Lesson 11.1 Making and Interpreting Line Plots

Use the data in the table to answer the questions.

Example

Marco has strips of wires of different lengths, as shown in the table below.

<table>
<thead>
<tr>
<th>Length of Strips (m)</th>
<th>1/5</th>
<th>2/5</th>
<th>3/5</th>
<th>7/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Strips</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

Marco made a line plot to show the number of strips. Each X represents one strip.

1. What is the total length of the strips of wire?

\[
3 \times \frac{1}{5} + 1 \times \frac{2}{5} + 6 \times \frac{3}{5} + 5 \times \frac{7}{10} = \frac{81}{10} = 8 \frac{1}{10}
\]

The total length is \(8\frac{1}{10}\) meter.

2. Marco uses 3 of the \(\frac{3}{5}\)-meter strips to make a doll. What is the total length of wire needed to make a doll?

\[
3 \times \frac{3}{5} = \frac{9}{5} = 1\frac{4}{5}
\]

Marco uses \(1\frac{4}{5}\) meters to make a doll.
Use the data in the table to answer the questions.

The table below shows the amount of orange juice in 9 juice boxes.

<table>
<thead>
<tr>
<th>Amount of Orange Juice (pt)</th>
<th>1/4</th>
<th>3/8</th>
<th>1/2</th>
<th>5/8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Juice Boxes</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

1. Make a line plot to show the data in the table.

![Line plot]

2. What is the total amount of orange juice in all of the juice boxes?

The total amount of juice is ______________.

3. All the orange juice is poured equally into 5 containers. How much juice is in each container?

The amount of juice in each container is ______________.
Use the data in the table to answer the questions.
Kelly weighs some lumps of clay and records their weight in a table, as shown below.

<table>
<thead>
<tr>
<th>Weight of Clay Lumps (lb)</th>
<th>$\frac{1}{8}$</th>
<th>$\frac{1}{4}$</th>
<th>$\frac{1}{2}$</th>
<th>$\frac{5}{8}$</th>
<th>$\frac{7}{8}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Clay Lumps</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

4. Make a line plot to show the data given in the table.

5. What is the total weight for each group of weight of clay lumps?
6. Which weight group of lumps \( \left( \frac{1}{8}, \frac{1}{4}, \frac{1}{2}, \frac{5}{8}, \text{ or } \frac{7}{8} \right) \) had the greatest total weight?

The group of lumps that had the greatest total weight was ___________.

Which weight group of lumps had the least weight?

The group of lumps that had the least total weight was ___________.

7. The lumps of clay are combined and then divided into 10 lumps of equal weight. What is the weight of each new lump of clay?

The weight of each new lump is = ___________.
Use the data in the table to answer the questions.

Rectangular tiles of different sizes were used to make an art piece. The table shows the area of the tiles that were used.

<table>
<thead>
<tr>
<th>Area of Rectangular Tiles (ft²)</th>
<th>3/8</th>
<th>9/16</th>
<th>3/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Tiles</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

8. Make a line plot to show the data in the table.
9. What is the total area of the art piece when all the tiles are fitted together?

The total area of the art piece is ____________.

10. The weight of 1 square foot of tile is 10 ounces. What is the weight of the entire art piece?

The weight of the entire art piece is ____________.
Practice 2  Making and Interpreting Double Bar Graphs

Complete. Use the data in the graph.

The double bar graph shows the number of boys and girls in two classes, 5A and 5B.

1. There are _______ students in 5A and _______ students in 5B.
2. There are _______ more girls than boys in 5A.
3. Class _______ has an equal number of boys and girls.
4. There are _______ girls altogether in 5A and 5B.
5. There are _______ boys altogether in 5A and 5B.
6. The average number of students in the two classes is _______.
Complete the bar graph using the data in the table. Then answer the questions.

7. The table shows the number of bags of apples and oranges sold by a grocer in three days.

<table>
<thead>
<tr>
<th>Number of Bags of Apples</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Number of Bags of Oranges</td>
<td>25</td>
<td>35</td>
<td>45</td>
</tr>
</tbody>
</table>

8. On Friday, _________ more bags of oranges than apples were sold.

9. On Saturday, _________ fewer bags of apples than oranges were sold.

10. The total number of bags of apples and oranges sold was the greatest on ________________.

11. The difference between the number of bags of apples and oranges sold was the least on ________________.
Practice 3  Graphing an Equation

Write the ordered pair for each point.

Example

A  \((0, 1)\)

1.  \(B\)  
2.  \(C\)  
3.  \(D\)  
4.  \(E\)  
5.  \(F\)  
6.  \(G\)
Plot each point on the coordinate grid.

7. \( P (0, 5) \)          8. \( Q (4, 0) \)

9. \( R (3, 6) \)          10. \( S (5, 1) \)

11. \( T (2, 5) \)         12. \( U (0, 0) \)
Use the graph to answer the questions.

The perimeter of a square is $P$ centimeters and the length of each side is $s$ centimeters. A graph of $P = 4s$ is drawn.

**Perimeter of a Square**

13. What is the perimeter of a square of side 2 centimeters? _________

14. What is the perimeter of a square of side 4.5 centimeters? _________

15. What is the length of a side of a square if its perimeter is 4 centimeters? _________

16. What is the length of a side of a square if its perimeter is 10 centimeters? _________

17. If the point $(7, M)$ is on the graph, what is the value of $M$? _________
Complete the table.

18. Each bottle contains 2 liters of cooking oil.

<table>
<thead>
<tr>
<th>Number of Bottles (x)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Liters (y)</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Complete the graph using the data in the table. Then answer the questions.

19. How many liters of oil are in 3 bottles? ______

20. How many liters of oil are in 2.5 bottles? ______

21. How many bottles contain 8 liters of oil? ______

22. How many bottles contain 7 liters of oil? ______

23. How many bottles contain 11 liters of oil? ______
Practice 4 Comparing Data Using Line Graphs

Complete the tables and graphs. Then answer the questions.

James walks at a pace of 20 steps per minute, and Kaylee walks at a pace of 25 steps per minute.

1. Complete the tables.

James' Pace \( (y = 20x) \)

<table>
<thead>
<tr>
<th>Travel Time (min)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Steps</td>
<td>0</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Kaylee's Pace \( (y = 25x) \)

<table>
<thead>
<tr>
<th>Travel Time (min)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Steps</td>
<td>0</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. a. Write the ordered pairs that represent the number of steps that James and Kaylee each takes.
b. Plot the points on a graph and join the points with two straight lines. Plot one line for James and another for Kaylee.

![Distance James and Kaylee Walked Graph]

3. How many steps does each person take in 4 minutes?

4. How long does it take for each person to walk 100 steps?

5. How does the number of steps that Kaylee takes compare to the number of steps that James takes in the same amount of time?
Complete the tables and graphs. Then answer the questions.

Printer A can print 20 pages per minute. Printer B can print 30 pages per minute.

6. Complete the tables.

**Printer A \((y = 20x)\)**

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Pages</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Printer B \((y = 30x)\)**

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Pages</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. a. Write the ordered pairs represented by each table.
b. Plot the points on a graph. Draw a straight line joining the points for each printer.

Pages Printed by Two Printers

Key
- Printer A
- Printer B

8. Which printer prints the most pages in 4 minutes? How many more?

9. Using both printers, how many pages are printed after 3 minutes?

10. How long will it take for both printers together to print 225 pages?
11. Suppose you made a graph of the number of pages that the two printers can print when running at the same time. Would this line graph be above the first two, between them, or under both of them? Explain.

Study the graph. Then answer the questions on page 118.

Two taps P and Q are turned on. Water is flowing from both of them into one container. Water from tap P flows at the rate of 60 milliliters per second. Water from tap Q flows at the rate of 30 milliliters per second.
12. How much water is in the container after 3 seconds?

13. If only one tap works at a time, how long does each tap take to bring the water level up to 120 milliliters?

14. How much water will flow from each tap after 6 seconds?

15. Which tap will fill a container faster? How much faster?
Practice 5  Combinations

Complete.
A bag has 1 red, 1 blue, and 1 green marble. Another bag has 1 red and 1 blue cube.

1. List all the possible combinations of choosing 1 marble and 1 cube.

<table>
<thead>
<tr>
<th>Color of Marble</th>
<th>Color of Cube</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. There are _________ combinations.

Complete.
Two leagues are competing in a soccer tournament. Each league has three teams. Teams A, B, and C are in East League. Teams X, Y, and Z are in West League. Each team in East League plays against every team in West League.

3. Complete the table for the games played.

<table>
<thead>
<tr>
<th>East League</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>West League</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. The number of combinations of games for the six teams is _________.

Lesson 11.5  Combinations
Draw a tree diagram to find the number of combinations.

5. Ms. Li has 4 different books and 1 red pen, 1 blue pen, and 1 black pen. She is wrapping one book and one pen to give as a gift. Draw a tree diagram to find the number of combinations she can choose.

There are __________ combinations.
Find the number of combinations.

6. Rina has 1 black, 1 red, and 1 yellow skirt. She has 1 white, 1 floral, and 1 striped shirt.
   a. Draw a tree diagram to show the possible outfits Rina can wear.

b. Find the number of outfits by multiplication.

The number of outfits is __________.
Complete.

7. There are 4 colors on a spinner. There are 6 faces on a number cube, numbered 1 to 6. The spinner is spun and the number cube is tossed.

There are [blank] combinations of color and number.

8. A bookshelf has 10 mathematics books, 8 science books, and 12 history books.

a. There are [blank] combinations of a mathematics book and a science book.

b. There are [blank] combinations of a science book and a history book.

c. There are [blank] combinations of a mathematics book and a history book.
Practice 6  Theoretical Probability and Experimental Probability

Use the table to answer the questions. Express each probability as a decimal.

A spinner has four equal sections in four different colors, red, blue, green, and yellow. The spinner is spun 100 times. The table shows the number of times it lands on each color.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Number of Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>lands on red</td>
<td>28</td>
</tr>
<tr>
<td>lands on blue</td>
<td>25</td>
</tr>
<tr>
<td>lands on green</td>
<td>24</td>
</tr>
<tr>
<td>lands on yellow</td>
<td>23</td>
</tr>
</tbody>
</table>

1. What is the experimental probability of landing on red?

2. What is the experimental probability of landing on blue?

3. What is the experimental probability of landing on green?

4. What is the experimental probability of landing on yellow?

5. What is the theoretical probability of landing on each of the four colors?
Use the table to answer the questions. Express each probability as a fraction in its simplest form.

A number cube has 1 face numbered 1, 2 faces numbered 2, and 3 faces numbered 3. The cube is tossed 100 times. The table shows the number of times each number is shown.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Number of Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>cube shows 1</td>
<td>14</td>
</tr>
<tr>
<td>cube shows 2</td>
<td>34</td>
</tr>
<tr>
<td>cube shows 3</td>
<td>52</td>
</tr>
</tbody>
</table>

6. What is the experimental probability of the cube showing 1?
   
   \[
   \frac{14}{100} = \frac{7}{50}
   \]

7. What is the theoretical probability of the cube showing 1?
   
   \[
   \frac{1}{6}
   \]

8. What is the experimental probability of the cube showing 2?
   
   \[
   \frac{34}{100} = \frac{17}{50}
   \]

9. What is the theoretical probability of the cube showing 2?
   
   \[
   \frac{2}{6} = \frac{1}{3}
   \]

10. What is the experimental probability of the cube showing 3?
    
    \[
    \frac{52}{100} = \frac{13}{25}
    \]

11. What is the theoretical probability of the cube showing 3?
    
    \[
    \frac{3}{6} = \frac{1}{2}
    \]
Use the table to answer the questions. Express each probability as a decimal.

A bag contains 2 blue marbles, 3 red marbles, and 5 green marbles. A marble is drawn from the bag, its color is noted and the marble is returned to the bag. The table shows the results of drawing a marble 200 times.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Number of Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>blue marble</td>
<td>36</td>
</tr>
<tr>
<td>red marble</td>
<td>56</td>
</tr>
<tr>
<td>green marble</td>
<td>108</td>
</tr>
</tbody>
</table>

12. What is the experimental probability of drawing a blue marble?

13. What is the theoretical probability of drawing a blue marble?

14. What is the experimental probability of drawing a red marble?

15. What is the theoretical probability of drawing a red marble?

16. What is the experimental probability of drawing a green marble?

17. What is the theoretical probability of drawing a green marble?
Complete.
A spinner is divided into 16 equal parts. Each part is colored green, yellow, or blue. The spinner is spun 25 times. The tally chart shows the number of times it lands on each color.

<table>
<thead>
<tr>
<th>Color</th>
<th>Tally</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>green</td>
<td>///</td>
<td>4</td>
</tr>
<tr>
<td>yellow</td>
<td>######</td>
<td>9</td>
</tr>
<tr>
<td>blue</td>
<td>####</td>
<td>12</td>
</tr>
</tbody>
</table>

18. Which is the likely set of colors on the spinner, Set A, Set B, or Set C? 
Set _________

<table>
<thead>
<tr>
<th></th>
<th>Green</th>
<th>Yellow</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set A</td>
<td>3</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Set B</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Set C</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

19. What is the experimental probability of landing on green?

_______

20. What is the experimental probability of landing on yellow?

_______

21. What is the experimental probability of landing on blue?

_______
Complete.

1. The table shows the conversion from gallons to pints. Complete the table.

<table>
<thead>
<tr>
<th>Number of Gallons (x)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Pints (y)</td>
<td></td>
<td>16</td>
<td></td>
<td></td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

2. Write the equation relating the number of pints (y) to the number of gallons (x).

3. Draw the graph of the equation. Label the axes and the equation.
Use the graph to answer the questions.

4. How many pints is $3\frac{1}{2}$ gallons?

5. How many pints is $4\frac{1}{2}$ gallons?

6. How many gallons is 20 pints?

7. How many gallons is 44 pints?

Complete.

8. The table shows the conversion from quarts to cups. Complete the table.

<table>
<thead>
<tr>
<th>Number of Quarts (x)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cups (y)</td>
<td>8</td>
<td>16</td>
<td>20</td>
<td>24</td>
</tr>
</tbody>
</table>

9. Write the equation relating the number of cups (y) to the number of quarts (x).
Put On Your Thinking Cap!

Problem Solving

Solve.

1. Jim has a dime, a nickel, and a quarter. How many different amounts of money can he form using one or more of these coins?
2. There are an equal number of red, blue, and green beads in a bag. One bead is picked, its color is noted and the bead is replaced. Then a second bead is picked.
   a. Draw a tree diagram to show the outcomes.
   b. What is the probability of picking two red beads? __________
   c. What is the probability of picking one red and one green bead?
      __________
   d. What is the probability of picking no red beads? __________