.S. youth shoe size	insole length (inches)
1	$7\frac{6}{8}$
1.5	8
2	$8\frac{1}{8}$
2.5	$8\frac{2}{8}$
3	$8\frac{4}{8}$
3.5	
4	$8\frac{6}{8}$
4.5	9
5	$9\frac{1}{8}$
5.5	
6	$9\frac{4}{8}$
6.5	$9\frac{5}{8}$
7	$9\frac{6}{8}$

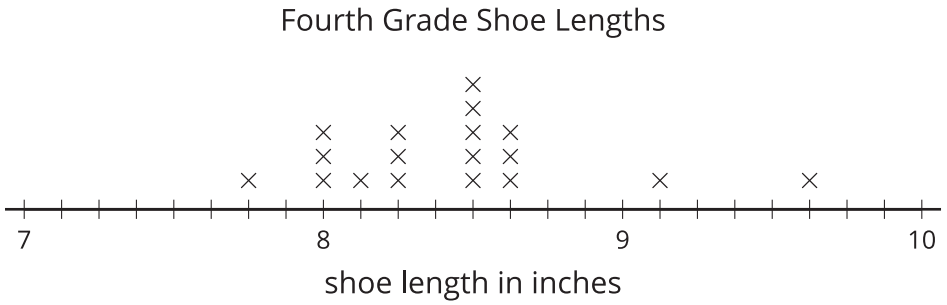


Activity 1

Shoe Lengths

Students in a fourth-grade class collect data on their shoe sizes and lengths. They plot the shoe lengths on a line plot.





The line plot is missing the shoe lengths of 6 students.

$9 \quad 9\frac{1}{8} \quad 8\frac{6}{8} \quad 7\frac{6}{8} \quad 9\frac{2}{8} \quad 8\frac{1}{8}$

1. Complete the line plot with the missing data.
2. Use the completed line plot to answer the following questions:
   a. What is the longest shoe length, in inches?

   b. What is the shortest shoe length, in inches?

   c. What is the difference between the longest and shortest shoe lengths, in inches? Explain or show your reasoning.

   d. The student who records 9 inches for her shoe length makes a mistake when reading the shoe chart. Her actual shoe length is $\frac{7}{8}$ inches shorter.

      What is her shoe length, in inches? Plot her corrected data point on the line plot.

Activity 2

Larger Shoes, Anyone?

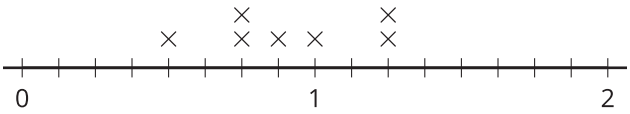
There are 10 students that record their shoe lengths in third grade and then again in fourth grade.

They found how much their feet have grown over a year and organize the data in a table and on a line plot.

student	change in shoe length (inches)
Jada	$\frac{5}{4}$
Priya	$\frac{7}{8}$
Andre	$\frac{3}{4}$
Elena	$\frac{1}{2}$
Han	$1\frac{2}{8}$

student	change in shoe length (inches)
Clare	1
Tyler	$1\frac{1}{8}$
Kiran	$\frac{6}{8}$
Diego	$1\frac{1}{4}$
Lin	$\frac{5}{8}$

How Much Have Our Feet Grown?



change in shoe length in inches

1. The line plot shows only 7 points. Whose information is missing? Add the 3 missing points to the line plot.

2. If Han's shoe length now is $9\frac{1}{8}$ inches, what was his shoe length in third grade?

3. If Priya's shoe length was $7\frac{6}{8}$ inches last year, what's her shoe length this year?

4. Tyler makes a calculation error. What he records, $1\frac{1}{8}$ inches, was $\frac{3}{8}$ inches off from the actual change in shoe length.

   a. What could be the actual change in his shoe length? Explain or show your reasoning.

   b. How does his error change the line plot? Explain your reasoning.

Section B Summary

We added and subtracted fractions with the same denominator, using number lines to help with our reasoning.

First, we learned that a fraction can be decomposed into a sum of smaller fractions. For example, here are a few ways to write $\frac{6}{10}$:

$$\frac{6}{10} = \frac{4}{10} + \frac{2}{10} \qquad \frac{6}{10} = \frac{5}{10} + \frac{1}{10}$$

$$\frac{6}{10} = \frac{2}{10} + \frac{2}{10} + \frac{2}{10}$$

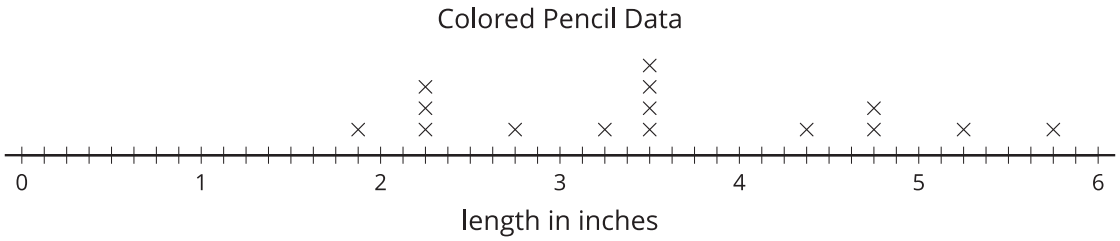
If the fraction is greater than 1, it can be decomposed into a whole number and a fraction less than 1. For instance, we can decompose $\frac{17}{10}$ and rewrite it as $1\frac{7}{10}$. A number such as $1\frac{7}{10}$ is called a **mixed number**.

$$\frac{10}{10} + \frac{7}{10}$$
$$1 + \frac{7}{10}$$
$$1\frac{7}{10}$$

Later, we decomposed fractions into sums and wrote equivalent fractions to help us add and subtract fractions. For example, to find the value of $1\frac{2}{5} - \frac{3}{5}$, we can:

- Decompose $1\frac{2}{5}$ into $1 + \frac{2}{5}$ or $\frac{5}{5} + \frac{2}{5}$, which is $\frac{7}{5}$.
- Find the value of $\frac{7}{5} - \frac{3}{5}$, which is $\frac{4}{5}$.

Finally, we organized and analyzed measurement data, using line plots. The data were lengths measured to the nearest inch, $\frac{1}{2}$ inch, $\frac{1}{4}$ inch, and $\frac{1}{8}$ inch.



We used equivalent fractions to plot the measurements because the fractions have different denominators. Then we used the line plots and what we know about addition and subtraction of fractions to solve problems about the data.