# Make Line Plots and Interpret Data

🅖 Use What You Know

You have created and used line plots before. Now you will create line plots and use them to answer more complex questions about data. Take a look at this problem.

Tomatoes come in different sizes and types. Mrs. May's class weighed several different tomatoes to the nearest $\frac{1}{8}$ pound. The results are shown in the line plot below. Use the line plot to describe how the weights varied.
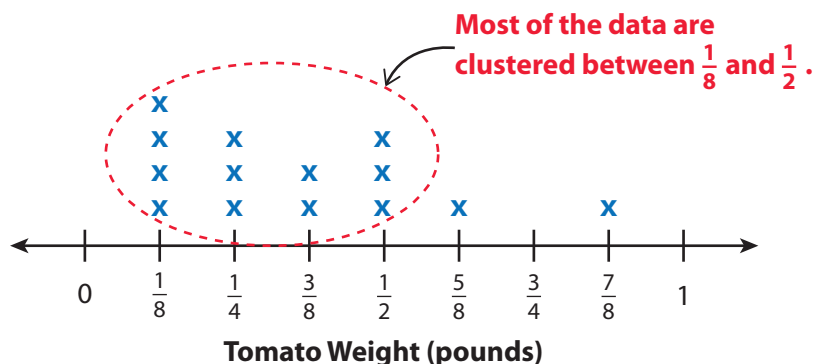

Tomato Weight (pounds)
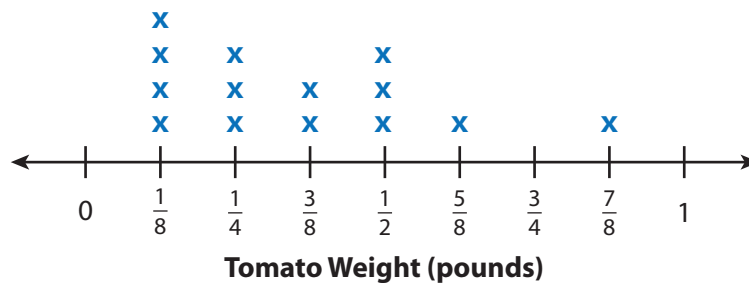
a. The greatest number of tomatoes weigh _____ .

b. Which best describes how the weights are spread out? Circle the best description.

   clustered between   clustered between   spread out
   0 lb and $\frac{1}{2}$ lb $\frac{1}{2}$ lb and 1 lb   between 0 lb and 1 1b

c. Are most of the tomatoes on the heavier or lighter end of the scale? _____

d. Are there any tomatoes whose weight is very different from the rest?

   If so, what does it weigh? _____

e. What is the difference between the weights of the heaviest and lightest tomato?

   _____

f. How many times the weight of the lightest tomato is the heaviest tomato?

   _____

▶▶ Find Out More

Plotting data on a line plot helps you get a "picture" of what the data look like and how the data are spread out. Each X represents one piece of data. So the taller stacks of Xs mean more data with the same value.

You can use the *Tomato Weight* line plot to talk about the distribution of tomato weights. **Distribution** is how spread out or how clustered the data are.

Most of the data are clustered between $\frac{1}{8}$ and $\frac{1}{2}$.

```
X
X   X           X
X   X   X   X
X   X   X   X   X       X
```

$$\begin{array}{ccccccccc} & 0 & \frac{1}{8} & \frac{1}{4} & \frac{3}{8} & \frac{1}{2} & \frac{5}{8} & \frac{3}{4} & \frac{7}{8} & 1 \end{array}$$

Tomato Weight (pounds)

You can also use operations with data values to come up with ways to describe the data. For example:

- Subtract $\frac{7}{8} - \frac{1}{8}$ to find the difference between the weights of the heaviest and lightest tomato. The difference tells how much the weights vary.

- Divide $\frac{7}{8} \div \frac{1}{8}$ to find that the heaviest tomato is 7 times heavier than the lightest tomato. This gives a comparison between the least and greatest data value.

▶ Reflect

1 Suppose you have one more tomato with a weight of $\frac{3}{4}$ pound. Would that change how much the weights vary? Explain.

_____

_____

_____

_____

Learn About ➤ **Making a Line Plot**

Read the problem below. Then explore different ways to understand how to make a line plot.

Kiera bought a bag of stickers to decorate her scrapbook pages. She sorted the stickers by width. She counted the stickers and found 18 stickers that are $\frac{1}{4}$ inch wide, 11 stickers that are $\frac{1}{2}$ inch wide, and 14 stickers that are $\frac{1}{8}$ inch wide. Kiera wants to see the distribution of the widths so she can plan how to use the stickers. Make a line plot of the data.

▶ **Model It** **You can use a table to understand the data given in the problem.**

List the number of stickers in a table from least width to greatest width.

Sticker Width (in inches)	Number of Stickers
$\frac{1}{8}$	14
$\frac{1}{4}$	18
$\frac{1}{2}$	11

▶ **Model It** **Use the table to list what you know and to plan how to make the line plot.**

- The fractions are in eighths, fourths, and halves.
- The least fraction is $\frac{1}{8}$. The greatest fraction is $\frac{1}{2}$.
- Label the line plot in eighths: $0, \frac{1}{8}, \frac{1}{4}, \frac{3}{8}, \frac{1}{2}$.
- The least number of stickers is 11.
- The greatest number of stickers is 18.

▶ **Connect It** **Now you will make the line plot for the problem on the previous page.**

2 What scale is used for the line plot? Explain.
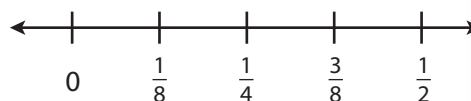
_____

_____

3 How many Xs will you draw above each width?

$\frac{1}{8}$ in. _____ $\frac{1}{4}$ in. _____ $\frac{3}{8}$ in. _____ $\frac{1}{2}$ in. _____

4 Use the number line at the right to make a line plot of the sticker widths.

5 Based on how the data are distributed, what is one conclusion you can make about Kiera's stickers?

_____

_____

6 How do you use a line plot to show the distribution of measurement data? _____

_____

_____

_____

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

Sticker Width (inches)

▶ **Try It** **Use what you just learned about creating line plots to solve this problem. Show your work on a separate sheet of paper.**

7 At a health fair, Shawn recorded the number of cups of sugar per gallon for several different sports drinks and sodas. Make a line plot of the data.

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

Learn About ▶ **Solving Problems Using Data in a Line Plot**

Read the problem below. Then explore different ways to understand how to solve the problem using the data from a line plot.

Look at the line plot of sticker widths that you made on the previous page. Kiera wants to make a 5-inch wide row of stickers under a photo. She wants to use the same stickers for the whole row. How many of which sticker width can she use?
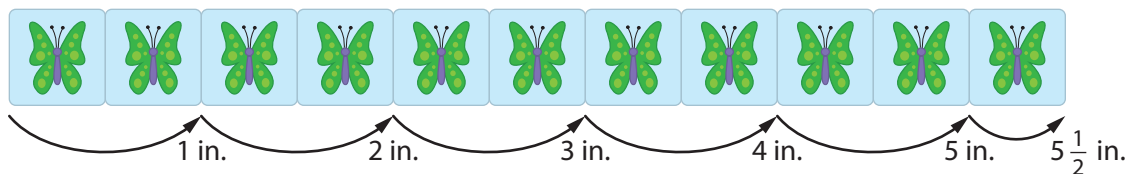
▶ **Picture It** You can use a picture to help understand the data in the problem.

Kiera has 14 stickers that are $\frac{1}{8}$-inch wide:

★★★★★★★★★★★★★★

1 in. $1\frac{6}{8}$ in.

Kiera has 18 stickers that are $\frac{1}{4}$-inch wide:

☀☀☀☀☀☀☀☀☀☀☀☀☀☀☀☀☀☀

1 in.   2 in.   3 in.   4 in. $4\frac{2}{4}$ in.
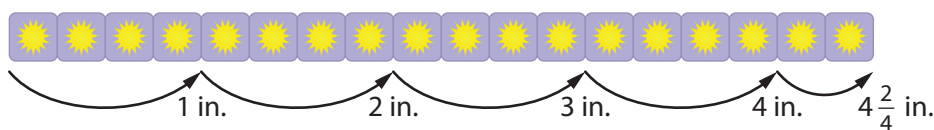
Kiera has 11 stickers that are $\frac{1}{2}$-inch wide:

🦋🦋🦋🦋🦋🦋🦋🦋🦋🦋🦋

1 in.   2 in.   3 in.   4 in.   5 in. $5\frac{1}{2}$ in.

▶ **Model It** You can use a model to help understand the data in the problem.

Line up all the stickers of each width above a ruler.

$\frac{1}{8}$ inch ★★★★★★★★★★★★★★

$\frac{1}{4}$ inch ☀☀☀☀☀☀☀☀☀☀☀☀☀☀☀☀☀☀

$\frac{1}{2}$ inch 🦋🦋🦋🦋🦋🦋🦋🦋🦋🦋🦋

0   1   2   3   4   5

inches

Connect It Now you will solve the problem from the previous page using the line plot.

8 How wide is the row Kiera can make with the $\frac{1}{8}$-inch stickers? _____

9 Can she make a 5-inch row with the $\frac{1}{4}$-inch stickers? Explain. _____

10 Can she make a 5-inch row with the $\frac{1}{2}$-inch stickers? Explain. _____

11 Which sticker width does Kiera need to use to make a 5-inch row? _____
How many of these stickers does she need? Explain.

_____

_____

12 How did the line plot help you to answer problem 11? _____

_____

_____

_____

_____

13 Give an example of another question that can be answered using the line plot. Include the answer. _____

_____

_____

Try It Use what you just learned about using data in line plots to solve these problems. Show your work on a separate sheet of paper.

Look at the line plot you made about the amount of sugar in different drinks in problem 7.

14 How many times the amount of sugar in one gallon of the least sugary drink is in one gallon of the most sugary drink? _____
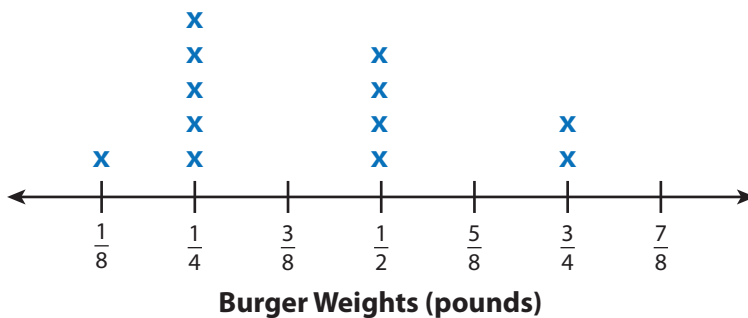
15 Suppose you take all of the sugar in one gallon of each of the three most sugary drinks and split it equally among them. How many cups of sugar will be in each gallon? _____

Practice ▶ Making Line Plots and Interpreting Data

Study the example below. Then solve problems 16–18.

Example

For a cookout, Mel made burgers of different weights. She recorded how many burgers of each weight she made. The line plot shows her data. How many pounds of meat did she use to make all the burgers?

Burger Weights (pounds)

> The student multiplied the number of burgers of each weight by the weight, then added the amounts to get the total.

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: $\frac{1}{8} + 1\frac{1}{4} + 2 + 1\frac{1}{2} = 4\frac{7}{8}$

Solution ___$4\frac{7}{8}$ pounds___

> **Pair/Share**
> Check the student's answer using addition instead of multiplication.

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16 Look at the *Burger Weight* line plot above.

One friend at the cookout asked for a triple quarter-pound burger. Where on the number line could that burger be represented?

Show your work.

> What would two $\frac{1}{4}$-pound burgers put together be?

> **Pair/Share**
> Draw a picture to show a triple quarter-pound burger.

Solution _____

17 A veterinarian's scale weighs animals to the nearest one eighth pound. The list below shows the weights, in pounds, of the last 14 dogs that the veterinarian saw.

$$15\frac{1}{8}, 19, 17\frac{1}{2}, 15\frac{1}{8}, 16\frac{1}{4}, 17\frac{1}{2}, 17\frac{1}{2}, 18\frac{1}{4}, 16\frac{5}{8}, 14\frac{1}{4}, 19, 17\frac{3}{8}, 17\frac{1}{8}, 18$$

Create 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?

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18 Look at your line plot for problem 17. Which statement about the data is true? Circle the letter of the correct answer.

  A The heaviest dog weighed about 5 times as much as the lightest dog.

  B Most of the dogs weighed more than 17 pounds.

  C All of the dogs weighed between 15 and 19 pounds.

  D At most, only 2 dogs weighed the same amount.

Michelle chose **A** 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 Michelle's answer make sense?

Practice ▶ **Making Line Plots and Interpreting Data**

Solve the problems.

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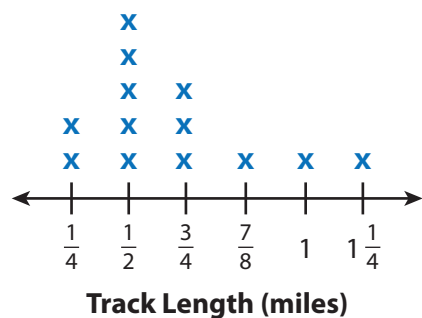
$$\frac{1}{4}, \frac{1}{2}, \frac{3}{8}, \frac{1}{2}, \frac{1}{4}, \frac{1}{2}, 1, 1\frac{1}{4}, \frac{3}{4}, \frac{1}{2}, \frac{7}{8}, \frac{1}{2}, \frac{3}{4}$$
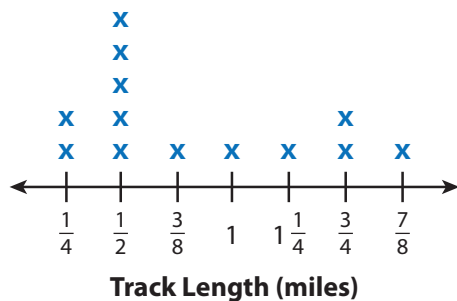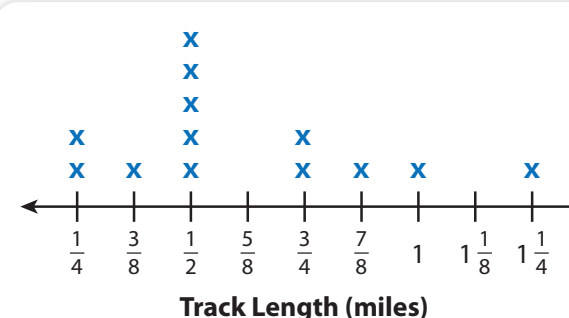

A
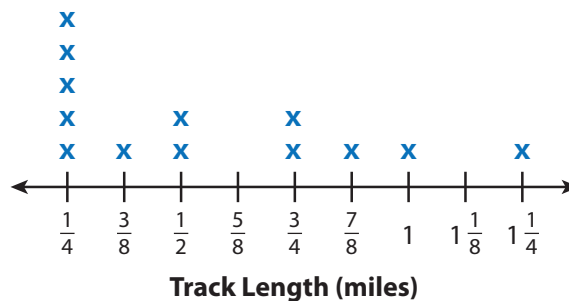

C

B

D

2 Look at the data in problem 1. Choose *True* or *False* for each statement.

a. Most of the tracks are more than 1 mile long.　　　　☐ True　☐ False

b. The most common track length is $\frac{1}{4}$ mile.　　　　☐ True　☐ False

c. None of the tracks are $\frac{5}{8}$ mile long.　　　　☐ True　☐ False

d. The longest track is 5 times as long as the shortest track.　☐ True　☐ False

3 Look at the data in problem 1. What is the total length of all the tracks that are longer than $\frac{5}{8}$ mile? _____ miles

4 Sara owns Sara's Hardware. She made the line plot below to compare the fuel capacity of several types of yard trimmers.

Tank Capacity of Yard Trimmers
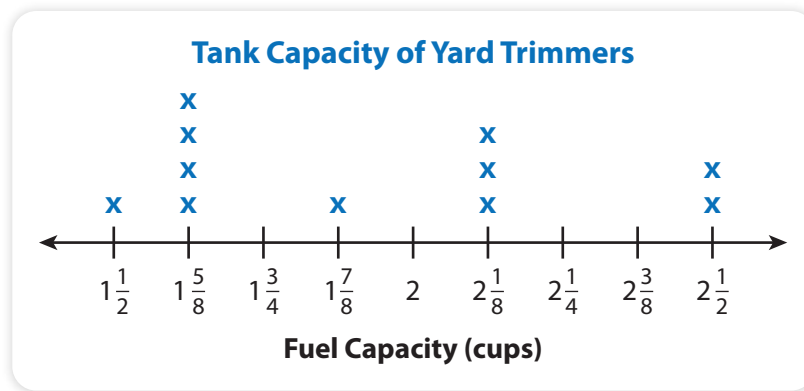
Fuel Capacity (cups)

Part A What is the most common fuel capacity of the trimmers Sara sells?

Answer _____ cups

Part B The tanks of all of Sara's yard trimmers are empty. How much fuel does Sara need to fill the tanks of all the trimmers?

Show your work.

Answer _____ cups

✔ **Self Check** **Go back and see what you can check off on the Self Check on page 211.**