Investigation 1 Additional Practice

1. a. Francine: 4.5 mph; Geraldo: 6 mph; Jennifer: 7.5 mph; Divide the number of miles traveled in 4 hours by 4.
b. Francine: 27 miles; Geraldo: 36 miles; Jennifer: 45 miles

2. a. Francine: \( D = 4.5t \); Geraldo: \( D = 6t \); Jennifer: \( D = 7.5t \)
b. Substitute 2.5 for \( t \) in each question.
c. the number being multiplied by \( t \)
d. Proportional

3. a. (Figure 1)
b. Students’ estimates should be close to the following values: Francine: 11.25 miles; Geraldo: 15 miles; Jennifer: 18.75 miles
c. Students’ estimates should be close to the following values: Francine: 15.6 hours; Geraldo: 11.7 hours; Jennifer: 9.3 hours
d. The faster the cyclist, the steeper the graph.

4. a. 7.25 miles per hour
b. Stilton’s graph would be steeper than Francine’s and Geraldo’s but less steep than Jennifer’s.

5. a.  

b. Sets i, ii, and iii represent linear relationships. The graphs of these data sets are straight lines.
c. No; none of the sets contain \( x \)- and \( y \)-values that are related by a constant of proportionality.

6. a. 56
b. 15
c. does

7. a. \( B = 7w \)
b. The graph is a line. The graph passes through the origin. The graph is increasing.

8.  

<table>
<thead>
<tr>
<th>Number of apples</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$1.50</td>
</tr>
<tr>
<td>4</td>
<td>$3</td>
</tr>
<tr>
<td>12</td>
<td>$9</td>
</tr>
<tr>
<td>5</td>
<td>$3.75</td>
</tr>
</tbody>
</table>
Skill: Linear Relationships

1. \( y = 12x + 5 \)
   a. $77
   b. $53

2. \( y = 1.5x + 2.5 \)
   a. $16
   b. $38.50

3. \( y = 3x + 36 \)
   a. 57 in.
   b. 120 in.

Investigation 2 Additional Practice

1. a. i.

   b. i. increase    ii. decrease
   iii. decrease    iv. increase
   c. i. (0, 0)     ii. (0, 7)
   iii. (0, −8)     iv. (0, −3)
   d. i.–iv. Answers will vary.

2. a. $25; $50
   b. $25
   c. $100 − $50 = $50

3. a. (2, 17), (9, 52), (2.9, 21.5)
   b. (10, 11), (24, 32)
   c. (5, −8.75), (−2.75, 14.5)

4. a. Possible answer: (−4, 0), (0, 2), and (2, 3)
   b. ii. \( y = 0.5x + 2 \)
   c. no; The \( x \)-value 56 corresponds to the \( y \)-value 30, not 35.
   d. yes; The \( x \)-value −20 does correspond to the \( y \)-value −8.
5. The equation for the line labeled \( A \): 
\[ y = 3 - x \]; the equation for the line labeled \( B \): 
\[ y = 2 + x \]; the equation for the line labeled \( C \): 
\[ y = -4 + 2x \]

a. (Figure 1)

b. line \( A \): \( y = 3 - x \), line \( B \): \( y = 2 + x \), line \( C \): \( y = -4 + 2x \)

6. The equation of the line labeled \( A \): 
\[ y = x + 3 \]; The equation of the line labeled \( B \): 
\[ y = x + 1 \]

a. They are parallel; they cross the y-axis at different points.

b. Change the constant value of 3 to 1

c. \( y = x + 1 \)

d. \( y = x + 2 \); 2 is halfway between 3 and 1

e. No

7. The graph is of the equation \( y = \frac{1}{2}x - 1 \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-2.5</td>
</tr>
<tr>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>7</td>
<td>2.5</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>100</td>
<td>49</td>
</tr>
</tbody>
</table>

b. For each increase in \( x \), the value of \( y \) increases by \( \frac{1}{2} \). So from 10 to 100, which is a change of 90, there is a change of \( \frac{1}{2} \) times 90 or 45.

8. a. \( y = x \) and \( y = -x \) (0, 0)

\( y = x + 1 \) and \( y = -x + 1 \) (0, 1)

\( y = x + 3 \) and \( y = -x + 3 \) (0, 3)

\( y = x - 4 \) and \( y = -x - 4 \) (0, -4)

b. The y-coordinate of the point of intersection is the common constant term in the two equations.

c. (0, 137)

9. \( y = x + 3 \)

\[ \begin{array}{ccc}
  x & 0 & -1 & -2 & -3 \\
  y & 3 & 2 & 1 & 0 \\
\end{array} \]

10. \( y = 1 - x \)

\[ \begin{array}{ccc}
  x & 0 & 1 & 2 & 3 \\
  y & 1 & 0 & -1 & -2 \\
\end{array} \]

11. Yes, the point is \((-1, 2)\), which is where the two lines intersect on the graph. The point \((-1, 2)\) is on both lines so it satisfies both equations.

12. yes

13. no

14. yes

15. no

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

b. \( y = 9 - 5x \)

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

17. \( y = \frac{5}{3}x + 2 \)

18. \( y = 2x - 4 \)

19. a. 7

b. 2

20. \( y = 2x + 4, y = 4 + 2x \)

21. increasing: \( y = \frac{1}{2}x + 3, y = \frac{1}{4}x - 5 \),

\( y = 5x, y = 5 + x \)

decreasing: \( y = 6 - x, y = -3x + 14 \)

---

**Figure 1**

<table>
<thead>
<tr>
<th>Line</th>
<th>Constant Rate of Change</th>
<th>( y )-intercept</th>
<th>( x )-intercept</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-1</td>
<td>(0, 3)</td>
<td>(3, 0)</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>(0, 2)</td>
<td>(-2, 0)</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>(0, -4)</td>
<td>(2, 0)</td>
</tr>
</tbody>
</table>
Moving Straight Ahead Practice Answers

Skill: Linear Functions, Graphs, and Tables
1. a. \( y = 0.14x + 0.60 \)
   b. 2 miles
   c. $1.72
2. a. Equation ii because the point satisfies the equation: \( 74 = 4.2(10) + 32 \).
   b. Answers will vary.
3. a. i.
   b. Answers will vary.
4. a. i.
   b. Answers will vary.
13. \( y = -6x \)
14. \( y = x - 7 \)
15. \( y = 3x - 8 \)
16. \( y = \frac{1}{2}x + 6 \)

Investigation 3 Additional Practice
1. a. Equation iii because the point satisfies the equation: \( 60 = 30 + 1.5(20) \).
   b. Answers will vary.
iii. The exact answers are given here. If students found the intersection points by inspecting the graphs, their answers may not be exact.

i. $(-3.125, 1.5)$  
ii. $(6, 3)$  
iii. $(-0.5, 8.5)$  
iv. $(2, -2)$  
The values may not fit exactly because they may be estimates, but they should be close.

4. a. $r = 6$  
b. $x = 10$  
c. $z = 64$  
d. $w = -187$

5. a. $x + 1$  
b. $x + (x + 1) = 41$; this equation is the same as $2x + 1 = 41$. Subtracting 1 from both sides gives $2x = 40$, so $x = 20$ and $x + 1 = 21$.

6. a. $24 - 5x = 4; x = 4$  
b. $2x + 17 = 7; x = -5$  
c. $\frac{1}{4}x - 11 = 11; x = 88$

7. a. $516.25$  
b. $852$  
c. $335.75$  
d. $195$  
e. $493.75$  
f. $91$  
g. $273$

8. a. $x = -2$; graph is a line with a slope of 3 and x-intercept $(-2, 0)$  
b. $x = 2$; graph is a line with a slope of 1 and x-intercept $(2, 0)$  
c. $x = -\frac{10}{3}$; graph is a line with a slope of 3 and x-intercept $(-\frac{10}{3}, 0)$  
d. The solution is the x-coordinate of the x-intercept.

9. a. Both strategies are correct.  
b. Answers will vary.  
c. Dividing is reasonable if all the values are divisible by the same number.

d. $5x = -15 \quad x + 4 = 1$  
   $x = -3 \quad x = -3$

10. a. $x = 13$  
b. $3x = 13 \quad x = \frac{13}{3}$  
c. $-2x = 13 \quad x = -\frac{13}{2}$  
d. The numerators of the solutions are all 13; the denominators are the coefficients of $x$.

11. a. $y = 4$  
b. $y = 6$  
c. $y = 10$  
d. $y = -2$  
e. $y = 10\frac{2}{3}$  
f. $y = 4\frac{1}{3}$

12. a. $13.5p \leq 1,250$  
b. $12p + 100 \leq 1,250$  
c. First caterer: 92 people or fewer  
   Second caterer: 95 people or fewer
d. Possible Answer: I would choose the second caterer. The first caterer will cost less if there are 66 people or fewer, but Kelli can invite more people with the second caterer.

13. \( C = 25 + 0.5g, \ C = 0.5g + 25 \)

14. \((2, -2)\)

15. \( x = 3; 3 = 6 - x, 5 = -3x + 14 \)
\( x = -3; -2x + 3, -6 = \frac{1}{3}x - 5, 6 = -2x \)
\( 2 = 5 + x \)

Skill: Exploring Equality

1. a. yes  b. no  c. no  d. yes
2. a. no  b. yes  c. yes  d. yes
3. 1  4. 11  5. -39  6. 137
7. 2; 4; 6; 8  8. 4; 7; 10; 13
9. -4; -3; -2; -1  10. 1; -4; -9; -14

Skill: Finding the Point of Intersection

1-3. Yes; the lines have different slopes, so there will be exactly one \( x \)-value that corresponds to the same \( y \)-value for each line.

4. \((1, 2); \)

5. a. \( y = 0.8x; y = 1.2x - 1.4 \)
   b. \( x = 3.5 \) pounds

Skill: Solving Linear Equations

1. \( h = 3 \)
2. \( s = 9 \)
3. \( y = 1 \)
4. \( g = 4 \)
5. \( j = 2 \)
6. \( w = 4 \)
7. \$5 + $2m; $45
8. \( 6 + 8w = 30; 3 \) weeks
9. 2  10. 2  11. 1
12. 1  13. 7  14. -6
15. \( 100 + 20w = 460; 18 \) weeks
16. \( 50 + 2v = 144; 47 \) visits

Investigation 4 Additional Practice

1. a. slope is 2; \( y \)-intercept is \((0, -10)\)
   b. slope is 4; \( y \)-intercept is \((0, 3)\)
   c. slope is 4; \( y \)-intercept is \((0, -4.5)\)
   d. slope is 2.6; \( y \)-intercept is \((0, 0)\)
   e. slope is 7; \( y \)-intercept is \((0, 1)\)
2. i. a. \( 2.5 \) ii. a. \(-1 \)
   b. \((0, 0)\) ii. b. \((0, 6)\)
   c. \( y = 2.5x \) ii. c. \( y = x + 6 \)
iii. a. \( 3 \) iv. a. \(-4 \)
   b. \((0, -1.5)\) iv. b. \((0, 3)\)
   c. \( y = 3x - 1.5 \) iv. c. \( y = 3 - 4x \)
3. a. slope is 1; \( y = x \)
   b. slope is \(-\frac{4}{3}; y = -\frac{4}{3}x \)
   c. slope is -3; \( y = -3x \)
4. a.
   b. i. slope = 1
      ii. slope = -1
   c. i. \( y \)-intercept = \((0, 0)\)
      ii. \( y \)-intercept = \((0, 0)\)
5. a. $M = 0.5n + 1.80$
   b. 0.5 is slope; It is the cost of each game.
   c. 1.80 is the $y$-intercept; It is the bus fare.
   d. $5.80$
   e. Jim can play 9 games, and he will have $0.45 left over.

6. a. $\$2.25;$ This is the intercept on the $y$-axis, which represents the cost if Angie buys 0 comics.
   b. $\$1.50;$ For each comic book purchased, the cost rises by $\$1.50$.
   c. Using the slope and the $y$-intercept, the equation is $M = 1.5n + 2.25$. This is not a proportional relationship.
   d. $45$ gallons; This is the $y$-intercept (the amount of water in the aquarium at $t = 0$).
   e. From the graph, the siphon removes 20 gallons in 12 minutes, or equivalently, $rac{20}{12} = \frac{5}{3}$ gallons in 1 minute.

7. a. $3\text{ square}$:
   b. From the graph, the siphon removes 20 gallons in 12 minutes, or equivalently, $rac{20}{12} = \frac{5}{3}$ gallons in 1 minute.
   c. $G = -\frac{5}{3}t + 45$
   d. Substitute 10 for $t$ in the equation. You get $G = 28.33$ gallons of water left in the aquarium.
   e. Substitute 0 for $G$ in the equation. You get $t = 27$ minutes.

8. a. $y = 7x - 2$
   b. $y = 9.18$
   c. $y = 0.5x + 1$
   d. $y = \frac{19}{54}x + \frac{43}{12}$
   e. $y = \frac{10}{7} - \frac{2}{3}x$

9. The equations for the lines are:
   - Line A: $y = 5 - \frac{5}{12}x$
   - Line B: $y = 6 - x$
   - Line C: $y = \frac{4}{5}x + \frac{12}{5}$
   - Line D: $y = \frac{1}{3}x - 10$

10. a. $C = 2.1n + 1.15$
    b. 1.15; This is the cost for shoe rental.
    c. 2.1; This is the cost of bowling each game.
    d. $\$13.75$
    e. Tony bowled 3 games.

11. a. Positive slope, $y$-intercept equals 0, passes through the origin (0, 0)
    b. Positive slope, positive $y$-intercept, crosses the $x$-axis to the left of the origin
    c. Slope equals 0, negative $y$-intercept, never crosses the $x$-axis
    d. Negative slope, positive $y$-intercept, crosses the $x$-axis to the right of the origin
    e. Negative slope, negative $y$-intercept, crosses the $x$-axis to the left of the origin

12. $(2, 2)$; since the equation of the line is: $y = 6 - 2x$

13. a. (Figure 2)
    b. The perimeter increases by 2.
    c. For Figure 4, you can see the pattern is increasing by 2. For Figure 10, you know it would be 6 columns to the right of Figure 4 in the expanded table, so the perimeter of each Figure 10 would be $2 \times 6 = 12$ units greater than each Figure 4 perimeter.
    d. 1 square: $P = 2N + 2$,
       where $N =$ number of copies
       2 square: $P = 2N + 4$,
       where $N =$ number of copies
       3 square: $P = 2N + 6$,
       where $N =$ number of copies
       4 square: $P = 2N + 8$,
       where $N =$ number of copies

---

## Figure 2

<table>
<thead>
<tr>
<th>Shape</th>
<th>Figure 1</th>
<th>Figure 2</th>
<th>Figure 3</th>
<th>Figure 4</th>
<th>Figure 10</th>
<th>Figure 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern 1</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>22</td>
<td>202</td>
</tr>
<tr>
<td>Pattern 2</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>24</td>
<td>204</td>
</tr>
<tr>
<td>Pattern 3</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>26</td>
<td>206</td>
</tr>
<tr>
<td>Pattern 4</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>28</td>
<td>208</td>
</tr>
</tbody>
</table>
Moving Straight Ahead Practice Answers

14. a. The slopes are the same; the
   y-intercepts are different. Another
difference is that Line A represents a
relationship that is not proportional
and Line B represents a relationship
that is proportional.

b. \( y = 2x + K \), where \( K \) is any number
   strictly between 2 and 0; for example,
y = 2x + \( \frac{1}{3} \). This line has the same
slope but a different y-intercept than
the first two lines.

c. The new line has the same slope, so it
   is parallel to the original two lines;
the new constant term is between
the original constant terms, so the
y-intercept of the new line is between
the y-intercept of the original two
lines.

15. As \( x \) increases by 1, \( y \) increases by 2.
   As \( x \) decreases by 1, \( y \) decreases by 2.

16. 3; 5
17. \( y = -\frac{1}{3}x - \frac{2}{3} \)
18. Positive slope:
   \( y = 3x \), \( y = \frac{1}{2}x - 1 \)
   Passes through the origin: \( y = 3x \), \( y = -x \)
   Positive y-intercept: \( y = -2x + 5 \), \( y = 1-x \),
y = 2 – 3x

Skill: Finding Slope
1. 3  2. -\( \frac{1}{2} \)  3. 0
4. \( \frac{1}{2} \)  5. -\( \frac{3}{2} \)  6. 2
7. -2

Skill: Using Slope
1. yes  2. no  3. no  4. no
5. \( \frac{1}{6} \)  6. 2  7. \( \frac{3}{2} \)  8. \( \frac{1}{16} \)

Skill: Writing Equations
1. \( y = -2x + 3 \)  2. \( y = 3x \)
3. \( y = -x - 3 \)  4. $1,000
5. $75  6. 4
7. $50  8. \( y = 4x + 100 \)