Lesson 11.1 Skills Practice

Hitting the Slopes
Determining Rate of Change from a Graph

Vocabulary
Match each definition to its corresponding term.

1. rate which has a second term of 1 unit  
   a. rate of change

2. ratio in which the units of the quantities being compared are different  
   b. per

3. the vertical change from one point to another point on a graph  
   c. run

4. phrase used when a rate is used to describe a rate of increase (or decrease) in a real-life situation  
   d. rate

5. the rate of change on a graph written as the vertical change from one point to another over the horizontal change of the same two points  
   e. unit rate

6. means “for each” or “for every”  
   f. rise

7. the horizontal change from one point to another point on a graph  
   g. run
Problem Set

Write a rate for each situation. State whether the rate is a rate of increase or a rate of decrease.

1. Use the graph to write a rate that compares the track length to the change in time at point A.

Point A is at (4, 480).

Because the bobsled started at 600 meters, the change in the track length remaining is 120 meters. The change in time is 4 seconds. So, the rate of decrease is \( \frac{120}{4} \).
2. Use the graph to write a rate that compares the track length to the change in time at point B.
3. Use the graph to write a rate that compares the track length to the change in time at point C.
4. Use the graph to write a rate that compares the change in elevation to the change in time at point $D$. 
5. Use the graph to write a rate that compares the change in elevation to the change in time at point $E$. 

![Graph showing distance ascended by a mountain climber vs. time in minutes.](Image)
6. Use the graph to write a rate that compares the change in elevation to the change in time at point $F$. 
Label two points on each graph to determine the rate of change for the graph. Write the rate in the format \( \frac{\text{rise}}{\text{run}} \) and as a unit rate.

**7.**

Sample answer:

Point \( A \): (4, 90)

Point \( B \): (6, 50)

\[
\frac{\text{rise}}{\text{run}} = \frac{-40 \text{ meters}}{2 \text{ seconds}}
\]

\[
\text{unit rate} = \frac{-20 \text{ meters}}{1 \text{ second}}
\]
9. \[ y \]

\[
\begin{array}{lcc}
\text{Distance (in feet)} & 0 & 2 & 4 & 6 & 8 & 10 & 12 & 14 & 16 & 18 & 20 \\
\text{Time (in minutes)} & 0 & 2 & 4 & 6 & 8 & 10 & 12 & 14 & 16 & 18 & 20 \\
\end{array}
\]

10. \[ y \]

\[
\begin{array}{lcc}
\text{Distance (in miles)} & 0 & 50 & 100 & 150 & 200 \\
\text{Time (in hours)} & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]
11. Time (in seconds) vs. Elevation (in meters)

12. Time (in hours) vs. Distance (in miles)
Lesson 11.1  Skills Practice

Determine the unit rate of change for lines A and B on each graph.

13.

Line A sample answer:

Point C: (0, 0)

Point D: (1, 1.5)

\[
\frac{\text{rise}}{\text{run}} = \frac{1.5 \text{ dollars}}{1 \text{ item}} \\
\text{unit rate} = \frac{1.5 \text{ dollars}}{1 \text{ item}}
\]

Line B sample answer:

Point E: (0, 0)

Point F: (1, 3)

\[
\frac{\text{rise}}{\text{run}} = \frac{3 \text{ dollars}}{1 \text{ item}} \\
\text{unit rate} = \frac{3 \text{ dollars}}{1 \text{ item}}
\]
14.

<table>
<thead>
<tr>
<th>Number of items</th>
<th>Cost (in dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

Cost in dollars vs. Number of items graph.
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15. The graph shows the elevation (in meters) over time (in seconds) for two different objects. The graph has x-axis labeled "Time (in seconds)" and y-axis labeled "Elevation (in meters)."

- Object A descends at a constant rate, reaching an elevation of 0 at time 20 seconds.
- Object B descends at a variable rate, reaching an elevation of 20 meters at time 10 seconds.

Determine the coordinates for points A and B on the graph.
16. A graph showing the relationship between time (in seconds) and elevation (in meters).
17. y

<table>
<thead>
<tr>
<th>x</th>
<th>Cost (in dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

Number of items

Graph showing a linear relationship between x and y.
18. Time (in minutes) \[\text{Elevation (in feet)}\]

[Graph showing a line with points labeled A and B on the x-axis and y-axis.

- Point A is at (10, 16).
- Point B is at (0, 20).
- The line passes through the origin (0, 0).]
Lesson 11.2  Skills Practice

At the Arcade
Determining Rate of Change from a Table

Vocabulary
Define the term in your own words.

1. first differences

Problem Set
Use the informal method to determine the rate of change for the data in each table. The rate of change is constant for the data in each table. Write the rate as a unit rate.

1. | Number of Balloons | Total Cost of Balloons (in Dollars) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>8</td>
<td>24</td>
</tr>
</tbody>
</table>

Sample answer:
Number of balloons = 4 − 2
= 2
Cost of balloons = 12 − 6
= 6
Rate of change = \( \frac{6 \text{ dollars}}{2 \text{ balloons}} \)
Unit rate = \( \frac{3 \text{ dollars}}{1 \text{ balloon}} \)
### Lesson 11.2 Skills Practice

#### 2.

<table>
<thead>
<tr>
<th>Number of Lawns</th>
<th>Total Earned (in Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>25.50</td>
</tr>
<tr>
<td>5</td>
<td>42.50</td>
</tr>
<tr>
<td>7</td>
<td>59.50</td>
</tr>
<tr>
<td>9</td>
<td>76.50</td>
</tr>
</tbody>
</table>

#### 3.

<table>
<thead>
<tr>
<th>Number of Touchdowns</th>
<th>Total Points Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
</tr>
</tbody>
</table>
Lesson 11.2  Skills Practice

<table>
<thead>
<tr>
<th>4.</th>
<th>Number of Minutes on an Exercise Bike</th>
<th>Total Number of Calories Burned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>540</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>720</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.</th>
<th>Number of Hours</th>
<th>Total Number of Miles Traveled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>325</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>520</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>715</td>
</tr>
</tbody>
</table>
6. | Number of Songs Downloaded | Total Cost of Songs (in Dollars) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>9.90</td>
</tr>
<tr>
<td>20</td>
<td>19.80</td>
</tr>
<tr>
<td>30</td>
<td>29.70</td>
</tr>
<tr>
<td>40</td>
<td>39.60</td>
</tr>
</tbody>
</table>

Use the formula \( \frac{y_2 - y_1}{x_2 - x_1} \) to calculate the unit rate of change for the data in each table. The rate of change is constant for the data in each table.

7. | Number of Raffle Tickets | Total Cost of Raffle Tickets (in Dollars) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

Sample answer:

\( (x_1, y_1) = (2, 1) \)

\( (x_2, y_2) = (4, 2) \)

\[
\frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 1}{4 - 2} = \frac{1}{2}
\]

Unit rate = \( \frac{\$0.50}{1 \text{ ticket}} \)
Lesson 11.2  Skills Practice

NAME ___________________________________________  DATE _______________________

8. | $x$ | $y$ |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>8</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-8</td>
</tr>
<tr>
<td>4</td>
<td>-16</td>
</tr>
</tbody>
</table>

9. | Number of Photos Printed | Total Cost of Photos (in Dollars) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td>40</td>
<td>8</td>
</tr>
</tbody>
</table>
### 10.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
</tr>
<tr>
<td>7</td>
<td>63</td>
</tr>
<tr>
<td>9</td>
<td>81</td>
</tr>
</tbody>
</table>

### 11.

<table>
<thead>
<tr>
<th>Number of Greeting Cards</th>
<th>Total Cost of Greeting Cards (in Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6.50</td>
</tr>
<tr>
<td>3</td>
<td>9.75</td>
</tr>
<tr>
<td>6</td>
<td>19.50</td>
</tr>
<tr>
<td>8</td>
<td>26.00</td>
</tr>
</tbody>
</table>
Calculate the rate of change between the points listed in each table. Determine if the table represents a linear relationship.

### Table 12

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>−3</td>
<td>54</td>
</tr>
<tr>
<td>1</td>
<td>−18</td>
</tr>
<tr>
<td>3</td>
<td>−54</td>
</tr>
<tr>
<td>7</td>
<td>−126</td>
</tr>
</tbody>
</table>

### Table 13

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>10</td>
<td>70</td>
</tr>
</tbody>
</table>

- For points $(2, 14)$ and $(5, 35)$: \[
\frac{35 - 14}{5 - 2} = \frac{21}{3} = 7
\]
- For points $(5, 35)$ and $(7, 49)$: \[
\frac{49 - 35}{7 - 5} = \frac{14}{2} = 7
\]
- For points $(7, 49)$ and $(10, 70)$: \[
\frac{70 - 49}{10 - 7} = \frac{21}{3} = 7
\]

Yes, the table represents a linear relationship.
### Lesson 11.2 Skills Practice

**14.**

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-10$</td>
<td>50</td>
</tr>
<tr>
<td>$-2$</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>$-20$</td>
</tr>
<tr>
<td>14</td>
<td>$-70$</td>
</tr>
</tbody>
</table>

**15.**

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-1$</td>
<td>$-24$</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>8</td>
<td>192</td>
</tr>
</tbody>
</table>
### Lesson 11.2 Skills Practice

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>−6</td>
<td>12</td>
</tr>
<tr>
<td>−3</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>−6</td>
</tr>
<tr>
<td>6</td>
<td>−10</td>
</tr>
</tbody>
</table>

17. | x | y   |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>13.5</td>
</tr>
<tr>
<td>5</td>
<td>33.75</td>
</tr>
<tr>
<td>10</td>
<td>67.5</td>
</tr>
<tr>
<td>15</td>
<td>101.25</td>
</tr>
</tbody>
</table>
18. | $x$  | $y$  |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$-4$</td>
<td>$-38$</td>
</tr>
<tr>
<td>$-1$</td>
<td>$-9.5$</td>
</tr>
<tr>
<td>$2$</td>
<td>$19$</td>
</tr>
<tr>
<td>$3$</td>
<td>$27$</td>
</tr>
</tbody>
</table>
Lesson 11.3  Skills Practice

To Put It in Context
Determining Rate of Change from a Context

Problem Set

Determine the rate of change for each situation.

1. Lashawna is making jewelry to sell at a craft fair. On Monday, she makes 12 bracelets. On Tuesday, she works an additional 2.5 hours and has a total of 22 bracelets. What is the unit rate of the time it takes her to make each bracelet?

   $\frac{22 \text{ bracelets}}{10 \text{ bracelets}} = \frac{2.5 \text{ hours}}{1 \text{ bracelet}}$

   The unit rate is $\frac{0.25 \text{ hour}}{1 \text{ bracelet}}$ or 15 minutes per bracelet.

2. Nina and her friends are going to the downtown rib festival. The festival organizers expect 10,000 people to attend the four-day festival. At the end of the festival the organizers say that they have exceeded their expected attendance by 2000 people. What was the average number of people to attend the festival per day?

   $\frac{10,000 \text{ people}}{4 \text{ days}} + 2000 \text{ people}$

   The average number of people per day is $\frac{12,000 \text{ people}}{4 \text{ days}}$ or 3000 people per day.
3. Rosa is ordering a submarine sandwich from the corner deli. The deli charges \$6.25 for a 7-inch sub. Some additional toppings cost extra. Rosa’s sandwich with two extra toppings costs \$7.75. What is the cost per additional topping?

4. Aiko spends 2.5 hours baking croissants for a community center bake sale. Aiko bakes the 90 croissants in 5 batches. What is the unit rate of the number of batches baked per hour?

5. Nelson is selling his photographs at an art festival. The festival is open for 6 hours each day for 3 days. At the conclusion of the festival, Nelson has sold 54 photographs. What is the unit rate of the number of photographs sold per hour?
Lesson 11.3  Skills Practice

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6. Clayton wants to purchase tickets for the rides at a carnival. He can choose to purchase tickets individually or he can purchase a ticket package. The package includes 25 tickets for $18.75. What is the cost per ticket if he purchases the package?

7. Carmen is selling pies at the cherry festival to raise money for her local volunteer fire department. She sells 85 pies for $12 each. The supplies to make the pies cost Carmen $340. What is the unit rate of the profit made for each pie?

8. Tameca is planning a hiking trip. The trail she would like to follow is 7.5 miles long. She plans to start her hike at 10:00 AM. She hopes to reach the end of the trail at 3:00 PM. What is the unit rate of the number of miles per hour that Tameca plans to hike?
9. Jamal is shopping with a gift card he received for his birthday. After he purchases two T-shirts the gift card balance has dropped from $50 to $20.02. What is the unit rate of the cost per T-shirt?

10. Olivia is printing photos for a scrapbook project. She prints 150 photos in 1 hour and 15 minutes. What is the unit rate of the number of minutes it takes to print each photo?
Franco is traveling to a vacation destination 715 miles from home. On the first day of his trip he travels 390 miles in 6 hours. On the second day of his trip he leaves at 8:00 AM and arrives at his destination at 1:00 PM. What is the unit rate of the total number of miles per hour traveled? Convert the information to coordinate points and use the formula \( \frac{y_2 - y_1}{x_2 - x_1} \) to answer the question.
12. Rakesha loves reading and is participating in a read-a-thon to raise money for a charity. She plans to read 15 books during the 90-day read-a-thon. During the first 30 days she reads 7 books. What is the unit rate of the number of days she has to read each book to meet her goal? Convert the information to coordinate points and use the formula \( \frac{y_2 - y_1}{x_2 - x_1} \) to answer the question.
Lesson 11.4 Skills Practice

All Together Now!
Determining Rate of Change from an Equation

Vocabulary
Give an example of each term.
1. slope

2. slope-intercept form

Problem Set
Determine the slope of the line represented by each equation.

1. \( y = 4x + 5 + 2x \)  
   \( y = 4x + 5 + 2x \)

2. \( y = 3x + 8 - 12x \)  
   \( y = 6x + 5 \)

   slope = 6

3. \( 2x + 3y = 21 \)

4. \( 8y - 2x = 24 \)
5. \( y = 8 \)  

6. \( y = 6x - 2 + x \)

7. \( y = -5(2x - 3) \)  

8. \( 10y - 6x = -90 \)

9. \( x = \frac{1}{2} \)  

10. \( 12y - 4x = -24 \)
Graph each equation with your graphing calculator and sketch its graph on the given grid. Determine the slope of the line.

11. \( y = 4x + 2 \)
   
slope = 4

12. \( y = \frac{1}{2}x + 1 \)

13. \( y = -\frac{1}{3}x - 5 \)
14. \( y = -2x - 3 \)

15. \( y = \frac{3}{4}x - 7 \)

16. \( y = -\frac{2}{3}x + 8 \)
Lesson 11.5 Skills Practice

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Where it Crosses
Determining y-Intercepts from Various Representations

Vocabulary
Define each term in your own words.

1. y-intercept

2. direct variation

Problem Set
Examine each linear graph and determine the y-intercept. Write the y-intercept in coordinate form. Show your work.

1. Since the graph is a line, it will keep increasing by 2 for every point going backward.

The next points to the left would be (2, 11), then (1, 13), then (0, 15).

The y-intercept is (0, 15).
Lesson 11.5  Skills Practice

2. Graph the lines for the following equations.

   y = mx + b

   a. y = 2x + 5
      (2, 5), (4, 4)

   b. y = 3x - 10
      (2, 6), (3, 8)

   c. y = -x + 10
      (4, 14), (2, 2)

   d. y = -2x + 20
      (2, 18), (4, 16)
Lesson 11.5 Skills Practice

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5. 

\[
\begin{array}{c}
\text{(4, 5)} \\
\text{(3, 10)}
\end{array}
\]

6. 

\[
\begin{array}{c}
\text{(3, 5)} \\
\text{(2, 2)}
\end{array}
\]
Determine the y-intercept for the linear relation represented in each table. Write the y-intercept as a coordinate pair.

7. \[
\begin{array}{|c|c|}
\hline
x & y \\
\hline
6 & 25 \\
9 & 34 \\
12 & 43 \\
15 & 52 \\
\hline
\end{array}
\]

Counting backward in the table the x-values would be 3, 0.

Skip counting backward in the table the y-values would be 16, 7.

The y-intercept is (0, 7).

8. \[
\begin{array}{|c|c|}
\hline
x & y \\
\hline
4 & 12 \\
6 & 13 \\
8 & 14 \\
10 & 15 \\
\hline
\end{array}
\]

9. \[
\begin{array}{|c|c|}
\hline
x & y \\
\hline
10 & −38 \\
15 & −58 \\
20 & −78 \\
25 & −98 \\
\hline
\end{array}
\]
### Lesson 11.5  Skills Practice

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10.</strong></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>y</td>
</tr>
<tr>
<td>8</td>
<td>−9</td>
</tr>
<tr>
<td>12</td>
<td>−12</td>
</tr>
<tr>
<td>16</td>
<td>−15</td>
</tr>
<tr>
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<td><strong>11.</strong></td>
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<td>x</td>
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<td>15</td>
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<td>20</td>
<td>−195</td>
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<td>25</td>
<td>−245</td>
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Determine the \( y \)-intercept for the linear relation represented in each equation. Write the \( y \)-intercept as a coordinate pair.

13. \( 3x + 7y = 63 \)  
\[ 3(0) + 7y = 63 \]  
\[ 7y = 63 \]  
\[ y = 9 \]  
The \( y \)-intercept is \((0, 9)\).

14. \( 5x - 4y = 120 \)

15. \( 2x - 8y = -48 \)

16. \( 20x + 15y = 105 \)

17. \( -16x + 23y = 253 \)

18. \( 19x + 17y = -51 \)
Lesson 11.5 Skills Practice

Determine the y-intercept for the linear relation represented in each context. Write the y-intercept as a coordinate pair. Explain what the y-intercept represents in the problem situation.

19. Carmen estimated that she would pay $19 to park in a downtown parking garage for a 3-hour event. After spending 5 hours downtown she paid $25 for parking.
   The difference between the prices is $6. The difference between the times parked is 2 hours.
   The rate paid is $3 per hour. The estimate for 3 hours of parking is $19, and $9 is due to the per hour rate. So, $10 must be an initial flat fee. The y-intercept is (0, 10).

20. Pedro is traveling on a toll road. He plans to exit the road 5 miles ahead at First Avenue and pay $1.75. He changes his plans and travels 9 miles to Butler Street and pays $2.75.

21. Alberto is saving for a new video game. After adding 2 weeks of his allowance to a savings account he has $105. After adding 3 more weeks of his allowance to his savings he has $150.
22. Noah is renewing a magazine subscription. One package offers to renew the magazine for 3 years for $26. A second package offers to renew the magazine for 5 years for $38.

23. Serena received a gift card to the local movie theater. After going to 2 movies, the balance of her gift card dropped to $64. After going to 3 more movies, the balance of her gift card dropped to $40.
Slope-Intercept Form
Determining the Rate of Change and y-Intercept

Vocabulary
Match each definition to its corresponding term.

1. \(Ax + By = C\), where \(A\), \(B\), and \(C\) are constants and \(A\) and \(B\) are not both zero.

2. \(m(x - x_1) = (y - y_1)\), a linear equation that passes through the point \((x_1, y_1)\) and has slope \(m\)

Problem Set
Sketch the graph of each line.

1. \(y = 3x + 2\)

2. \(y = -\frac{2}{3}x + 5\)
3. \( y = \frac{1}{2}x - 6 \) 

4. \( y = -4x - 3 \)

5. \( y = -\frac{3}{4}x - 4 \) 

6. \( y = \frac{3}{8}x + 1 \)

Determine the \( y \)-intercept of each line given the slope and a point that lies on the line.

7. \( m = 4 \) and \((2, 13)\) 
   \[ y = mx + b \]
   \[ 13 = 4(2) + b \]
   \[ 13 = 8 + b \]
   \[ 5 = b \]

8. \( m = \frac{3}{2} \) and \((4, -6)\) 
   \[ y = mx + b \]
   \[ -6 = \frac{3}{2}(4) + b \]
   \[ -6 = 6 + b \]
   \[ 5 = b \]
Lesson 11.6  Skills Practice

9. $m = -\frac{2}{5}$ and $(5, 12)$
10. $m = -\frac{1}{4}$ and $(3, 8)$

11. $m = 7$ and $(2, 13\frac{1}{2})$
12. $m = \frac{3}{4}$ and $(8, 21)$
Write the equation of each line given two points that lie on the line.

13. (3, 25) and (4, 31)

   Calculate the slope, \( m \).
   \[
   m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{31 - 25}{4 - 3} = \frac{6}{1} = 6
   \]

   Calculate the \( y \)-intercept, \( b \).
   \[
   y = mx + b \\
   25 = 6(3) + b \\
   b = 7
   \]

   Substitute \( m \) and \( b \).
   \[
   y = 6x + 7
   \]

14. (10, 22) and (15, 24)
Lesson 11.6  Skills Practice

NAME ___________________________ DATE ____________________

15. (6, 1) and (18, −1)

16. \( \left( 2, \frac{15}{2} \right) \) and \( \left( 5, \frac{39}{4} \right) \)
Lesson 11.6  Skills Practice

17. (7, 1) and (21, 11)

18. (2, -7) and (4, -10)
Write the equation of each line given the slope and a point that lies on the line. Write the equation in slope-intercept form.

19. slope = 9 and (2, 21)
   \[ m(x - x_1) = (y - y_1) \]
   \[ 9(x - 2) = (y - 21) \]
   \[ 9x - 18 = y - 21 \]
   \[ 9x + 3 = y \]
   \[ y = 9x + 3 \]

20. slope = \(-2\) and (4, 7)
   \[ m(x - x_1) = (y - y_1) \]
   \[ -2(x - 4) = (y - 7) \]
   \[ -2x + 8 = y - 7 \]
   \[ -2x + 8 + 7 = y \]
   \[ y = -2x + 15 \]

21. slope = \(\frac{2}{5}\) and (10, 13)
   \[ m(x - x_1) = (y - y_1) \]
   \[ \frac{2}{5}(x - 10) = (y - 13) \]
   \[ \frac{2x}{5} - 4 = y - 13 \]
   \[ \frac{2x}{5} = y - 9 \]
   \[ y = \frac{2}{5}x + 9 \]

22. slope = \(-\frac{4}{3}\) and (6, \(-16\))
   \[ m(x - x_1) = (y - y_1) \]
   \[ -\frac{4}{3}(x - 6) = (y + 16) \]
   \[ -\frac{4}{3}x + 8 = y + 16 \]
   \[ -\frac{4}{3}x + 8 - 16 = y \]
   \[ y = -\frac{4}{3}x - 8 \]
Lesson 11.6  Skills Practice

23. slope $= \frac{1}{3}$ and $(9, -12)$

24. slope $= \frac{-5}{12}$ and $(24, -6)$

Calculate the $y$-intercept and $x$-intercept for each linear equation in standard form. Sketch the graph of the line.

25. $4x + 6y = 48$

$4x + 6y = 48$

$4(0) + 6y = 48$

$6y = 48$

$y = 8$

The $y$-intercept is $(0, 8)$.

$4x + 6y = 48$

$4x + 6(0) = 48$

$4x = 48$

$x = 12$

The $x$-intercept is $(12, 0)$. 
26. $3x + 15y = 135$
27. \(-2x + 8y = 56\)
28. $5x + 6y = -90$

![Graph showing the equation $5x + 6y = -90$. The graph includes a grid with labeled axes and points plotted along the line. The x-axis ranges from -18 to 18, and the y-axis ranges from -12 to 12. Various points are marked along the line.|
29. $2x + 8y = -24$
30. \(7x - 3y = -42\)