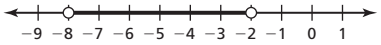
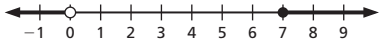
Answers

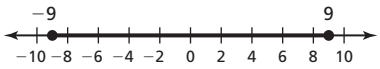
98. $-8 < k < -2$



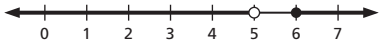
99. $g \geq 7$ *or* $g < 0$



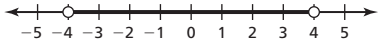
100. $-9 \leq t \leq 9$



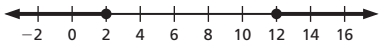
101. $x < 5$ *or* $x \geq 6$



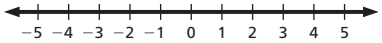
102. $-4 < y < 4$



103. $h \leq 2$ *or* $h \geq 12$

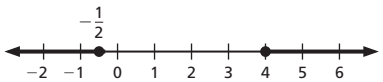


104. all real numbers

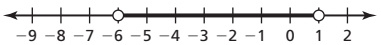


105. no solution

106. $w \geq 4$ *or* $w \leq -\frac{1}{2}$



107. $-6 < x < 1$



108. $|x - 88| \leq 0.007$; $87.993 \leq x \leq 88.007$

109. $|x - 78| \leq 3$; $75 \leq x \leq 81$

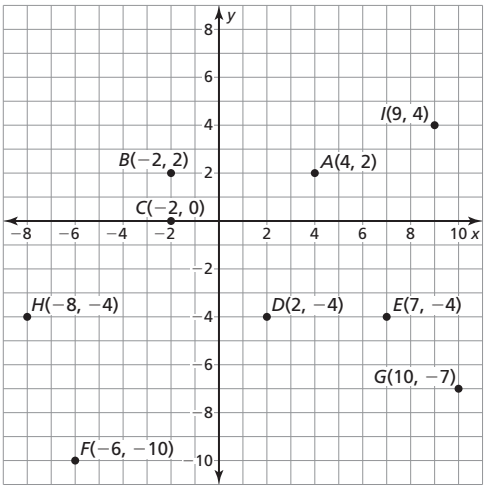
Chapter 3

3.1 Start Thinking

no; yes; Absolute value is a measure of distance, so y can never be negative.

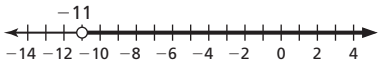
3.1 Warm Up

1–9.



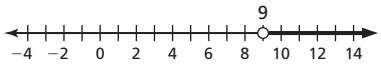
3.1 Cumulative Review Warm Up

1. $x > -11$

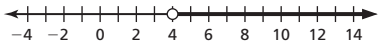


2. $m \geq 7$

3. $r > 9$

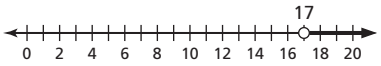


4. $w > 4$

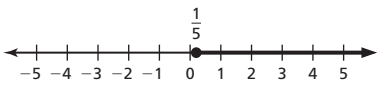


5. $h \leq 6$

6. $j > 17$

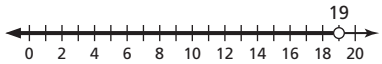


7. $p \geq \frac{1}{5}$



Answers

8. $n < 19$



3.1 Practice A

1. no; The inputs 8 and 4 have two different outputs.

2. yes; Every input has exactly one output.

3. yes; No vertical line can be drawn through more than one point on the graph.

4. no; You can draw a vertical line that passes through more than one point on the graph.

5. The domain is -3, -1, 0, 1, and 3. The range is 0, 2, and 3.

6. The domain is -2, -1, 0, 1, and 2. The range is -2, -1, 0, 1, and 2.

7. a. independent: x members, dependent: cost y

b. The domain is 1, 2, 3, 4, 5, and 6. The range is 42, 49, 56, 63, 70, and 77.

8. no; Each teacher has 30 students, so there is more than one output (students) per input (teacher).

9. yes; Each weight has exactly one cost.

3.1 Practice B

1. no; The input 1 has two different outputs.

2. yes; Every input has exactly one output.

3. yes; No vertical line can be drawn through more than one point on the graph.

4. no; You can draw a vertical line that passes through more than one point on the graph.

5. The domain is $-1 \le x \le 3$. The range is $-8 \le x \le 8$.

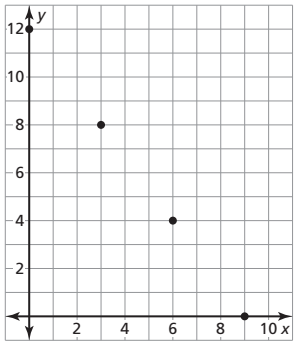
6. The domain is $1 \le x < 2$, $2 < x < 4$, and $4 < x \le 6$. The range is $1 \le y < 3$, $3 < y < 5$, and $5 < y \le 6$.

7. a. $y = -\frac{4}{3}x + 12$

b. *Sample answer:*

Input, x	0	3	6	9
Output, y	12	8	4	0

c. *Sample answer:*



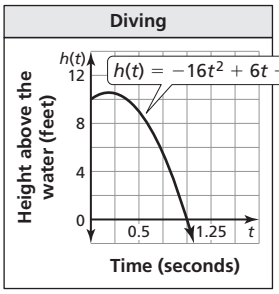
8. domain: $-\infty < x < \infty$, range: $y \ge 2$

9. domain: $-\infty < x < \infty$, range: $y \le 1$

10. domain: $-\infty < x < \infty$, range: $y \le -3$

3.1 Enrichment and Extension

a.



x	y
0.1	10.44
0.2	10.56
0.3	10.36
0.4	9.84
0.5	9
0.6	7.84
0.7	6.36
0.8	4.56
0.9	2.44
1	0

b. domain: 0 to 1, range: 0 to about 12; It takes 1 second to hit the water, and time is not negative. You are on a 10-foot diving board and bounce up, and then drop toward the water which is 0.

c. The graph is a curve, and the polynomial has a degree of 2. As you bounce up and drop toward the water, your speed will change due to gravity.

d. about 10.56 ft

e. about 0.2 sec

f. about 1 sec

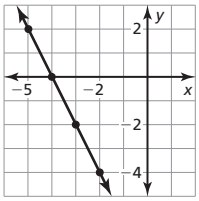
g. $t = \frac{-6 \pm \sqrt{6^2 - 4(-16)(10)}}{2(-16)} = \frac{-6 \pm 26}{-32} = -\frac{5}{8}$ or 1; Choose the positive solution $t = 1$.

3.1 Puzzle Time

A YARDSTICK

Answers

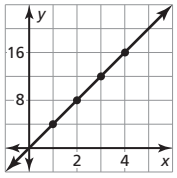
3.2 Start Thinking



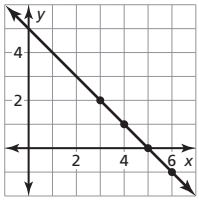
Sample answer: $(-1, -6)$; no; The y-coordinate of the point with an x-coordinate of 1 is -10, not -2; no; If both $(1, -10)$ and $(1, -2)$ are part of the relation, then it is not a function because the x-value 1 is paired with two different y-coordinates. Visually, the relation would fail the vertical line test.

3.2 Warm Up

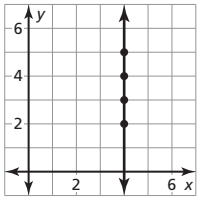
1.



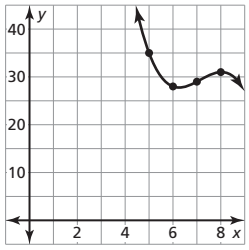
2.



3.



4.



3.2 Cumulative Review Warm Up

1. $x = -\frac{y}{2}$

2. $x = \frac{a}{3 - 5z}$

3. $x = \frac{y + 5}{5 - r}$

4. $x = \frac{r}{s - t}$

5. $x = \frac{c + 61}{84}$

6. $x = \frac{m}{10}$

3.2 Practice A

1. linear; The graph is a line.

2. nonlinear; The graph is not a line.

3. linear; The rate of change is constant.

4. nonlinear; The rate of change is not constant.

5. nonlinear; cannot be written in the form $y = mx + b$

6. linear; can be written in the form $y = mx + b$

7. linear; can be written in the form $y = mx + b$

8. nonlinear; cannot be written in the form $y = mx + b$

9.

x	4	8	12	16	20
y	−4	0	4	8	12

10. domain: 4, 8, and 12; discrete; consists of only certain numbers in the interval

11. domain: $0 \le x \le 6$; continuous; consists of all numbers within an interval

3.2 Practice B

1. linear; The graph is a line.

2. nonlinear; The graph is not a line.

3. nonlinear; The rate of change is not constant.

4. linear; The rate of change is constant.

5. linear; can be written in the form $y = mx + b$

6. linear; can be written in the form $y = mx + b$

7. nonlinear; cannot be written in the form $y = mx + b$

8. nonlinear; cannot be written in the form $y = mx + b$

9. continuous; Time is continuous.

10. discrete; You cannot buy part of a ticket.

Answers

3.2 Enrichment and Extension

a. $C(d) = 1.75d + 3.00$

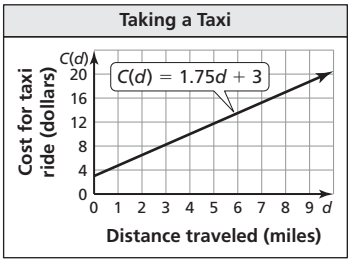
b. $C(d) = \frac{7}{4}d + 3$

c. \$20.50

d. 4 mi

e. 3; This represents the up-front charge of \$3.00.

f.

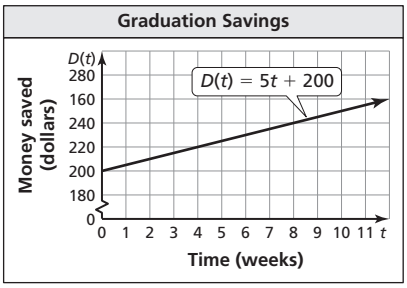


domain: $d \geq 0$; range: $C \geq 0$

g. $\frac{7}{4}$; Graph the problem and analyze the ratio of the change in the y-values to the change in the x-values. Or, use the slope formula: $\frac{8.25 - 4.75}{3 - 1} = \frac{3.50}{2} = 1.75$.

h. cost per mile

i. *Sample answer:* You receive \$200 for a graduation present, and you deposit it in a savings account. Each week after, you add \$5 to the account, but no interest is earned. The amount in the account is a function of the number of weeks that have passed. At three months, how much money will you have? Three months is approximately 12 weeks. The equation that represents the situation is $D(t) = 5t + 200$, and $D(12) = 5(12) + 200 = 260$, so you will have \$260 after 12 weeks, or about 3 months.



3.2 Puzzle Time

A SLOWPOKE

3.3 Start Thinking

When $x = -4$, $y = 29$. When $x = 0$, $y = 13$. When $x = 1$, $y = 9$. When $x = 3$, $y = 1$; *Sample answer:* $y = -3x - 12$; Multiply by -3, and then subtract 12.

3.3 Warm Up

1. 9; −3; −6 **2.** −22; 2; 8 **3.** −1272; 0; 48

4. −5916; 0; 39 **5.** −84; 0; 21 **6.** 1068; 0; 70.5

3.3 Cumulative Review Warm Up

1. $m > -3$ **2.** $d < \frac{8}{5}$ **3.** $g \geq -\frac{9}{17}$

4. $m \leq -10$ **5.** $r \geq 15$ **6.** $b \leq \frac{9}{2}$

3.3 Practice A

1. $f(-2) = -5$; $f(0) = -3$; $f(5) = 2$

2. $g(-2) = 4$; $g(0) = 0$; $g(5) = -10$

3. $h(-2) = 11$; $h(0) = 5$; $h(5) = -10$

4. a. The number of customers at 8 A.M. was 10.

b. The number of customers at 2 P.M. was the same as the number of customers at 3 P.M.

c. There was a time when there were no customers in the department store.

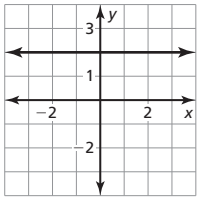
d. There were more customers at noon than at 11 A.M.

5. −4 **6.** −1.5 **7.** 3 **8.** 2

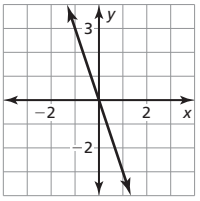
9. 3 **10.** 4

11. a. \$228.50 **b.** 10 months

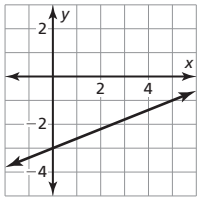
12.



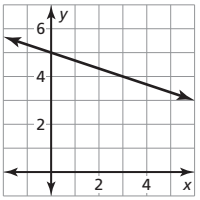
13.



14.



15.



16. a. (−2, 7) **b.** (2, 4)

Answers

3.3 Practice B

1. $f(-2) = -2$; $f(0) = 1$; $f(5) = 8.5$

2. $g(-2) = 19$; $g(0) = 13$; $g(5) = -2$

3. $h(-2) = -3$; $h(0) = -5$; $h(5) = -10$

4. a. All (or 100%) of your friends had a landline phone in 2000.

b. The percentage of your friends with a landline phone was the same in 2005 as it was in 2006.

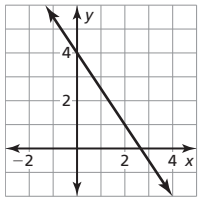
c. $m\%$ of your friends had a landline phone in 2010.

d. The percentage of your friends with a landline phone was greater in 2011 than it was in 2012.

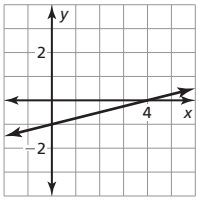
5. 3 **6.** -5 **7.** 30 **8.** 12

9. 5 **10.** 5

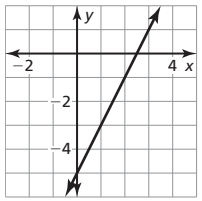
11.



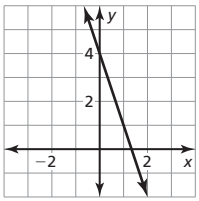
12.



13.



14.



15. either one; They both charge \$250 for 5 hours of labor.

3.3 Enrichment and Extension

1. $-12x - 9$ **2.** $9x + 4$

3. $-12x^2 - 9$ **4.** $-x - 4$

5. 76 **6.** $-7x - 6$ **7.** $f(g(x))$

8. a. $p(x) = x + 40$

b. $t(x) = 1.07x$

c. $(p \circ t)(x) = 1.07x + 40$ and $(t \circ p)(x) = 1.07x + 42.80$; The function $(p \circ t)(x) = 1.07x + 40$ has the tax only applied to the purchase price and not the delivery fee. The function $(t \circ p)(x) = 1.07x + 42.80$ has both the purchase price and the delivery fee included in the tax; $(p \circ t)(x)$

d. $(p \circ t)(x)$

3.3 Puzzle Time

IT TAKES THE BUZZ

3.4 Start Thinking

Sample answer:

Jim goes to the store to buy x xaxa balls and y yo-yo's. If xaxa balls cost \$1.79 and yo-yo's cost \$4.29, how many xaxa balls and yo-yo's did Jim buy if his total came to \$22.53?; $1.79x + 4.29y = 22.53$; If $x = 0$ in this situation, it would mean Jim did not buy any xaxa balls; If $y = 0$, Jim did not buy any yo-yo's; By considering what happens when x and y are zero, you can plot those points without doing much calculation. This makes it easier to find a few of points of the line.

3.4 Warm Up

1. $y = x^2$ **2.** $y = 1.5 - 0.1x$

3. $y = x^3$ **4.** $y = 6x + 3$

3.4 Cumulative Review Warm Up

1. $6g = 18$ Write the equation.

$\frac{6g}{6} = \frac{18}{6}$ Divide each side by 6.

$g = 3$ Simplify.

2. $p \div 6 = 2$ Write the equation.

$p \div 6 \bullet 6 = 2 \bullet 6$ Multiply each side by 6.

$p = 12$ Simplify.

3. $-7r = 63$ Write the equation.

$\frac{-7r}{-7} = \frac{63}{-7}$ Divide each side by -7.

$r = -9$ Simplify.

4. $\frac{x}{7} = 7$ Write the equation.

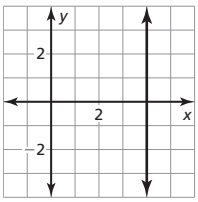
$\frac{x}{7} \bullet 7 = 7 \bullet 7$ Multiply each side by 7.

$x = 49$ Simplify.

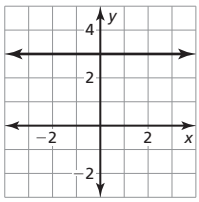
Answers

3.4 Practice A

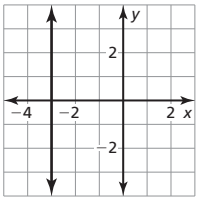
1.



2.



3.



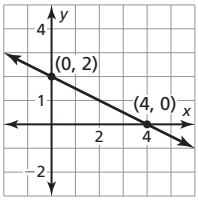
4. x-intercept: $(5, 0)$; y-intercept: $(0, -2)$

5. x-intercept: $(4, 0)$; y-intercept: $(0, 3)$

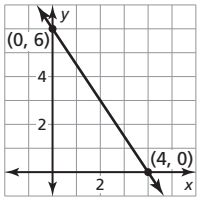
6. x-intercept: $(10, 0)$; y-intercept: $(0, -6)$

7. x-intercept: $(-4, 0)$; y-intercept: $(0, -6)$

8.



9.



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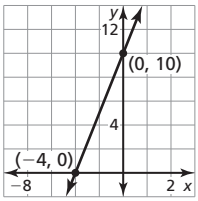

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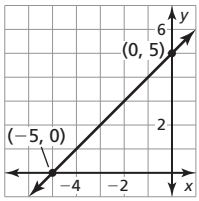
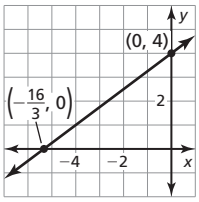
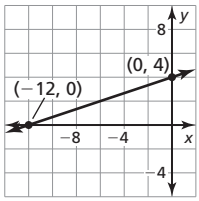


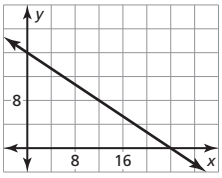
12.



13.



14. a.



x-intercept: could send 24 teams to Competition A and no teams to Competition B; y-intercept: could send 16 teams to Competition B and no teams to Competition A

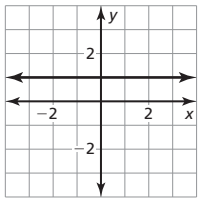
b. *Sample answer:* 3 teams to Competition A and 14 teams to Competition B; 6 teams to Competition A and 12 teams to Competition B; 9 teams to Competition A and 10 teams to Competition B; 12 teams to Competition A and 8 teams to Competition B

15. The x- and y-intercepts were combined into one coordinate; The x-intercept is at $(9, 0)$ and the y-intercept is at $(0, -4)$.

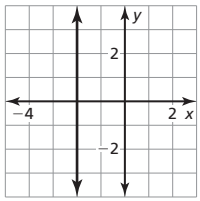
16. *Sample answer:* $3x + 2y = 7$; Neither 3 nor 2 is a factor of 7.

3.4 Practice B

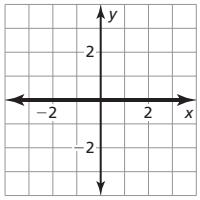
1.



2.



3.



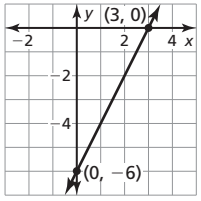
4. x-intercept: $(7, 0)$; y-intercept: $(0, -5)$

5. x-intercept: $(-9, 0)$; y-intercept: $(0, -6)$

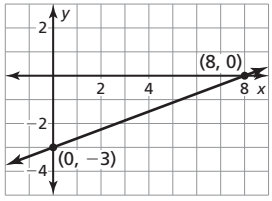
6. x-intercept: $\left(\frac{1}{4}, 0\right)$; y-intercept: $\left(0, -\frac{1}{3}\right)$

7. x-intercept: $(2, 0)$; y-intercept: $\left(0, -\frac{2}{5}\right)$

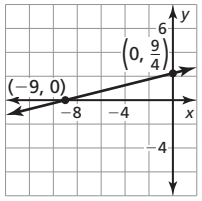
8.



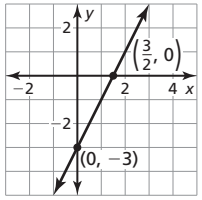
9.



10.

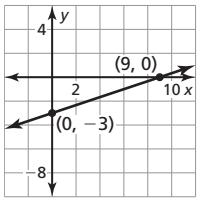


11.

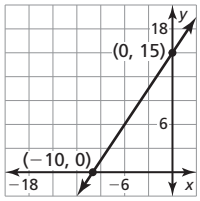


Answers

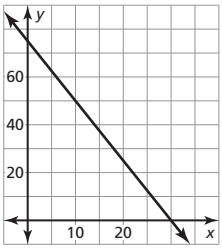
12.



13.



14. a.



x-intercept: You could purchase 30 key chains and no wristbands; y-intercept: You could purchase 75 wrist bands and no key chains.

b. 30 wrist bands

15. The x- and y-values are switched; The x-intercept is at $(3, 0)$, and the y-intercept is at $(0, 2)$.

16. *Sample answer:* $4x + 6y = 8$; The number 4 is a factor of 8. The number 6 is not a factor of 8.

3.4 Enrichment and Extension

1. x-intercept: $\left(\frac{c}{a}, 0\right)$; y-intercept: $\left(0, \frac{c}{b}\right)$

2. x-intercept: $\left(\frac{2c}{a}, 0\right)$; y-intercept: $\left(0, \frac{2c}{b}\right)$

3. x-intercept: $\left(\frac{c}{2a}, 0\right)$; y-intercept: $\left(0, \frac{c}{b}\right)$

4. x-intercept: $(0, 0)$; y-intercept: $(0, 0)$

5. x-intercept: $\left(\frac{c-2}{a}, 0\right)$; y-intercept: $\left(0, \frac{c-2}{2b}\right)$

6. x-intercept: $(4c - 2, 0)$; y-intercept: $\left(0, \frac{4c-2}{b}\right)$

7. x-intercept: $(3ac, 0)$; y-intercept: $\left(0, \frac{18c}{b}\right)$

8. x-intercept: $\left(\frac{1}{6}, 0\right)$; y-intercept: $\left(0, \frac{1}{5}\right)$

9. x-intercept: $\left(\frac{-c}{10}, 0\right)$; y-intercept: $\left(0, \frac{5c}{8}\right)$

10. x-intercept: $(-14, 0)$; y-intercept: $(0, 28)$

11. x-intercept: $\left(6ab^2, 0\right)$; y-intercept: $\left(0, 2a^3b\right)$

12. x-intercept: $\left(\frac{5}{3}, 0\right)$; y-intercept: $\left(0, \frac{5}{2}\right)$

3.4 Puzzle Time

FOR HAY FEVER

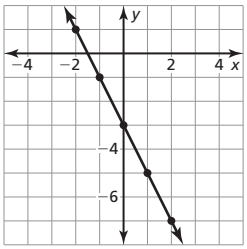
3.5 Start Thinking

Roadway grade is a term used to describe the steepness of a road. Truck drivers need to know this information so they can be extra cautious when traveling in bad conditions, or when their semi is carrying a lot of weight. This information allows truck drivers to give themselves extra stopping distance going downhill; A grade of 13% when going downhill would be represented as $-\frac{13}{100}$, where the numerator is the vertical change and the denominator is the horizontal change. This represents a vertical difference of -13 feet for every 100 feet of terrain.

3.5 Warm Up

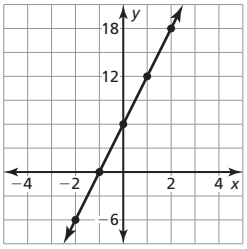
1.

x	−2	−1	0	1	2
y	1	−1	−3	−5	−7



2.

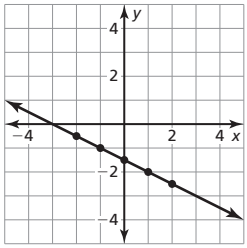
x	−2	−1	0	1	2
y	−6	0	6	12	18



Answers

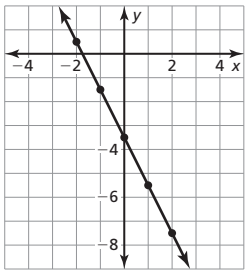
3.

x	−2	−1	0	1	2
y	−0.5	−1	−1.5	−2	−2.5



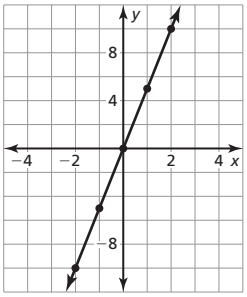
4.

x	−2	−1	0	1	2
y	0.5	−1.5	−3.5	−5.5	−7.5



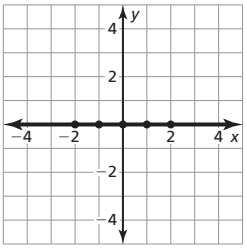
5.

x	−2	−1	0	1	2
y	−10	−5	0	5	10



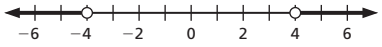
6.

x	−2	−1	0	1	2
y	0	0	0	0	0

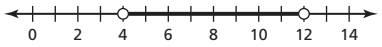


3.5 Cumulative Review Warm Up

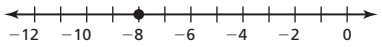
1. $x < -4$ or $x > 4$.



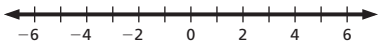
2. $4 < d < 12$



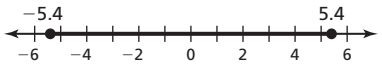
3. $s = -8$



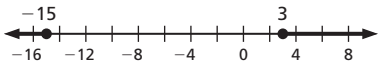
4. All real numbers



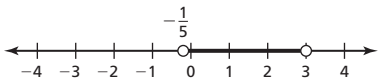
5. $-5.4 \leq y \leq 5.4$



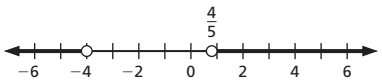
6. $h \leq -15$ or $h \geq 3$.



7. $-\frac{1}{5} < c < 3$



8. $n < -4$ or $n > \frac{4}{5}$



3.5 Practice A

1. The line falls from left to right, so the slope is negative; $m = -\frac{4}{3}$

2. The line rises from left to right, so the slope is positive; $m = 1$

3. $m = \frac{1}{3}$

4. $m = 0$

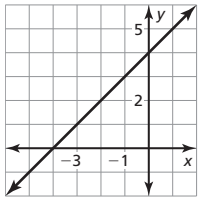
5. $m = -6$; (0, 2)

6. $m = 7$; (0, 0)

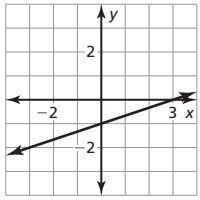
7. $m = 0$; (0, −3)

8. $m = 1$; (0, −9)

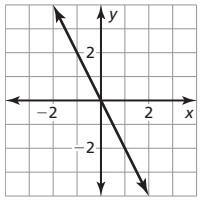
Answers

9. 

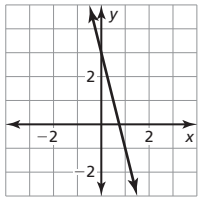
x-intercept: $(-4, 0)$

10. 

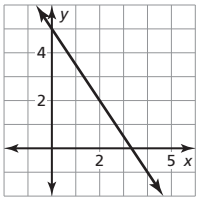
x-intercept: $(3, 0)$

11. 

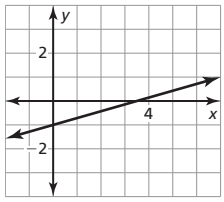
x-intercept: $(0, 0)$

12. 

x-intercept: $\left(\frac{3}{4}, 0\right)$

13. 

$m = -\frac{3}{2}$; y-intercept: $(0, 5)$; x-intercept: $\left(\frac{10}{3}, 0\right)$

14 

$m = \frac{2}{7}$; y-intercept: $(0, -1)$; x-intercept: $\left(\frac{7}{2}, 0\right)$

3.5 Practice B

1. There is no change in x; m = undefined

2. The line falls from left to right, so the slope is negative; $m = -\frac{5}{4}$

3. m = undefined

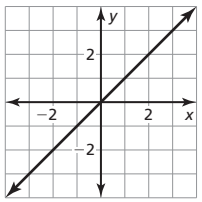
4. $m = -\frac{5}{2}$

5. $m = 0$; $(0, 12)$

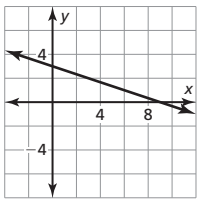
6. $m = 3$; $(0, 7)$

7. $m = 2$; $\left(0, \frac{9}{2}\right)$

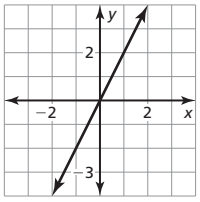
8. $m = 4$; $\left(0, \frac{2}{3}\right)$

9. 

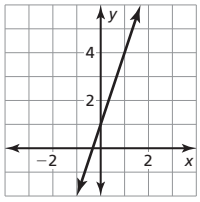
x-intercept: $(0, 0)$

10. 

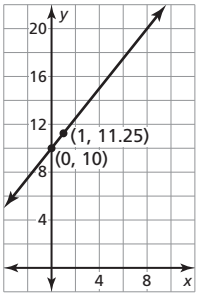
x-intercept: $(9, 0)$

11. 

x-intercept: $(0, 0)$

12. 

x-intercept: $\left(-\frac{1}{3}, 0\right)$

13. a. 

b. $m = \frac{5}{4}$; the current length of the hair is 10 cm

c. about 0.5 in.

14. $\frac{1}{9}$

15. -6

3.5 Enrichment and Extension

1. $\frac{b-1}{a+2}$

2. $\frac{b}{2a}$

3. -1

4. $1/5$

5. 2; 12

6. -3; 5

7. 8; $-\frac{11}{3}$

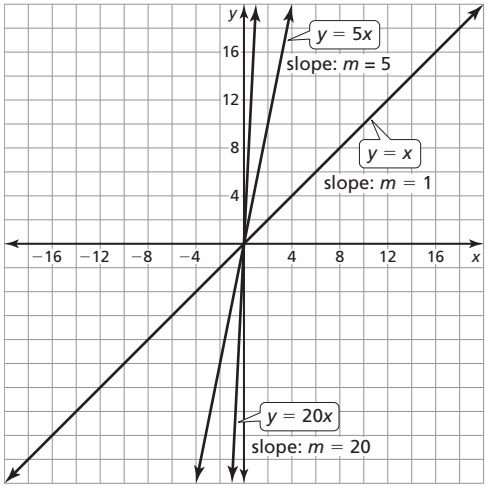
8. $-\frac{29}{5}$, $\frac{13}{2}$

3.5 Puzzle Time

PUT IT ON MY BILL

Answers

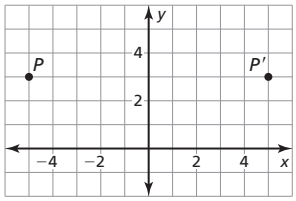
3.6 Start Thinking



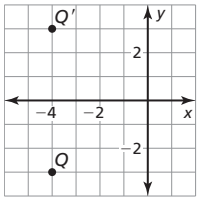
As the slope gets larger, the graph of the line becomes steeper; If the slope were changed to 100, the line would look very steep; If the slope is changed to 1000, the line will look vertical, or very close to vertical; If the number was the greatest number you could think of, the graph of the line would be only a fraction of a degree off from being vertical; This illustrates that the steeper the slope becomes, the less horizontal movement there is. As that horizontal movement approaches zero, the line becomes more and more vertical.

3.6 Warm Up

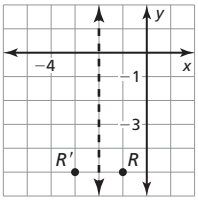
1.



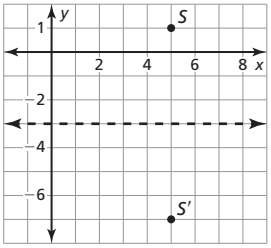
2.



3.



4.



3.6 Cumulative Review Warm Up

1. $c = 1$ **2.** $q = -1$ **3.** $g = 7$

4. $m = 8$ **5.** $w = -2$ **6.** $k = 5$

3.6 Practice A

1. The graph of g is vertical translation 2 units down of the graph of f.

2. The graph of g is a horizontal translation 1 unit left of the graph of f.

3. The graph of f is a horizontal translation 10 units right of the graph of d.

4. The graph of h is a reflection in the x-axis of the graph of f.

5. The graph of h is a reflection in the y-axis of the graph of f.

6. The graph of r is a horizontal shrink of the graph of f by a factor of $\frac{1}{3}$.

7. The graph of r is a vertical shrink of the graph of f by a factor of $\frac{1}{3}$.

8. $g(x) = f(x) - 3$ **9.** $g(x) = -f(x)$

3.6 Practice B

1. The graph of g is horizontal translation 5 units left of the graph of f.

2. The graph of g is horizontal translation 6 units right of the graph of f.

3. The graph of T is a vertical translation 20 units up of the graph of C.

4. The graph of h is a reflection in the y-axis of the graph of f.

5. The graph of h is a reflection in the x-axis of the graph of f.

6. The graph of r is a horizontal stretch of the graph of f by a factor of $\frac{5}{2}$.

7. The graph of r is a vertical stretch of the graph of f by a factor of 6.

8. The graph of g is a horizontal translation 3 units right of the graph of f.

Answers

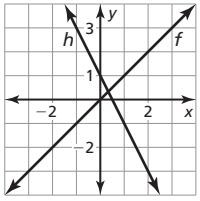
9. The graph of g is a horizontal shrink of the graph of f by a factor of $\frac{3}{4}$.

10. The graph of g is a vertical stretch of the graph of f by a factor of $\frac{1}{2}$.

11. The graph of g is a vertical translation 3 units up of the graph of f.

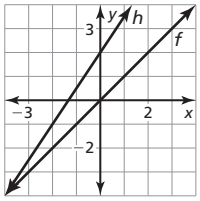
12. $g(x) = f\left(\frac{3}{2}x\right)$ **13.** $g(x) = f(x + 5)$

14.



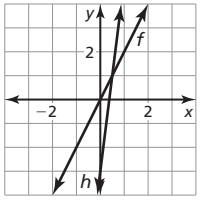
The graph of h is a reflection in the x-axis followed by a vertical stretch by a factor of 2 and a vertical translation 1 unit up of the graph of f.

15.



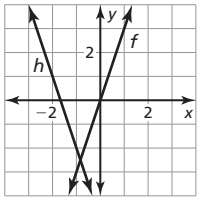
The graph of h is a vertical stretch by a factor of $\frac{3}{2}$ and a vertical translation 2 units up of the graph of f.

16.



The graph of h is a vertical stretch by a factor of 4 and a vertical translation 3 units down of the graph of f.

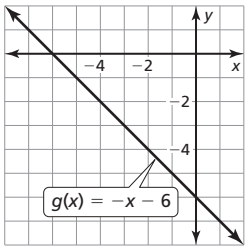
17.



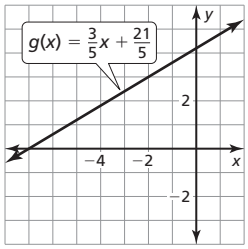
The graph of h is a reflection in the x-axis followed by a vertical translation 5 units down of the graph of f.

3.6 Enrichment and Extension

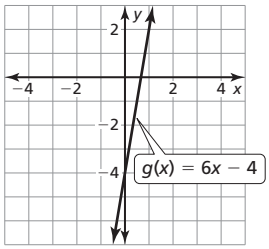
1. $g(x) = -x - 6$; -4, -6, -7



2. $g(x) = \frac{3}{5}x + \frac{21}{5}$; 3, $\frac{21}{5}$, $\frac{24}{5}$



3. $g(x) = 6x - 4$; -16, -4, 2



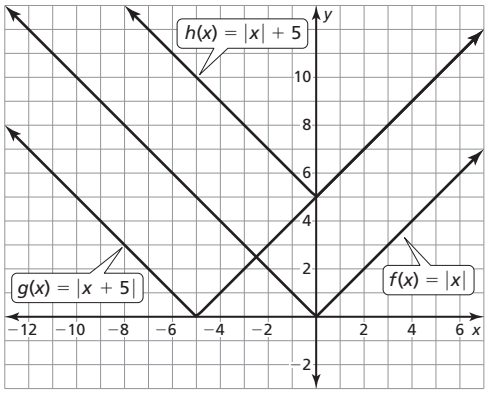
4. The coefficient of x makes the horizontal shift different; yes; Functions with this format will no longer follow the same rules. In order to find the horizontal shift you must factor out the coefficient of 2, so you have $g(x) = f\left(2\left(x - \frac{1}{2}\right)\right) - 3$. There is a horizontal shift of $\frac{1}{2}$ unit right.

3.6 Puzzle Time

GOT A MINUTE

Answers

3.7 Start Thinking



The graph of $f(x) = |x|$ is a "V" shape with its vertex at the origin; In the equation $g(x) = |x + 5|$, you must first add 5 to x, and then apply the absolute value. In the equation $h(x) = |x| + 5$, you first take the absolute value of x and then add 5 to the result. In the case of x being negative, this causes the answers to be different.

3.7 Warm Up

1. $n = 4$ or $n = 12$

2. $b = 4$ or $b = 6$

3. $z = -3$ or $z = 2$

4. $t = -12$ or $t = 2$

5. no solution

6. no solution

7. $n = -4$ or $n = 2$

8. $t = -\frac{29}{5}$ or $t = 3$

3.7 Cumulative Review Warm Up

1. $n - 7 < 12$; $n < 19$

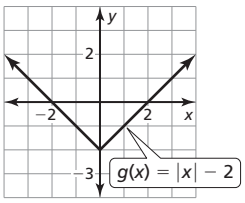
2. $n + 2 \leq -4$; $n \leq -6$

3. $n + 8 > 5$; $n > -3$

4. $5 \geq n - 16$; $n \leq 21$

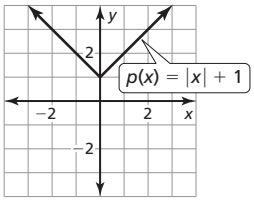
3.7 Practice A

1.



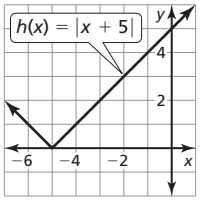
The graph of g is a vertical translation 2 units down of the graph of f; $-\infty < x < \infty$; $y \geq -2$

2.



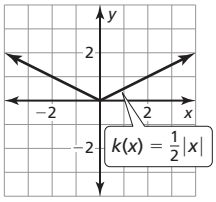
The graph of p is a vertical translation 1 unit up of the graph of f; $-\infty < x < \infty$; $y \geq 1$

3.



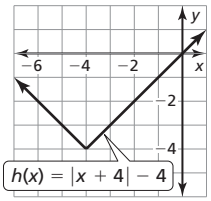
The graph of h is a horizontal translation 5 units left of the graph of f; $-\infty < x < \infty$; $y \geq 0$

4.



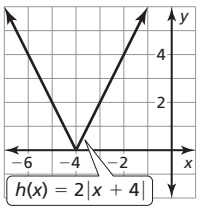
The graph of k is a vertical shrink of the graph of f by a factor of $\frac{1}{2}$; $-\infty < x < \infty$; $y \geq 0$

5.



The graph of h is a vertical translation 4 units down of the graph of f.

6.



The graph of h is a vertical stretch by a factor of 2 of the graph of f.

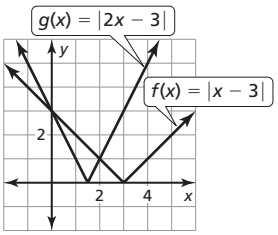
7. The graph of g is a vertical translation 3 units up of the graph of f; $k = 3$

8. The graph of h is a horizontal translation 2 units left of the graph of f; $h = -2$

Answers

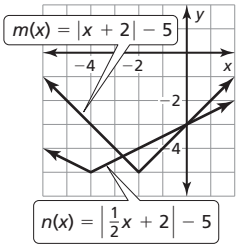
9. $h(x) = |x| + 4$ **10.** $h(x) = 3|x|$

11.



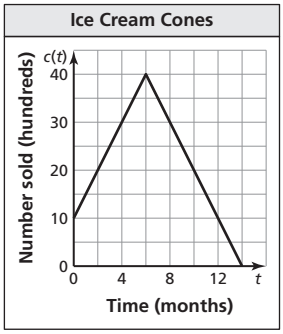
Because $g(x) = f(2x)$, the graph of g is a horizontal shrink by a factor of $\frac{1}{2}$ of the graph of f.

12.



Because $n(x) = m\left(\frac{1}{2}x\right)$, the graph of n is a horizontal stretch by a factor of 2 of the graph of m.

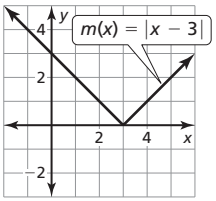
13. a.



b. 1500 ice cream cones

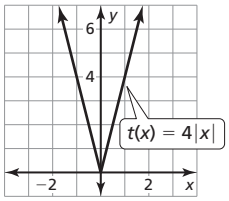
3.7 Practice B

1.



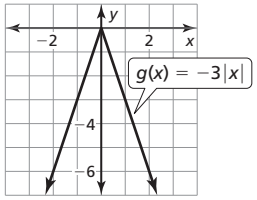
The graph of m is a horizontal translation 3 units right of the graph of f; $-\infty < x < \infty$; $y \geq 0$

2.



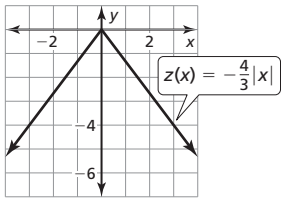
The graph of t is a vertical stretch by a factor of 4 of the graph of f; $-\infty < x < \infty$; $y \geq 0$

3.



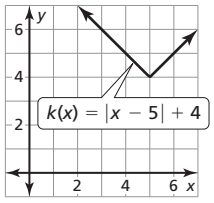
The graph of g is a reflection in the x-axis followed by a vertical stretch by a factor of 3 of the graph of f; $-\infty < x < \infty$; $y \leq 0$

4.



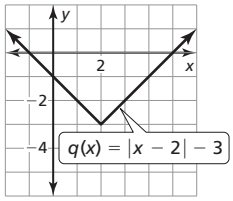
The graph of z is a reflection in the x-axis followed by a vertical stretch by a factor of $\frac{4}{3}$ of the graph of f; $-\infty < x < \infty$; $y \leq 0$

5.



The graph of k is a horizontal translation 3 units right of the graph of f.

6.



The graph of q is a vertical translation 7 units down of the graph of f.

7. The graph of s is a reflection in the x-axis followed by a vertical stretch by a factor of 2 of the graph of f; $a = -2$

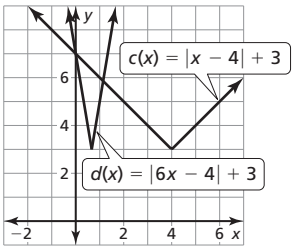
Answers

8. The graph of w is a vertical shrink by a factor of $\frac{1}{4}$ of the graph of f; $a = \frac{1}{4}$

9. $h(x) = |x - 7|$

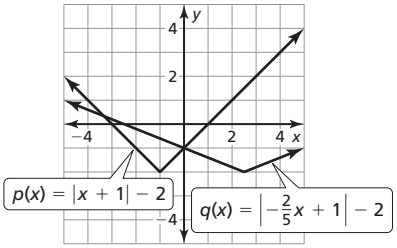
10. $h(x) = -\frac{1}{3}|x|$

11.



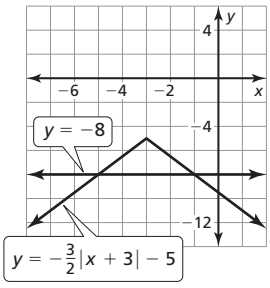
Because $d(x) = c(6x)$, the graph of d is a horizontal shrink by a factor of $\frac{1}{6}$ of the graph of c.

12.



Because $q(x) = p\left(-\frac{2}{5}x\right)$, the graph of q is a reflection in the x-axis followed by a horizontal stretch by a factor of $\frac{5}{2}$ of the graph of p.

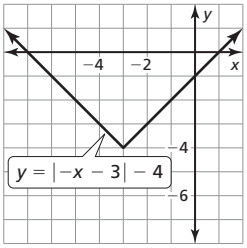
13.



$x = -1$ and $x = -5$

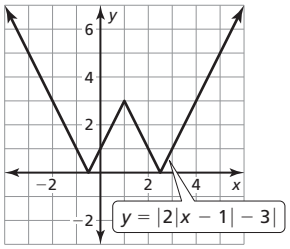
3.7 Enrichment and Extension

1.



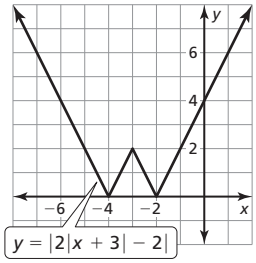
domain: $(-\infty, \infty)$, range: $[-4, \infty)$

2.



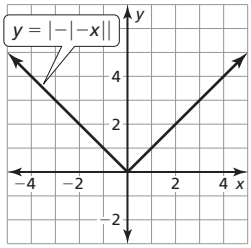
domain: $(-\infty, \infty)$, range: $[0, \infty)$

3.



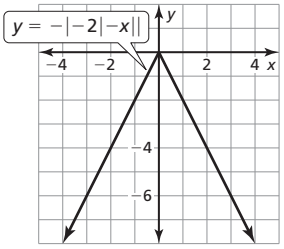
domain: $(-\infty, \infty)$, range: $[0, \infty)$

4.



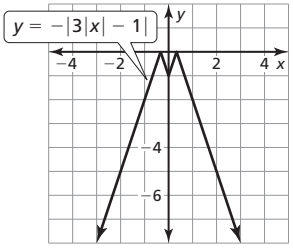
domain: $(-\infty, \infty)$, range: $[0, \infty)$

5.



domain: $(-\infty, \infty)$, range: $(-\infty, 0]$

6.



domain: $(-\infty, \infty)$, range: $(-\infty, 0]$

Answers

3.7 Puzzle Time

FISH AND CHIPS

Cumulative Review

1. $x = 37$ **2.** $b = -8$ **3.** $y = 147$

4. $h = 0$ **5.** $j = 21\pi$ **6.** $w = 1$

7. $x = -7$ **8.** $u = 3$ **9.** $z = 61$

10. $513 = 3x$; \$171 **11.** $221 = 50(4) + x$; \$21

12. $r = -11$ **13.** $x = 2$ **14.** $y = -17$

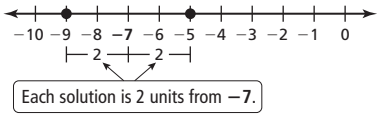
15. $z = 1$ **16.** 1300 text messages

17. infinitely many solutions

18. infinitely many solutions

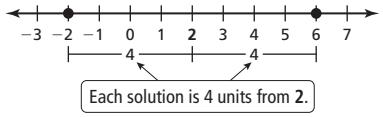
19. $x = -2$; one solution

20. $x = -9, x = -5$

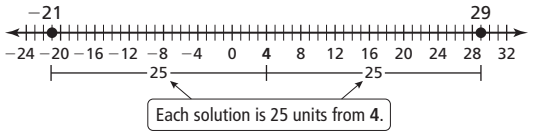


21. no solution

22. $r = -2, r = 6$



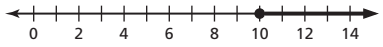
23. $y = -21, y = 29$



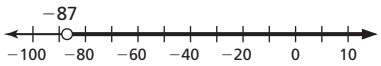
24. $|x - 70| = 0.02$; $x = 69.98$ ft-lbs and $x = 70.02$ ft-lbs

25. $n \geq 20$ **26.** $50 \leq 2h$

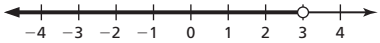
27. $b \geq 10$



28. $t > -87$



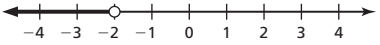
29. $z < 3$



30. $5 - x \geq 13$; $x \leq -8$

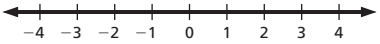
31. $x + 14 \leq 2$; $x \leq -12$

32. $w < -2$

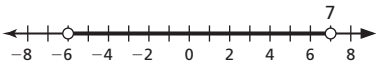


33. no solution

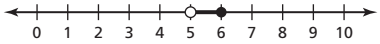
34. all real numbers



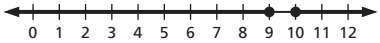
35. $-6 < n < 7$



36. $5 < w \leq 6$



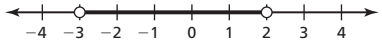
37. $t \geq 10$ or $t \leq 9$



38. no solution

39. $w \geq 3$ or $w \leq \frac{1}{3}$

40. $-3 < x < 2$



41. not a function; The input 2 has two outputs, 3 and 8.

42. function; Every input has exactly one output.

43. function; Every input has exactly one output.

44. not a function; The input 1 has two outputs, 4 and 8.

45. function; Every input has exactly one output.

46. not a function; The input -2 has two outputs, 10 and 1.

Answers

47. domain: 1, 2, 3, 4, 5; range: 2, 3, 4, 5, 6; function

48. domain: 6, 3, 1, 7; range: 2, 1, 4, 0; not a function

49. domain: $-2 \le x \le 2$, range: $-2 \le y \le 2$; not a function

50. a. x is the independent variable and y is the dependent variable.

b. domain: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10; range: 44, 41, 38, 35, 32, 29, 26, 23, 20, 17, 14

51. linear; The rate of change is constant.

52. nonlinear; The rate of change is not constant.

53. nonlinear; The graph is not a line.

54. linear; The graph is a line.

55. nonlinear; The graph is not a line.

56. $-8, -5, -1$

57. 22, 7, −13

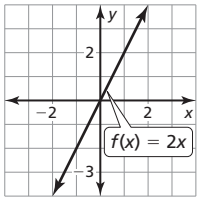
58. $-3, -9, -17$

59. -8

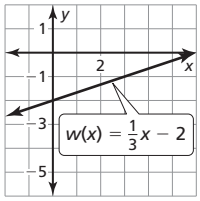
60. 6

61. 8

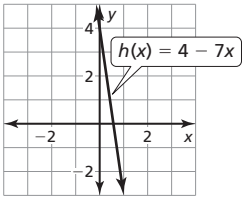
62.



63.



64.



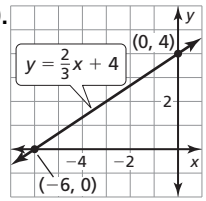
65. a. 36 mi/h **b.** 2 h

66. (4, 0) and (0, 2)

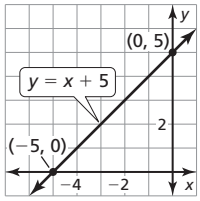
67. $\left(-\frac{21}{2}, 0\right)$ and (0, 3)

68. (−13, 0) and $\left(0, \frac{13}{3}\right)$

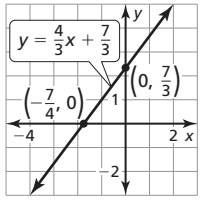
69.



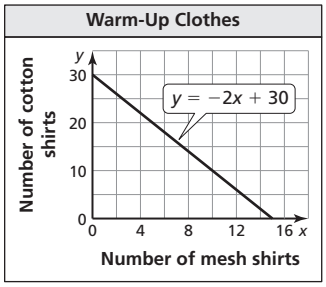
70.



71.



72. a.



The x-intercept shows that you can order 15 mesh shirts and no cotton shirts, and the y-intercept shows that you can order 30 cotton shirts and no mesh shirts.

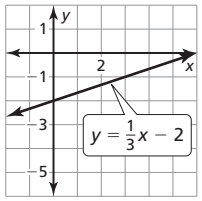
b. 13 mesh shirts

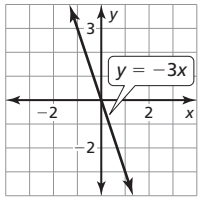
73. $m = 3$

74. $m = 2$

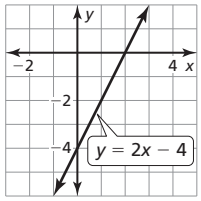
75. $m = \frac{1}{3}, b = -2$

76. $m = -3, b = 0$





77. $m = 2, b = -4$



78. The graph of g is a horizontal stretch of the graph of f by a factor of 9.

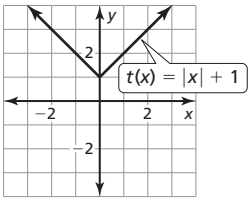
79. The graph of g is a vertical translation 8 units down of the graph of f.

80. $g(x) = 3f(x)$

Answers

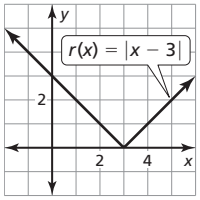
81. $g(x) = f(x - 4)$

82.



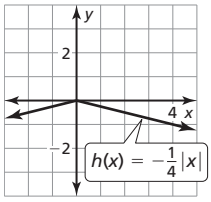
The function t is of the form $y = f(x) + k$, where $k = 1$. So, the graph of t is a vertical translation 1 unit up of the graph of f; domain: all real numbers, range: $y \geq 1$

83.



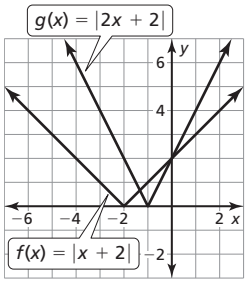
The function r is of the form $y = f(x - h)$, where $h = 3$. So, the graph of r is a horizontal translation 3 units right of the graph of f; domain: all real numbers, range: $y \geq 0$

84.



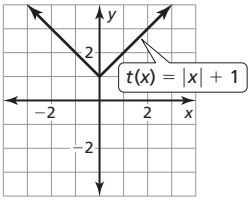
The function h is of the form $y = -af(x)$ where $a = \frac{1}{4}$. So, the graph of h is a vertical shrink of the graph of f by a factor of $\frac{1}{4}$ and a reflection in the x-axis; domain: all real numbers, range: $y \leq 0$

85.



The graph of g is a horizontal shrink of the graph of f by a factor of $\frac{1}{2}$. The y-intercepts are the same for both graphs and the points on the graph of f move halfway closer to the y-axis.

86.



The graph of t is a horizontal shrink of the graph of h by a factor of $\frac{1}{3}$. The y-intercepts are the same for both graphs and the points on the graph of t move one-third of the way closer to the y-axis.

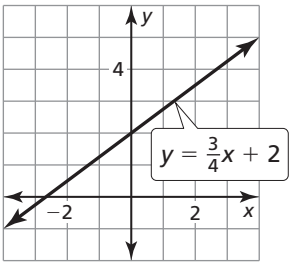
Chapter 4

4.1 Start Thinking

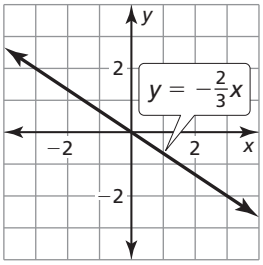
The slope and y-intercept of the equation; The graph passes through the origin; The graph shows that $y = x$ for all values of x.

4.1 Warm Up

1.



2.



3.