

Lesson 27

Line Plots

Name: _____

Prerequisite: Display Data on a Line Plot

Study the example problem showing how to display data on a line plot. Then solve problems 1–6.

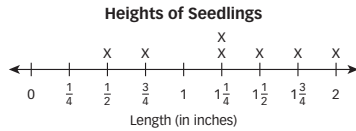
Example

Ginny measured the heights of tomato seedlings in her garden. The heights are shown in the table below. Make a line plot to represent the data.

Seedling Heights							
Seedling	A	B	C	D	E	F	G
Height (in inches)	$1\frac{1}{4}$	$\frac{3}{4}$	$1\frac{1}{4}$	2	$1\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$

Use a number line with a scale of $\frac{1}{4}$ inch.

For each seedling, put an X on the line plot above its height.



For problems 1–3, use the line plot in the example above.

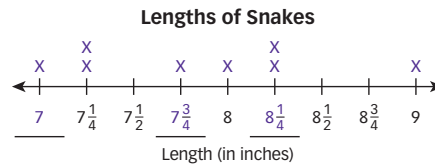
- B 1** Explain how to use the line plot to find how many seedlings Ginny measured.
Answers will vary. Possible answer: Count the number of Xs. Each X stands for one seedling. There are 7 Xs so Ginny measured 7 seedlings.
- B 2** What are the heights of the shortest seedling and the tallest seedling? Explain how you know.
 Shortest seedling: $\frac{1}{2}$ inch Tallest seedling: 2 inches
Possible explanation: The numbers increase as you go from left to right on the number line. The X farthest to the left is at $\frac{1}{2}$ inch. The X farthest to the right is at 2 inches.
- M 3** Two seedlings have the same height. What is the height? Explain how you know.
 $1\frac{1}{4}$ inch. Possible explanation: There are 2 Xs at the $1\frac{1}{4}$ -inch mark on the line plot.

Solve.

- M 4** The lengths of snakes at a zoo are shown in the table below.

Snake Lengths								
Snake	A	B	C	D	E	F	G	H
Length (in inches)	9	$7\frac{1}{4}$	$8\frac{1}{4}$	$7\frac{1}{4}$	8	7	$7\frac{3}{4}$	$8\frac{1}{4}$

Complete the line plot below to represent the data in the table.

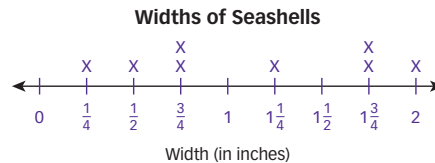


- M 5** Look at the line plot in problem 4. How many snakes are less than 8 inches long? Explain how you know.
4 snakes. Possible explanation: Count the Xs on the line plot at numbers that are less than 8. There are 4 Xs at numbers less than 8.

- M 6** Sally measured the width of seashells she collected. The table below shows the data.

Seashell Widths								
Seashell	A	B	C	D	E	F	G	H
Width (in inches)	2	$\frac{3}{4}$	$1\frac{3}{4}$	$\frac{1}{2}$	$1\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{4}$	$1\frac{3}{4}$

Draw a line plot to represent the data in the table.



Key

B Basic **M** Medium **C** Challenge



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Represent Data on a Line Plot

Study the example problem showing how to make a line plot. Then solve problems 1–5.

Example

Students in science class measured the widths of butterfly wingspans in inches. The widths are shown in the table. Make a line plot to represent the data.

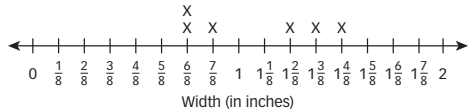
$\frac{3}{4}$	$\frac{7}{8}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$\frac{3}{4}$
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Draw and label a number line by eighths. Put an X above each butterfly wingspan width.

Write equivalent fractions.

$$\frac{1}{4} = \frac{2}{8} \quad \frac{1}{2} = \frac{4}{8} \quad \frac{3}{4} = \frac{6}{8}$$

Butterfly Wingspan Widths



The height of fourth graders was measured on the first day of school and on the last day of school. The growth in inches of some students is listed below.

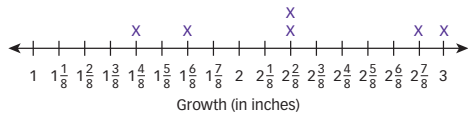
$$3, 1\frac{3}{4}, 2\frac{1}{4}, 1\frac{1}{2}, 2\frac{1}{4}, 2\frac{7}{8}$$

B 1 Write the data in eighths, by using equivalent fractions.

$$3, \frac{16}{8}, \frac{22}{8}, \frac{14}{8}, \frac{22}{8}, \frac{27}{8}$$

M 2 Complete the line plot below to represent the data.

Growth of Students



Solve.

M 3 Look at the measurements in inches listed below. What fractions could be labeled on a number line with a line plot of the data? Circle all that apply.

$$10\frac{1}{4}, 10\frac{1}{2}, 11, 11\frac{3}{4}$$

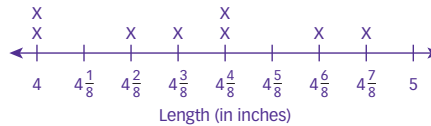
- A Halves **C** Fourths
B Thirds **D** Eighths

Micah's dog has 8 puppies. The length in inches of each puppy is listed below.

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

M 4 Draw a line plot to represent the data.

Puppy Lengths



M 5 Use the line plot to answer the questions.

- a. How many measurements are recorded? 8
- b. What is the longest length of a puppy? 4 $\frac{7}{8}$ inches
- c. What is the shortest length of a puppy? 4 inches
- d. How many puppies are less than or equal to $4\frac{1}{2}$ inches in length? 6
- e. How many puppies are greater than $4\frac{1}{2}$ inches in length? 2

Vocabulary

line plot a graph using marks along a number line to show how many objects are in a set.

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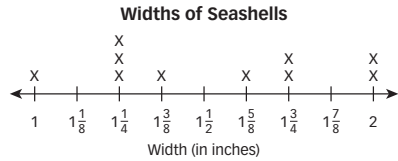
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Solve Addition Problems with Line Plots

Study the example showing how to solve an addition problem with a line plot. Then solve problems 1–5.

Example

Ashley is decorating a frame with seashells. She wants to know if all the shells will fit along the edge of a 16-inch wide frame. She measures the width of each shell and records the information in a line plot. If Ashley puts all the shells in a row, will the total width of the shells fit on the frame?



Write the fractions in eighths. $1 + 1\frac{2}{8} + 1\frac{2}{8} + 1\frac{2}{8} + 1\frac{3}{8} + 1\frac{5}{8} + 1\frac{6}{8} + 1\frac{6}{8} + 2 + 2$

Then add. $12\frac{26}{8} = 12 + 3\frac{2}{8} = 15\frac{2}{8}$, or $15\frac{1}{4}$

The total width of the shells is $15\frac{1}{4}$ inches.

$15\frac{1}{4} < 16$, so the shells will fit on the frame.

- M 1** Look at the line plot in the example. Ashley decides to glue the five largest shells along the edge of another frame. The shells fit exactly. How wide is the other frame?

Show your work. Possible work: $1\frac{3}{4} = 1\frac{6}{8}$

$$1\frac{5}{8} + 1\frac{6}{8} + 1\frac{6}{8} + 2 + 2 = 7\frac{17}{8} = 9\frac{1}{8}$$

Solution: $9\frac{1}{8}$ inches

- M 2** Ashley puts the $1\frac{1}{4}$ -inch shells onto a string. What is the total width of the shells on the string?

Show your work. Possible work:

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

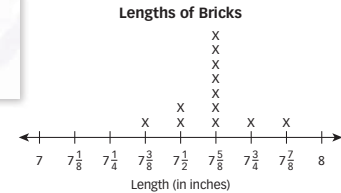
Solution: $3\frac{3}{4}$ inches

Vocabulary

line plot a graph using marks along a number line to show how many objects are in a set.

Solve.

A standard-sized brick should be $7\frac{5}{8}$ inches long. The line plot shows the actual lengths of 12 different bricks.



- M 3** What is the sum of the lengths of all the bricks that are exactly $7\frac{5}{8}$ inches long?

Show your work.

$$7\frac{5}{8} + 7\frac{5}{8} + 7\frac{5}{8} + 7\frac{5}{8} + 7\frac{5}{8} + 7\frac{5}{8} + 7\frac{5}{8} = 49\frac{35}{8}$$

$$49\frac{35}{8} = 49 + 4\frac{3}{8} = 53\frac{3}{8}$$

Solution: $53\frac{3}{8}$ inches

- M 4** What is the sum of the lengths of all the bricks that are less than $7\frac{5}{8}$ inches long?

Show your work.

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

$$7\frac{3}{8} + 7\frac{4}{8} + 7\frac{4}{8} = 21\frac{11}{8} = 22\frac{3}{8}$$

Solution: $22\frac{3}{8}$ inches

- M 5** What is the sum of the lengths of all the bricks that are greater than $7\frac{5}{8}$ inches long?

Show your work.

$$7\frac{3}{4} = 7\frac{6}{8}$$

$$7\frac{6}{8} + 7\frac{7}{8} = 14\frac{13}{8} = 15\frac{5}{8}$$

Solution: $15\frac{5}{8}$ inches

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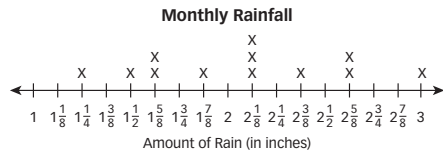
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Solve Subtraction Problems with Line Plots

Study the example showing how to solve a subtraction problem with a line plot. Then solve problems 1–5.

Example

The monthly rainfall in inches for one city is shown in the line plot. What is the difference in inches of rain between the month with the greatest amount of rain and the month with the least amount of rain?



Write a subtraction expression. $3 - 1\frac{1}{4}$

Write the numbers in fourths. $\frac{12}{4} - \frac{5}{4}$

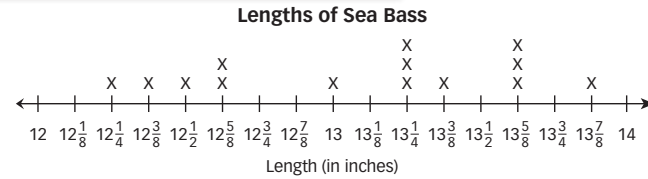
Find the difference. $\frac{12}{4} - \frac{5}{4} = \frac{7}{4} = 1\frac{3}{4}$

The difference is $1\frac{3}{4}$ inches.

- M 1** Which questions below can be answered using the line plot in the example above? Circle all that apply.
- A In 3 months, it rained the same amount. What is the difference between that amount and the amount in the month when it rained the most?
 - B What was the total amount of rainfall for the year?
 - C In how many months did it rain more than 2 inches?
 - D How much rainfall occurred in January?
- M 2** Look at the choices you circled in problem 1. Which can be solved using subtraction? What is the solution? Explain.
- Choice A.** $\frac{7}{8}$ inch. **Possible explanation:** In 3 months, it rained $2\frac{1}{8}$ inches.
- The most rainfall in a month was 3 inches.** $3 - 2\frac{1}{8} = \frac{24}{8} - \frac{17}{8} = \frac{7}{8}$.

Solve.

Marine biologists caught fish for research. They measured the sea bass they caught and recorded the lengths in the line plot below.



- M 3** What is the difference in length between the longest and shortest sea bass that the biologists caught?
- Show your work.** **Possible work:** $13\frac{7}{8} - 12\frac{1}{4}$
 $13\frac{7}{8} - 12\frac{2}{8} = 1\frac{5}{8}$
- Solution:** $1\frac{5}{8}$ inches
- M 4** Sea bass that are caught and that have a length less than 13 inches must be thrown back into the ocean. How many more inches does the shortest fish need to grow before it can be taken out of the ocean?
- Show your work.** **Possible work:** $13 - 12\frac{1}{4}$
 $12\frac{4}{4} - 12\frac{1}{4} = \frac{3}{4}$
- Solution:** $\frac{3}{4}$ inch
- M 5** Sea bass can grow to a maximum length of 23 inches. How much more would the longest fish caught need to grow in order to reach the maximum length?
- Show your work.** **Possible work:** $23 - 13\frac{7}{8}$
 $22\frac{8}{8} - 13\frac{7}{8} = 9\frac{1}{8}$
- Solution:** $9\frac{1}{8}$ inches



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Solve Problems with Line Plots

Solve the problems.

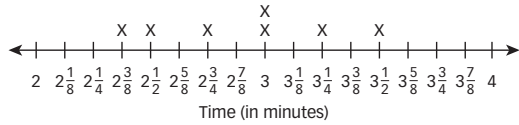
B

- 1 The line plot shows the finish times of races run by a relay running team. What is the difference in minutes between the team's two fastest times?

Where on the line plot are faster times?



Relay Team Finish Times



- A** $\frac{1}{8}$ minute **C** $1\frac{1}{8}$ minutes
B $\frac{1}{4}$ minute **D** $2\frac{7}{8}$ minutes

M

- 2 Use the line plot in problem 1. What is the total amount of time the team spent running in relay races?

What symbol represents one race on the line plot?



- A** 17 minutes
B $17\frac{3}{8}$ minutes
C 20 minutes
D $20\frac{3}{8}$ minutes

Miriam chose **B** as the correct answer. How did she get that answer?

Possible answer: She added together the race times but she forgot to add 3 twice.

Solve.

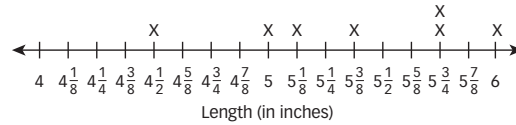
M

- 3 Ginny recorded how much her tomato plants grew this season. She plotted the growth of each plant in a line plot. What was the total length in inches that her plants grew this season?

What operation do you use to find the combined length?



Growth of Plants



Show your work.

Possible work:

$$4\frac{4}{8} + 5 + 5\frac{1}{8} + 5\frac{3}{8} + 5\frac{6}{8} + 5\frac{6}{8} + 6 = 35\frac{20}{8} = 35 + 2\frac{4}{8} = 37\frac{4}{8} \text{ or } 37\frac{1}{2}$$

Solution: $37\frac{1}{2}$ inches

C

- 4 Use the line plot in problem 4 to tell whether each sentence is True or False.

Plants that grew a greater number of inches are farther to the right on the number line in the line plot.



- a. The difference between the plant that grew the most and least is $2\frac{1}{2}$ inches. True False
b. Two plants that grew the most have a combined growth of $10\frac{1}{2}$ inches. True False
c. Two plants that grew the least have a combined growth of $9\frac{1}{2}$ inches. True False
d. Two plants grew the same amount. The combined growth of these two plants is $11\frac{1}{2}$ inches. True False