# Make Line Plots and Interpret Data

Dear Family,

This week your child is learning about line plots and about how to interpret data on line plots.

A **line plot** is a data display that shows data as marks above a number line. A line plot is useful for showing how data are grouped. The line plot below shows the weights of onions. Each onion is represented by an X on the line plot. Xs that are one above another represent onions that have the same weight. Weights are labeled beneath the number line.

Onion Weights

Weight (in pounds)
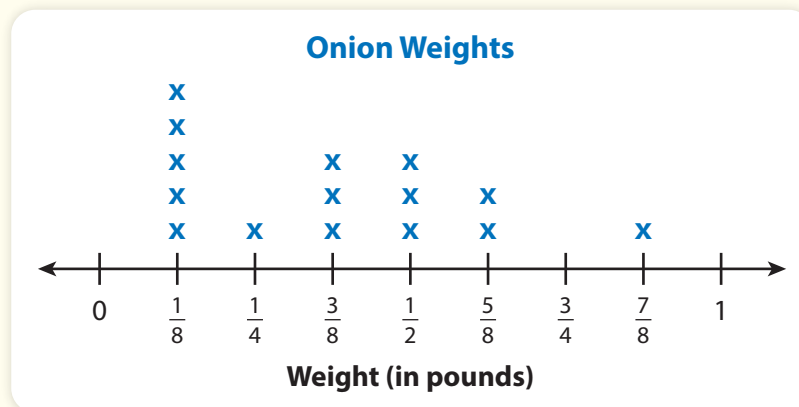
The line plot shows how the data are grouped. You can describe the data by looking at the line plot. Most pieces of data on this line plot are grouped between $\frac{1}{8}$ and $\frac{1}{2}$.

You can also do mathematical operations with the data values to describe the data. For example, you can find the difference between the heaviest and lightest onions. The weights vary from $\frac{1}{8}$ pound to $\frac{7}{8}$ pound. The difference is $\frac{6}{8}$, or $\frac{3}{4}$, pound.

Using line plots can help your child ask and answer complex questions about data.

Invite your child to share what they know about making line plots and interpreting data by doing the following activity together.

{ACTIVITY} MAKING A LINE PLOT

Do this activity with your child to make line plots and interpret data.

Materials centimeter ruler

Work with your child to make a line plot of the lengths of book covers.

- Gather several books. Measure the length of the cover of each book. Measure to the nearest centimeter. Use your own centimeter ruler or cut out and use the centimeter ruler below.

- Make a list of the lengths and use the data to make a line plot.

  - Use the number line below. Title the line plot "Lengths of Book Covers"and write the label "Length (in centimeters)" beneath the number line.

  - Decide what scale to use based on the measurements you collect. Then mark Xs to show the data.

- Describe how the data shown on the line plot are grouped.

- Do mathematical operations with the data values to describe the data. For example, find the difference between the length of the longest book cover and the length of the shortest book cover.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
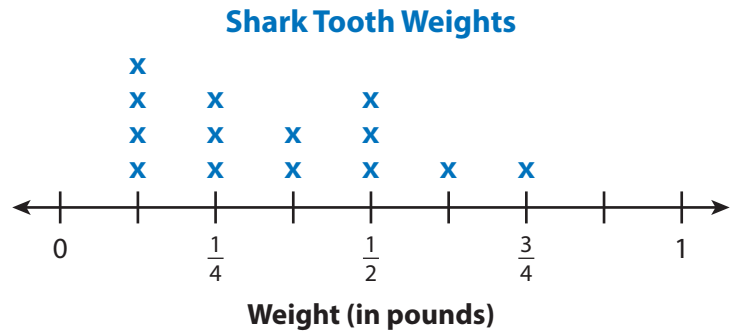
centimeters

Explore Making Line Plots and Interpreting Data

You have made and used line plots before. Now you will make line plots and use them to answer more complex questions about data. Use what you know to try to solve the problem below.

A scientist finds shark teeth fossils of different sizes and weighs each tooth to the nearest $\frac{1}{8}$ pound. The results are shown in the line plot. What is the difference between the weights of the heaviest tooth and the lightest tooth?

Shark Tooth Weights

```
x
x       x               x
x       x       x       x
x       x       x       x       x       x
├───┼───┼───┼───┼───┼───┼───┼───┼───►
0       1/4             1/2             3/4             1
```

Weight (in pounds)

TRY IT

🧰 Math Toolkit
- fraction tiles
- fraction circles
- fraction bars
- number lines

DISCUSS IT

Ask your partner: Why did you choose that strategy?

Tell your partner: I knew . . . so I . . .

🎯 Learning Targets
- Make a line plot of measurement data given in fractions of a unit.
- Use data from a line plot to solve problems that involve fractions.

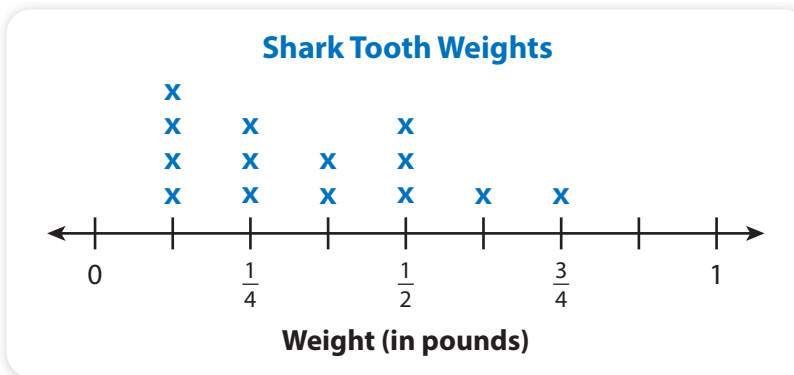**Lesson 27** Make Line Plots and Interpret Data

CONNECT IT

1 **LOOK BACK**

What is the difference between the weights of the heaviest tooth and the lightest tooth? Explain how you know.

2 **LOOK AHEAD**

Graphing data on a line plot helps you get a picture of the data and how the data are spread out or grouped.

Shark Tooth Weights

Weight (in pounds)

a. The scale of a line plot is the value represented by the distance between one tick mark and the next on the number line.

Counting up, how many tick marks does it take to get from 0 to 1? ....

What fraction of the whole is the distance between tick marks? ....

The scale is .... pound.

b. How many data values are recorded on the line plot? Explain how you know.

c. What do the four Xs above $\frac{1}{8}$ represent?

3 **REFLECT**

The scale of the line plot is $\frac{1}{8}$. Why are the numbers $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$, and 1 on the line plot?
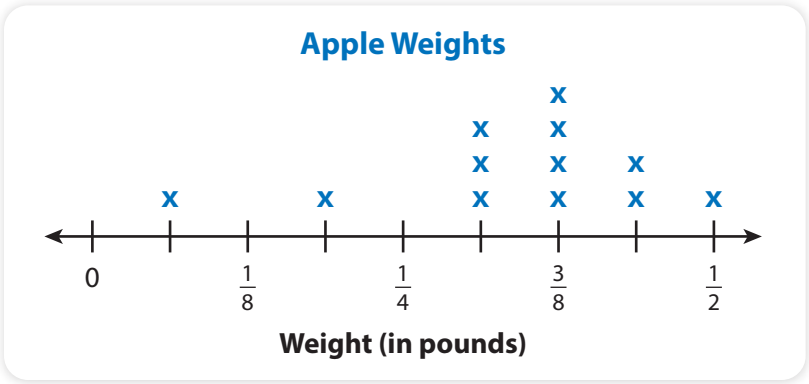
Prepare for Making Line Plots and Interpreting Data

1 Think about what you know about line plots. Fill in each box.
Use words, numbers, and pictures. Show as many ideas as you can.
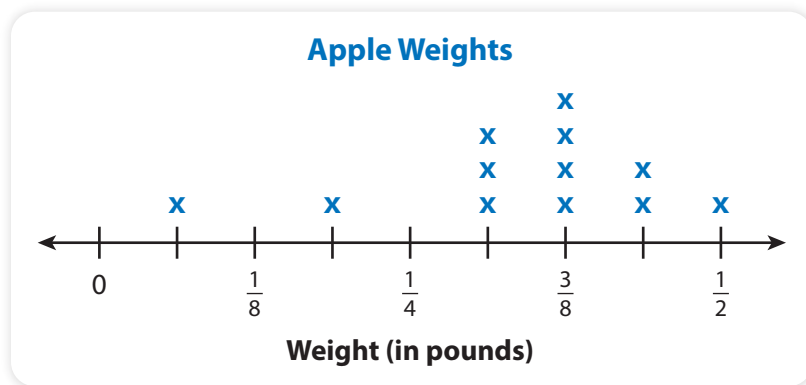
Word	In My Own Words	Example
line plot		
scale		
data		

2 Look at the line plot. What is the scale? How do you know?

Apple Weights

Weight (in pounds)

3 Solve the problem. Show your work.

A worker at an orchard weighs some apples of different sizes and types. They weigh each apple to the nearest $\frac{1}{16}$ pound. The results are shown in the line plot below. What is the difference between the weights of the heaviest apple and the lightest apple?

Apple Weights

```
                              x
                    x         x
                    x         x
          x    x    x    x    x    x         x
◄─────┼────┼────┼────┼────┼────┼────┼────┼────┼────►
      0         1         1         3         1
                8         4         8         2
```
Weight (in pounds)

Solution ....

4 Check your answer. Show your work.

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Develop Making a Line Plot

Read and try to solve the problem below.

Sticker Widths (in inches)		
$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$
$\frac{3}{4}$	$\frac{1}{4}$	$\frac{5}{8}$
$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{1}{2}$	1	1

Bruno buys 12 different types of stickers to decorate his scrapbook. He measures the width, in inches, of each type of sticker and writes down the results. Make a line plot to organize and display Bruno's data.
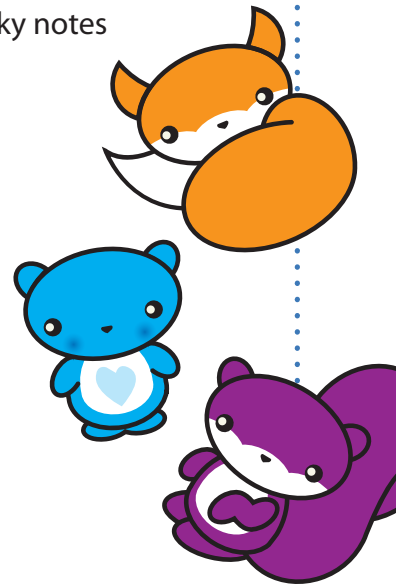
TRY IT

Math Toolkit
- fraction tiles or circles
- fraction bars
- number lines
- rulers
- sticky notes

DISCUSS IT

Ask your partner: How did you get started?

Tell your partner: I started by . . .

Explore different ways to understand making a line plot.

> **Bruno buys 12 different types of stickers to decorate his scrapbook. He measures the width, in inches, of each type of sticker and writes down the results. Make a line plot to organize and display Bruno's data.**

Sticker Widths (in inches)		
$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$
$\frac{3}{4}$	$\frac{1}{4}$	$\frac{5}{8}$
$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{1}{2}$	1	1

MODEL IT

**List what you know and plan how to make the line plot.**

• The fractions are in eighths, fourths, and halves.

• The narrowest sticker is $\frac{1}{8}$ inch. The widest sticker is 1 inch.

• The line plot will start at 0 and go up to 1 inch.

• The line plot will show an X for each of the 12 stickers.

• The line plot will have a title and scale label.

MODEL IT

Use your plan to start labeling and marking the line plot to display the data.

Draw a number line from 0 to 1. Choose an appropriate scale for the data.

Graph each data value. The line plot below shows the first row from Bruno's list of sticker widths.

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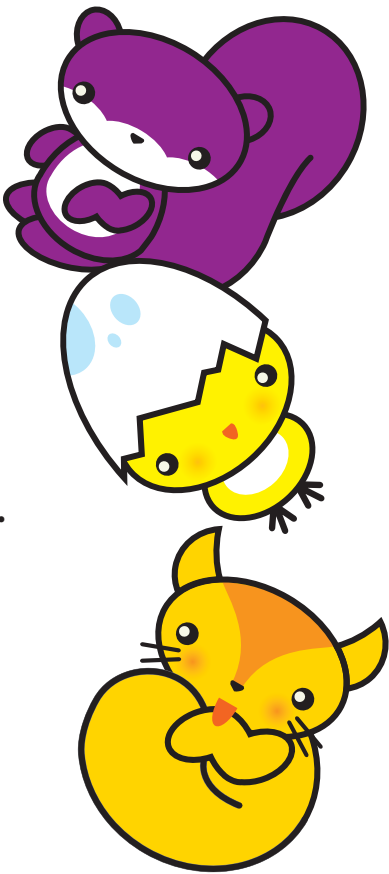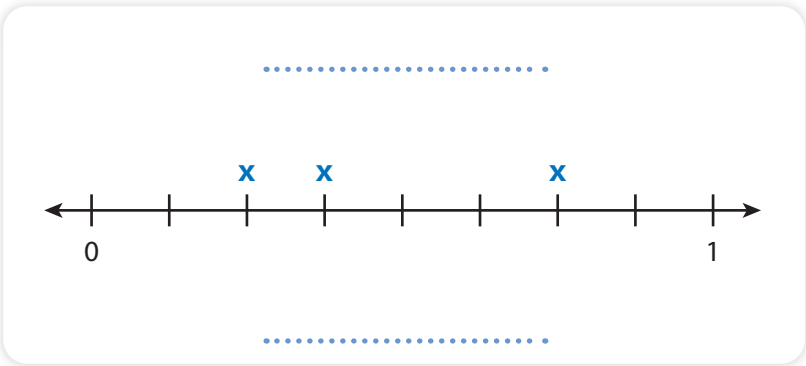
CONNECT IT
Now you will use the problem from the previous page to help you understand how to make a line plot.

1 Look at the first **Model It**. Why is it a good plan to go from 0 up to 1 inch for the line plot?

2 What scale is used for the line plot in the second **Model It**? Explain.

3 Why does this scale make sense for the data?

4 The tick marks in the second **Model It** are not labeled with fractions. Do they have to be? How can you locate data points with Xs when the tick marks are not labeled with numbers?

5 Complete the line plot in the second **Model It**. Include the rest of the data, a title above the line plot, and a label for the scale below the line plot.

6 How do you use a line plot to organize measurement data?

7 REFLECT

Look back at your **Try It**, strategies by classmates, and **Model Its**. Which models or strategies do you like best for making line plots? Explain.

....

....

....
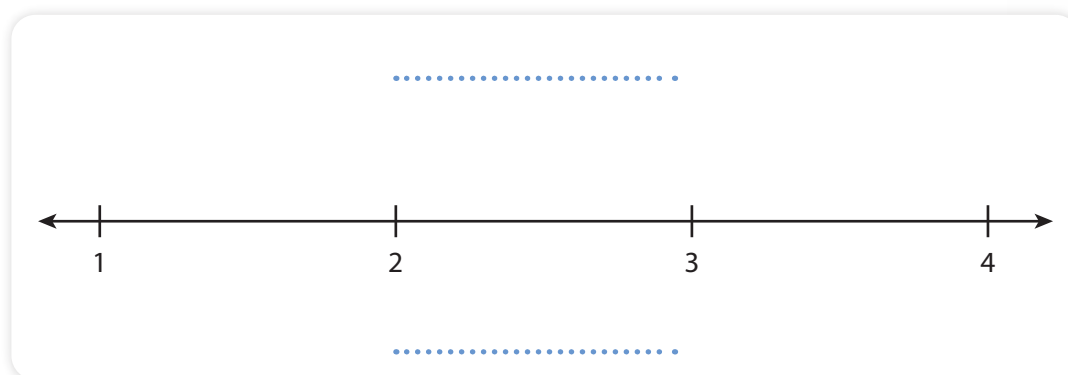
APPLY IT

Use what you just learned to solve these problems.

8 Aiden collects bugs for a science project. He records the length in inches of each bug. Complete the line plot of the data.

$1\frac{5}{8}$, $3\frac{1}{4}$, $1\frac{3}{4}$, $2\frac{7}{8}$, $1\frac{3}{4}$, $3\frac{1}{4}$, $1\frac{5}{8}$, $2\frac{3}{8}$, 1, $1\frac{3}{4}$

```
◄———+———————+———————+———————+———►
    1       2       3       4
```

9 Mrs. Hunter walks whenever she can instead of driving her car. She keeps track of the distances she walks each day, in miles. Use the data to make a line plot. Show your work.

Distance Walked Each Day (miles)						
	Mon	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat**	**Sun**
Week 1	$7\frac{1}{4}$	5	$6\frac{1}{2}$	$5\frac{1}{2}$	5	7	6
Week 2	$4\frac{1}{4}$	$6\frac{1}{2}$	$5\frac{1}{2}$	5	$7\frac{1}{4}$	$6\frac{1}{4}$	$4\frac{3}{4}$

```
◄——————————————————————————————►
```

Practice Making Line Plots

Study the Example showing how to make a line plot. Then solve problems 1–4.

EXAMPLE

Aisha's grandfather gives her a box of foreign coins. She measures the length across each coin as shown. Then she makes a list that shows the lengths. How can Aisha show the data in a line plot?
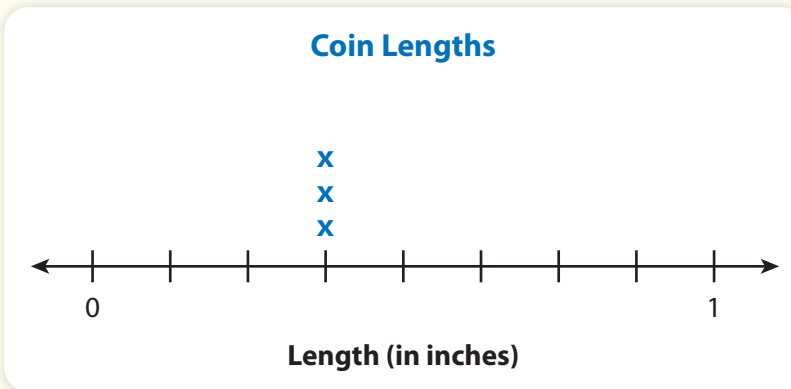
Begin making the line plot by marking a number line from 0 to 1 in eighths.

Make one X to stand for each coin in the table. The line plot below shows three of the 12 data values in Aisha's list.

Coin Lengths (in inches)

$\frac{3}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{3}{4}$
$\frac{7}{8}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{3}{8}$	$\frac{7}{8}$

Coin Lengths

```
        X
        X
        X
   ├──┼──┼──┼──┼──┼──┼──┼──┼──┤
   0                          1
```
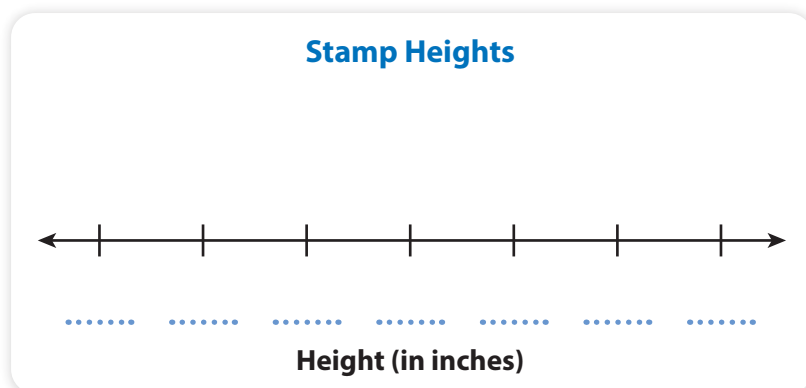
Length (in inches)

1 Which data values do the three Xs Aisha draws represent?

2 Graph the rest of the data from the list in the Example on the line plot.

3   Pablo has a collection of stamps. He records the heights of the stamps in inches.

$\frac{1}{2}$, 1, $1\frac{1}{2}$, $2\frac{1}{2}$, 3, 2, 2, $\frac{1}{2}$, 1, 1, $2\frac{1}{2}$, 2, $1\frac{1}{2}$, 1, $2\frac{1}{2}$

Complete a line plot of Pablo's data. Label each tick mark for this line plot.

Stamp Heights

Height (in inches)

4   Pablo also records the widths of some of the stamps in inches.

$\frac{3}{4}$, 1, $1\frac{1}{2}$, $1\frac{1}{4}$, $1\frac{1}{2}$, 1, $1\frac{3}{4}$, $1\frac{3}{4}$, $1\frac{1}{2}$, $\frac{1}{2}$

Make a line plot of Pablo's data for stamp widths.
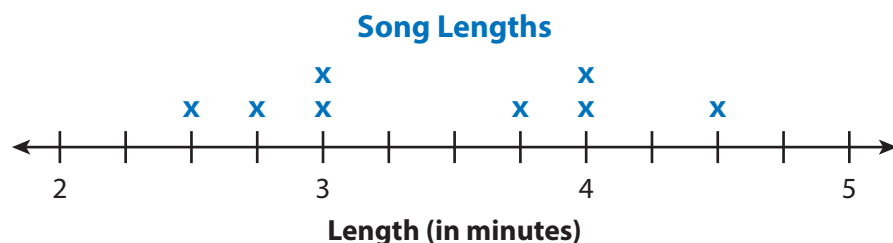
What scale did you use to make your line plot? Explain.

Vocabulary

scale (on a graph) the value represented by the distance between one tick mark and the next on a number line.

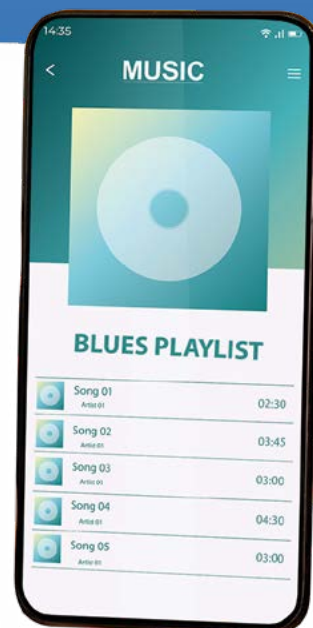©Curriculum Associates, LLC   Copying is not permitted.

Develop Solving Problems Using Data in a Line Plot

Read and try to solve the problem below.

The line plot shows the lengths of songs on a blues playlist.

Song Lengths

```
        x           x
    x   x   x       x   x       x
<---+---+---+---+---+---+---+---+---+---+---+--->
    2           3           4           5
```
Length (in minutes)

Two new songs are added. The new playlist is now 34 minutes in length. What are two possible lengths for the new songs?

TRY IT

🧰 **Math Toolkit**
- fraction tiles
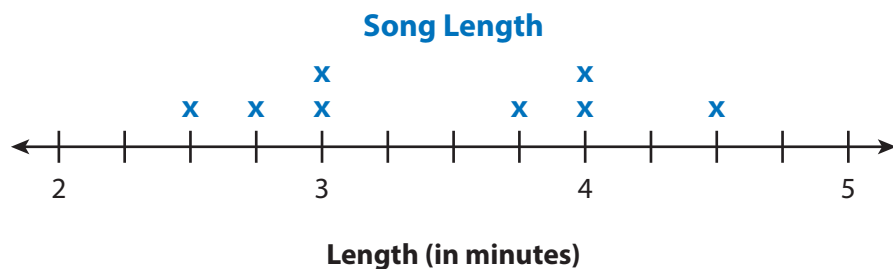- fraction circles
- fraction bars
- number lines

DISCUSS IT

Ask your partner: Do you agree with me? Why or why not?

Tell your partner: I disagree with this part because . . .

Explore different ways to understand solving a problem using data from the line plot.

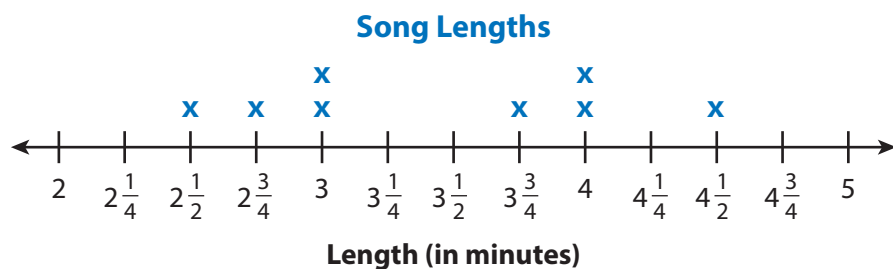**The line plot shows the lengths of songs on a blues playlist.**

Song Length

Length (in minutes)

Two new songs are added. The new playlist is now 34 minutes in length. What are two possible lengths for the new songs?

PICTURE IT

You can use a picture to help understand the data in the problem.

Label the tick marks in the line plot to show the song lengths.

Song Lengths

Length (in minutes)

MODEL IT

You can use equations to help understand the problem.

Write an equation to find m, the length in minutes of the original playlist.

$$m = 2\frac{1}{2} + 2\frac{3}{4} + 3 + 3 + 3\frac{3}{4} + 4 + 4 + 4\frac{1}{2}$$

Write an equation that shows how to find the total number of minutes, t, that the new songs add to the length of the playlist.

$$t = 34 - m$$

Find two songs that add to the number of minutes, t.

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CONNECT IT

Now you will use the problem from the previous page to help you understand how to solve a problem using data in a line plot.

1 How many minutes, m, is the original playlist? Explain how you know.

2 How many minutes, t, do the two new songs add to the playlist? Explain.

3 What are two possible lengths for the new songs? Is more than one correct answer possible? Explain.

4 How did the line plot help you solve the problem?

5 How did you use operations with fractions to solve the problem?

6 REFLECT

Look back at your **Try It**, strategies by classmates, and **Picture It** and **Model It**. Which models or strategies do you like best for solving problems using data in a line plot? Explain.

....

....

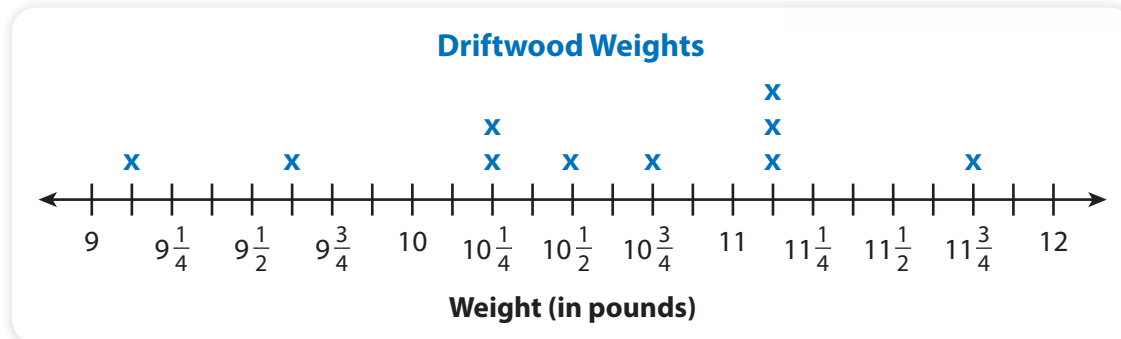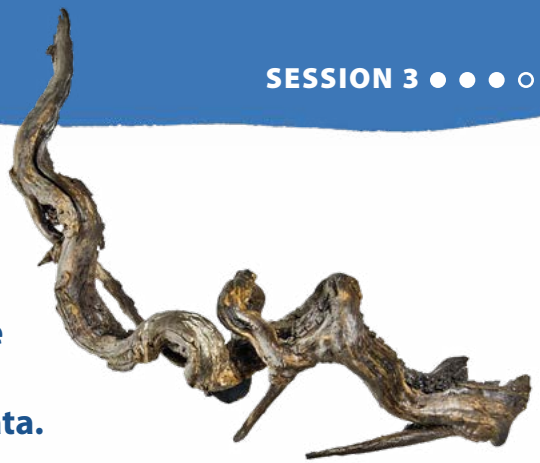..

APPLY IT

Use what you just learned to solve these problems.

Soo collects driftwood at Laguna Beach. He collects one piece of driftwood each week for 10 weeks and weighs each piece. He uses the line plot below to display the data.

Driftwood Weights

Weight (in pounds)

7 What is the difference between the weights of the lightest piece and the heaviest piece of driftwood Soo collects? Show your work.

Solution ....

8 What is the total weight of the pieces of driftwood Soo collects that weigh less than $10\frac{1}{2}$ pounds? Show your work.

Solution ....

9 What is the total weight of the pieces of driftwood Soo collects most often?

Ⓐ $11\frac{3}{4}$ pounds

Ⓑ $22\frac{1}{4}$ pounds
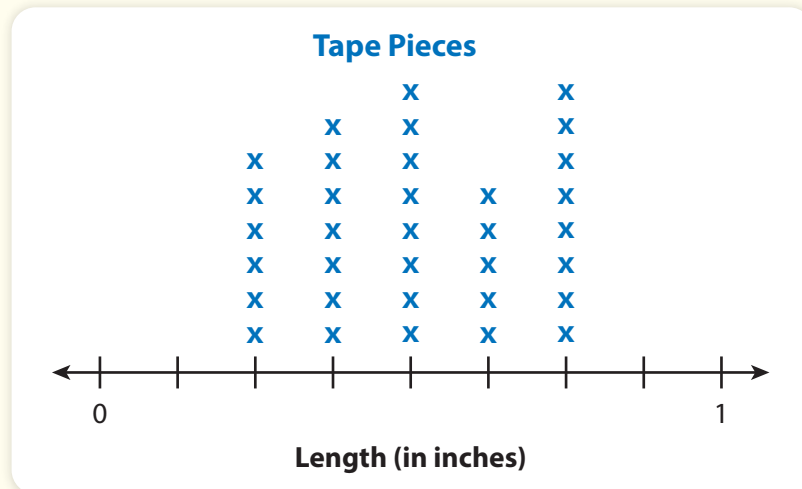
Ⓒ $33\frac{3}{8}$ pounds

Ⓓ $33\frac{3}{4}$ pounds

Practice Solving Problems Using Data in a Line Plot

Study the Example showing how to solve a problem using data in a line plot.
Then solve problems 1–6.

EXAMPLE

Silvia uses pieces of color tape to decorate model planes. The line plot shows how many pieces she has in several different lengths.

Suppose Silvia places all the $\frac{1}{4}$-inch pieces end to end in a straight line. How long is the line?

Tape Pieces

```
                x               x
            x   x               x
        x   x   x               x
        x   x   x       x       x
        x   x   x       x       x
        x   x   x       x       x
        x   x   x       x       x
        x   x   x       x       x
    ←———+———+———+———+———+———+———+———+———→
        0                               1
```
Length (in inches)

The tick marks divide the distance from 0 to 1 into eighths.

The second tick mark to the right of 0 is $\frac{2}{8}$, or $\frac{1}{4}$.

There are six $\frac{1}{4}$-inch pieces, and $6 \times \frac{1}{4} = \frac{6}{4}$, or $1\frac{1}{2}$. The line is $1\frac{1}{2}$ inches long.

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1 How long a line can Silvia make using all the $\frac{3}{8}$-inch pieces? Show your work.
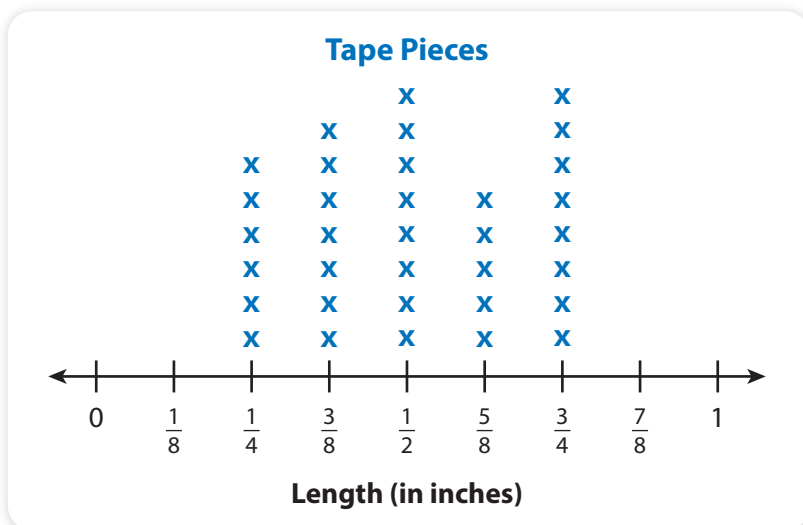
Solution ....

2 What is the difference in length between a line made with all the $\frac{3}{8}$-inch pieces and a line made with all the $\frac{3}{4}$-inch pieces? Show your work.

Solution ....

Use the data in the line plot to solve problems 3–6.

3 Suppose Silvia uses 2 pieces of each length that she has to make a line. How long is the line? Show your work.

Tape Pieces

		X		X			
	X	X		X			
X	X	X		X			
X	X	X	X	X			
X	X	X	X	X			
X	X	X	X	X			
X	X	X	X	X			
X	X	X	X	X			

0    $\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$ $\frac{7}{8}$ 1

Length (in inches)

Solution ....

4 Silvia adds another data value so that the difference between the longest and shortest pieces is $\frac{3}{4}$ inch. What is the length of the piece Silvia adds? Explain.

5 Silvia places all the $\frac{5}{8}$-inch pieces end to end in a straight line. How long is the line? Show your work.

Solution ....

6 How could Silvia use at least two pieces of different lengths to make a 4-inch line?

Refine Making Line Plots and Interpreting Data

Complete the Example below. Then solve problems 1–7.

EXAMPLE

The line plot shows the weights of black bean burgers Muna makes. How many pounds of black bean burger mixture does she use to make all the burgers?

Burger Weights

Weight (in pounds)
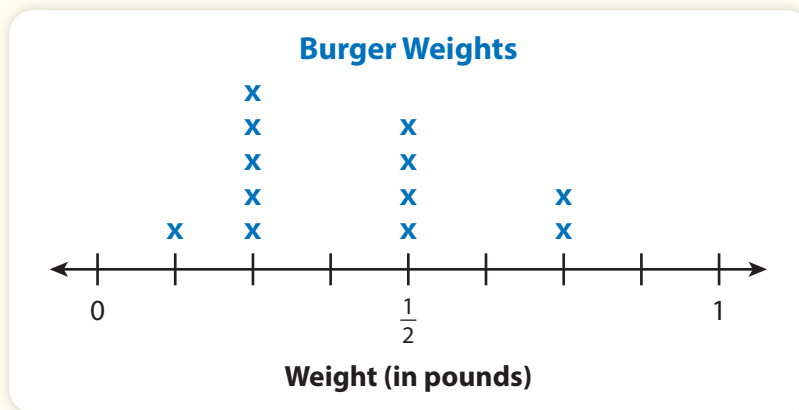
Look at how you could use the data in the line plot.

One $\frac{1}{8}$-lb burger: $\frac{1}{8}$ Five $\frac{1}{4}$-lb burgers: $5 \times \frac{1}{4} = 1\frac{1}{4}$

Four $\frac{1}{2}$-lb burgers: $4 \times \frac{1}{2} = 2$ Two $\frac{3}{4}$-lb burgers: $2 \times \frac{3}{4} = 1\frac{1}{2}$

Total: $\frac{1}{8} + 1\frac{1}{4} + 2 + 1\frac{1}{2}$

Solution ....

The student multiplied the number of burgers of each weight by that weight and then added the amounts to find the total.

APPLY IT

1   Use the line plot in the Example. Muna cuts the smallest black bean burger in half. What is the weight of each half? Show your work.

What operations could you use to solve the problem?

Solution ....

2 An animal doctor's scale weighs animals to the nearest $\frac{1}{4}$ pound. The list below shows the weights, in pounds, of the last 10 dogs the animal doctor saw.

$$14\frac{1}{2}, \ 17\frac{1}{2}, \ 15\frac{1}{4}, \ 17\frac{1}{4}, \ 17\frac{1}{2}, \ 15\frac{1}{4}, \ 14\frac{1}{4}, \ 16, \ 14\frac{3}{4}, \ 15\frac{1}{4}$$

Make a line plot to show the data.

How should the line plot's scale be labeled to show these data?

PAIR/SHARE
How is your line plot the same as your partner's? How is it different?

3 Look at the line plot for problem 2. Which statement about the data is true?

Ⓐ The heaviest dog is $4\frac{1}{4}$ pounds heavier than the lightest dog.

Ⓑ The three lightest dogs weigh $43\frac{1}{2}$ pounds combined.

Ⓒ The three heaviest dogs weigh $52\frac{1}{2}$ pounds combined.

Ⓓ The 16-pound dog is closer in weight to the lightest dog than to the heaviest dog.

Kanatase chose Ⓐ as the correct answer. How did she get that answer?

Read each statement carefully and check it against the data to see if it is true.
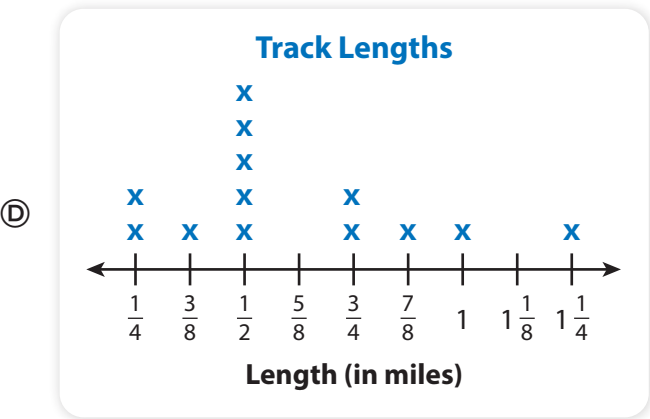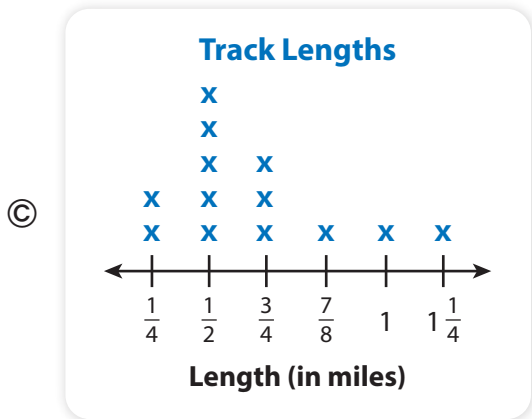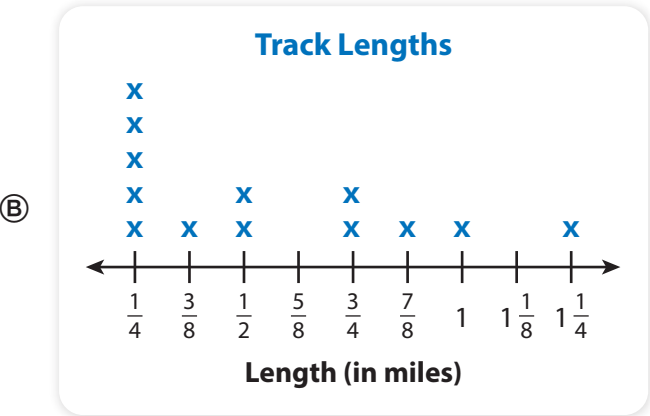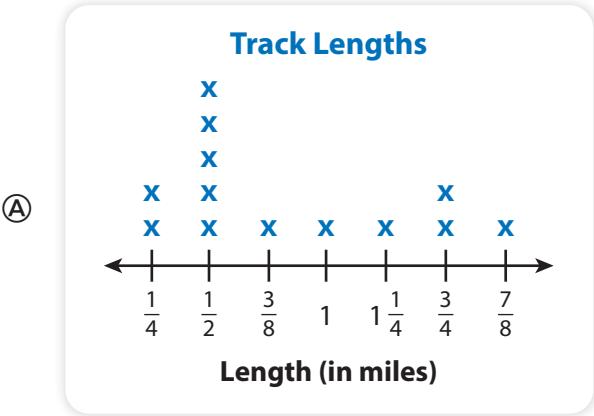
PAIR/SHARE
Does Kanatase's answer make sense?

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4 Demarco drives a race car. The race tracks vary in length. To prepare for racing season, he records the lengths, in miles, of the tracks in the list shown below. Which line plot correctly shows the track data?
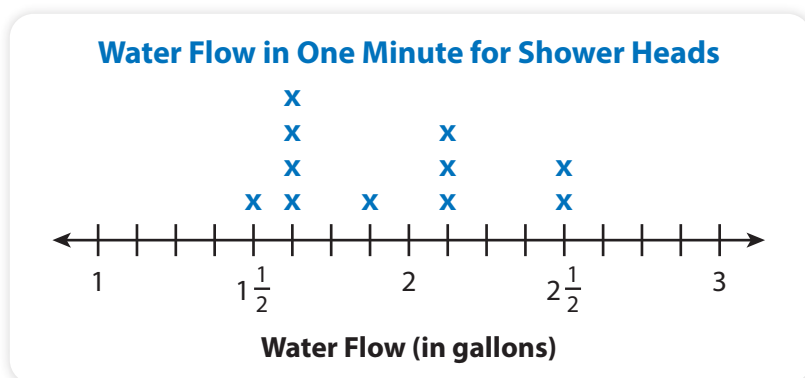
$$\frac{1}{4}, \ \frac{1}{2}, \ \frac{3}{8}, \ \frac{1}{2}, \ \frac{1}{4}, \ \frac{1}{2}, \ 1, \ 1\frac{1}{4}, \ \frac{3}{4}, \ \frac{1}{2}, \ \frac{7}{8}, \ \frac{1}{2}, \ \frac{3}{4}$$

Ⓐ

Track Lengths

Length (in miles)

Ⓑ

Track Lengths

Length (in miles)

Ⓒ

Track Lengths

Length (in miles)

Ⓓ

Track Lengths

Length (in miles)

5 Look at the data for problem 4. Choose *True* or *False* for each statement.

	True	False
The longest track is 6 times the length of the shortest track.	Ⓐ	Ⓑ
The combined length of the three shortest tracks is $\frac{4}{8}$ mile.	Ⓒ	Ⓓ
The combined length of the three longest tracks is $3\frac{1}{8}$ miles.	Ⓔ	Ⓕ
Half the length of the shortest track is $\frac{1}{8}$ mile.	Ⓖ	Ⓗ

Lesson 27 Make Line Plots and Interpret Data **571**

6   Alita wants to use less water. She makes the line plot below
to compare the water flow for several shower heads.

Water Flow in One Minute for Shower Heads

```
          X
          X            X
          X            X            X
     X    X      X     X            X
   ┣━┿━┿━┿━┿━┿━┿━┿━┿━┿━┿━┿━┿━┿━┿━┿━┿━┫
     1        1½        2        2½        3
```
Water Flow (in gallons)

Part A What is the most common water flow in one minute

for the shower heads? ....

Part B Alita buys the shower head with the least water flow. How much
water does she use for a 7-minute shower? Show your work.

Solution ....

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Jing looks at the line plot above. He says the difference between the
most common water flow and the least water flow is $\frac{1}{4}$ gallon. He says
he knows the difference without subtracting. Explain Jing's mistake.
Then find the actual difference between the measurements.

☑ SELF CHECK Go back to the Unit 4 Opener and see what you can check off.