Chapter 1

Check Your Understanding Section 1.1

Practise

1. Identify the values of the parameters h and k for each of the following functions.

   a) $y = f(x - 10)$ $h =$ ______ $k =$ ______

   b) $y - 3 = f(x + 2)$ $h =$ ______ $k =$ ______

   c) $y = f(x - 17) + 13$ $h =$ ______ $k =$ ______

   d) $y + 7 = (x + 1)^2$ $h =$ ______ $k =$ ______

   e) $y - 4 = |x|$ $h =$ ______ $k =$ ______

You may need to rearrange the equation before answering.

2. Given $h = 2$ and $k = -5$, write an equation for each transformed function $y - k = f(x - h)$.

   a) $f(x) = x^2$

   b) $f(x) = |x|$

   c) $f(x) = \frac{1}{x}$

3. Describe, using mapping notation, how the graphs of the following functions can be obtained from the graph of $y = f(x)$. Then, describe each transformation in words.

   a) $y = f(x - 25)$ $(x, y) \rightarrow$ ______

   This represents a ______ translation ______ by ______ units.
   (*horizontal* or *vertical*) (*right/left/up/down*)

   b) $y + 50 = f(x)$ $(x, y) \rightarrow$ ______

   This represents a ______ translation ______ by ______ units.
   (*horizontal* or *vertical*) (*right/left/up/down*)

   c) $y - 10 = f(x + 20)$ $(x, y) \rightarrow$ ______

   This represents a ______.

See also #8 on page 13 of *Pre-Calculus 12*.

4. Given the graph of $y = f(x)$, graph the transformed function on the same set of axes. Write the transformation using mapping notation.

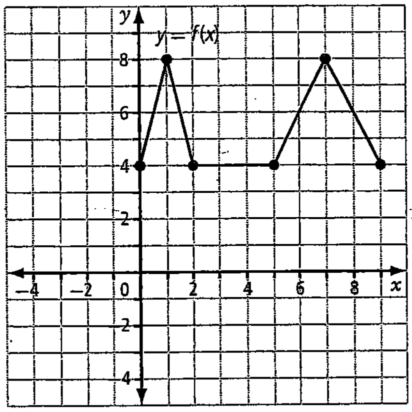
a) Graph $y + 7 = f(x + 2)$.

$h =$ ________ means a horizontal translation ________ units to the ________.
(*left* or *right*)

$k =$ ________ means a vertical translation ________ units ________.
(*up* or *down*)

Key points: (x, y) maps to $(x + h, y + k)$

(x, y)	$\rightarrow$	$(x + h, y + k)$
(0, 4)	$\rightarrow$	

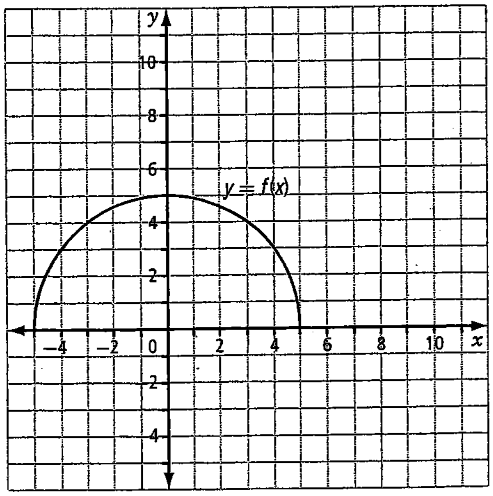


Verify that your mapping is correct by checking that the translated function is congruent to the base.

b) Graph $y + 2 = f(x - 5)$.

Key points:

(x, y)	$\rightarrow$	$(x + h, y + k)$



Apply

5. The graph of the function $f(x) = x^2$ is translated 6 units to the right and 4 units down to form the transformed function $y = g(x)$.

   a) Identify the values of the parameters h and k. $h =$ ______ $k =$ ______

   b) Write the transformation $f(x) \rightarrow g(x)$ using mapping notation.

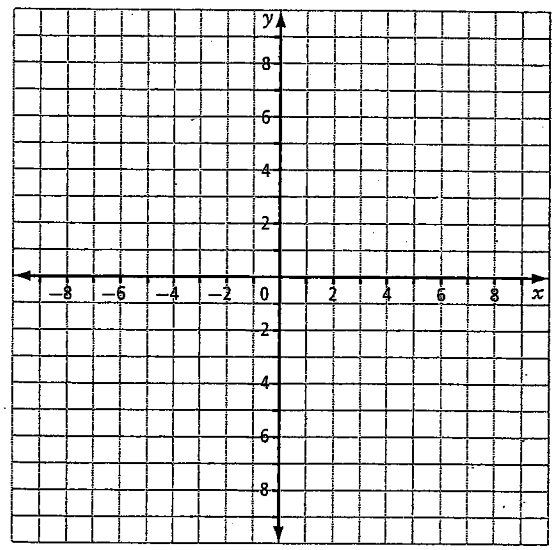
   ____

   c) Determine the equation of the function $y = g(x)$. ____________________

   d) Graph $f(x)$ and $g(x)$ on the same set of axes.

   Key points:

(x, y)	$\rightarrow$	$(x + h, y + k)$



   e) Compare the vertex of $f(x)$ to that of $g(x)$. What do you notice?

   Vertex of $f(x)$: Vertex of $g(x)$:

   f) Compare the domain and range of $f(x)$ to those of $g(x)$. What do you notice?

   Domain of $f(x)$: Domain of $g(x)$:

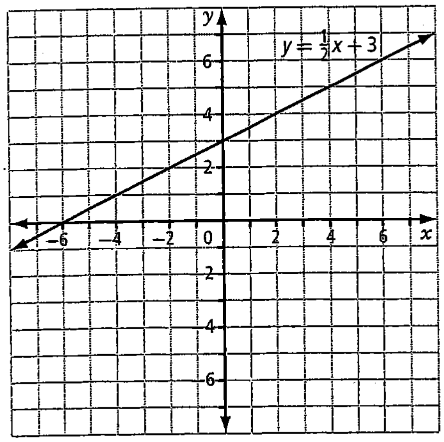
   Range of $f(x)$: Range of $g(x)$:

Check Your Understanding Section 6.2

Practise

1. Graph the horizontal reflection (reflection in the y-axis) of each function. State the equation of the reflected function in simplified form. Note any features of the function that change and any that stay the same.

a)



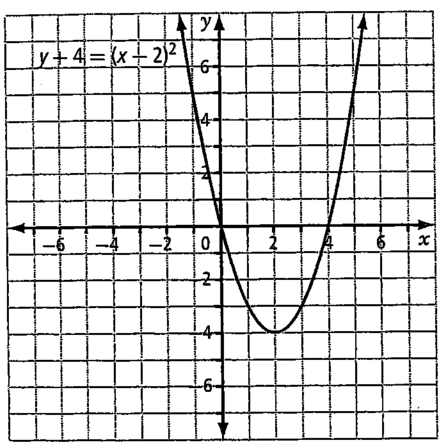
Equation of function: $y = \frac{1}{2}x + 3$

Equation of reflected function:

____

Notes:

b)



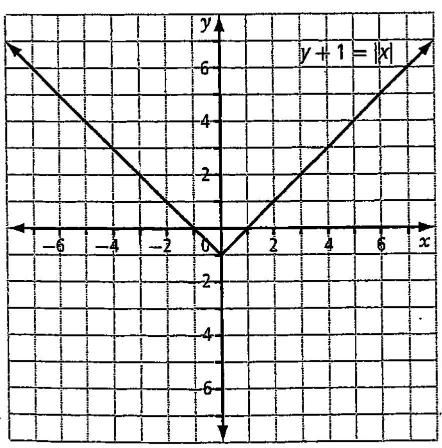
Equation of function: $y + 4 = (x - 2)^2$

Equation of reflected function:

____

Notes:

c)



Equation of function: $y + 1 = |x|$

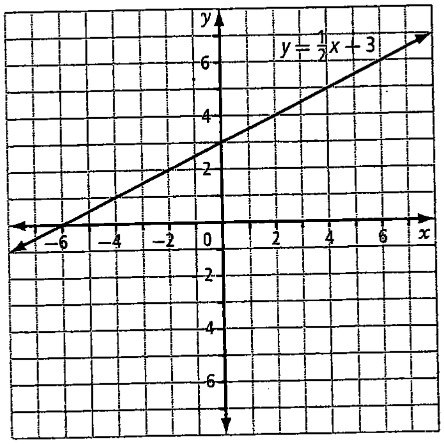
Equation of reflected function:

____

Notes:

2. Graph the vertical reflection (reflection in the x-axis) of each function. State the equation of the reflected function in simplified form. Note any features of the function that change and any that stay the same.

a)



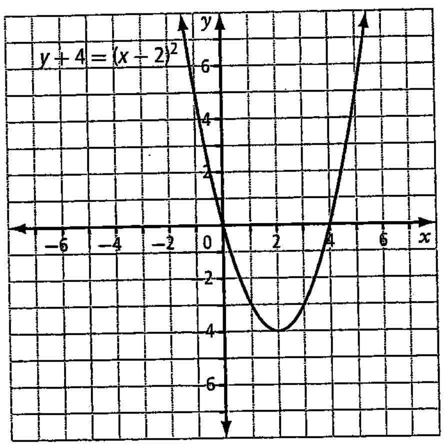
Equation of function: $y = \frac{1}{2}x + 3$

Equation of reflected function:

____

Notes:

b)



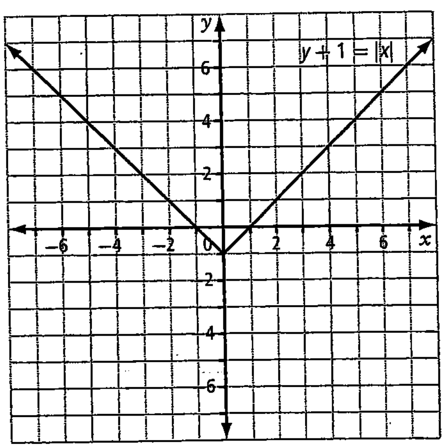
Equation of function: $y + 4 = (x - 2)^2$

Equation of reflected function:

____

Notes:

c)



Equation of function: $y + 1 = |x|$

Equation of reflected function:

____

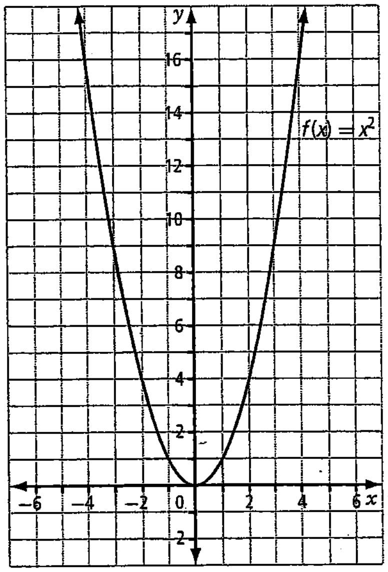
Notes:

3. Given $f(x) = x^2$, graph the following transformations. Give the equation and mapping notation for each transformation.

a) vertical stretch by a factor of $\frac{1}{4}$

Key points: (x, y) maps to (x, ay)

(x, y)	→	
$(0, 0)$	→	
$(\pm 1, 1)$	→	
$(\pm 2, 4)$	→	
$(\pm 3, 9)$	→	
$(\pm 4, 16)$	→	

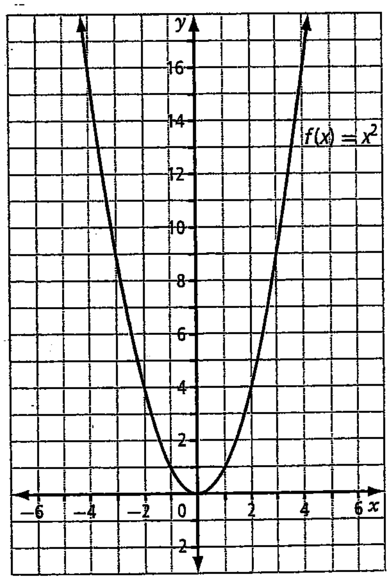


Equation: ______________________

b) horizontal stretch by a factor of 2 (b = reciprocal of the stretch factor)

Key points: (x, y) maps to $\left(\frac{1}{b}x, y\right)$

(x, y)	→	
$(0, 0)$	→	
$(\pm 1, 1)$	→	
$(\pm 2, 4)$	→	
$(\pm 3, 9)$	→	
$(\pm 4, 16)$	→	



Equation: ______________________

4. Compare your answers in parts a) and b) of #3.

a) Show algebraically why both transformations result in the same transformed function.

b) Give another example of a pair of horizontal and vertical stretches that would result in the same transformed function.

Check Your Understanding Section 1.3

Practise

You may need to factor the equation before answering.

1. Describe, in order, the transformations represented by each equation.

   a) $y + 5 = 4f(-x)$

   i)

   ii)

   iii)

   b) $y = -f(2x + 14)$

   i)

   ii)

   iii)

   c) $y = 1.75f[0.25(x - 1.5)]$

   i)

   ii)

   iii)

   d) $y - 3 = -\frac{1}{2}f(-3x - 3)$

   i)

   ii)

   iii)

2. Determine the equation of each transformed function.

   a) $y = f(x)$ is stretched horizontally by a factor of 6, reflected in the x-axis, and translated 7 units down.

   b) $y = |x|$ is reflected in the y-axis, stretched vertically by a factor of $\frac{1}{2}$, and translated 3 units to the right.

   c) $y = x^2$ is reflected in the x-axis, stretched horizontally by a factor of 3, and translated so that the vertex is at $(10, -4)$.

3. The key point $(1, 10)$ is on the graph of $y = f(x)$. Determine the coordinates of its image point under each transformation.

   a) $y + 4 = f(x - 5)$

   $(x, y) \rightarrow$

   $(1, 10) \rightarrow$

   b) $y = -f(x + 12)$

   $(x, y) \rightarrow$

   $(1, 10) \rightarrow$

   c) $y = 3f(-0.5x + 10)$

   $(x, y) \rightarrow$

   $(1, 10) \rightarrow$

This is similar to #6 on page 39 of *Pre-Calculus 12*.

4. If the key point $(-2, -8)$ is on the graph of $y = f(x)$, determine the coordinates of its image point under each of the transformations in #3.

Apply

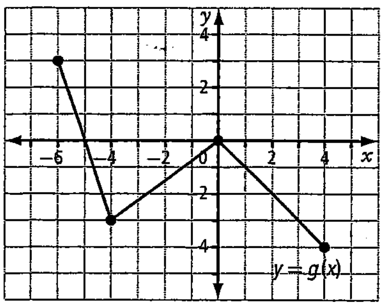
5. The graph of the function $y = g(x)$ is given. Graph each of the following transformations of the function. Show each stage of the transformation in a different colour.

a) $y + 2 = -g(2x)$

i)

ii)

iii)

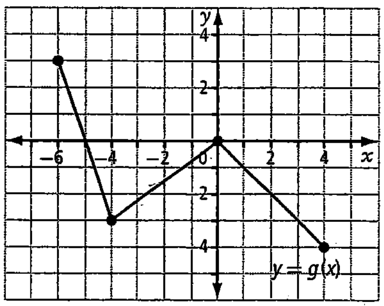


b) $y = g(-4x + 12)$

i)

ii)

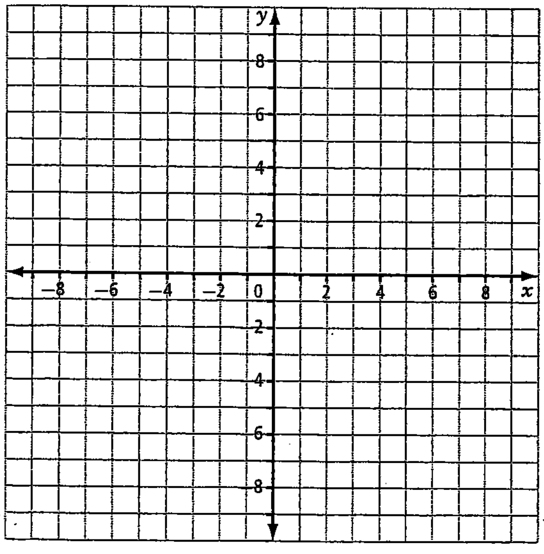
iii)



6. The graph of the function $f(x) = |x|$ is stretched vertically by a factor of 2, reflected in the x-axis, and translated 6 units to the left and 3 units down to form the transformed function $y = g(x)$.

a) Determine the equation of the function $y = g(x)$.

b) Graph $y = g(x)$.

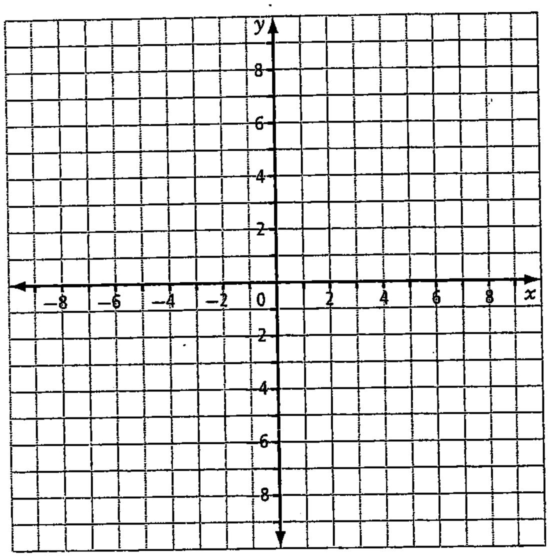


Start by graphing the base function $y = f(x)$.

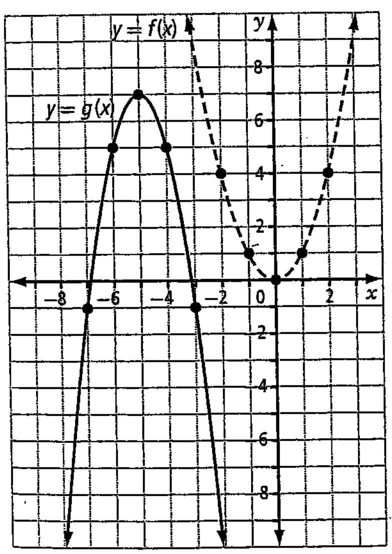
7. The graph of the function $f(x) = \frac{1}{x}$ is stretched horizontally by a factor of 4, reflected in the x-axis, and translated 4 units to the right and 1 unit down to form the transformed function $y = g(x)$.

a) Determine the equation of the function $y = g(x)$.

b) Graph $y = g(x)$.

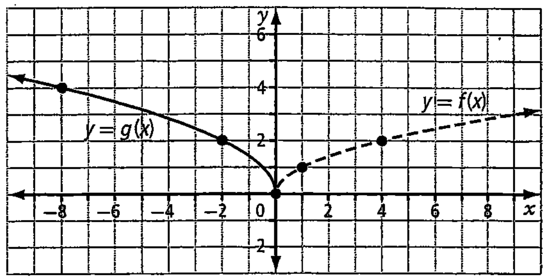


8. Determine an equation for $g(x)$ of the form $y - k = af(b(x - h))$ given the graphs of $y = f(x)$ and the transformed function $y = g(x)$.



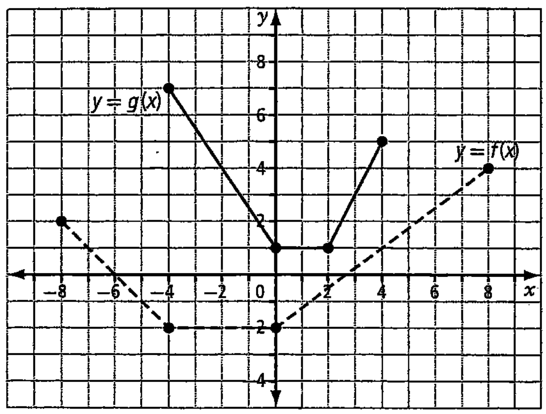
Equation:

9. Determine an equation for $g(x)$ of the form $y - k = af(b(x - h))$ given the graphs of $y = f(x)$ and the transformed function $y = g(x)$.



Equation:

10. Determine an equation of the form $y - k = af(b(x - h))$ given the following graphs of $y = f(x)$ and of the transformed function $y = g(x)$.



Consider each of the possible types of transformations in reverse order: translations, vertical stretches and reflections, and horizontal stretches and reflections.

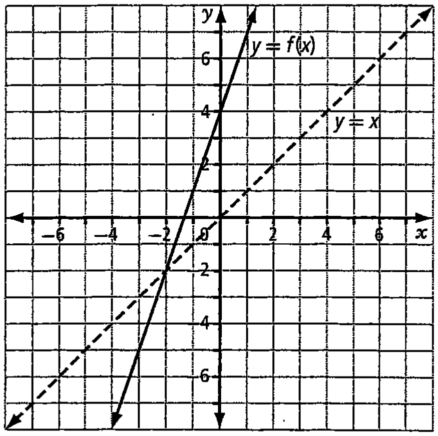
For additional similar questions, see #10 on page 40 of *Pre-Calculus 12*.

Check Your Understanding Section 1.4

Practise

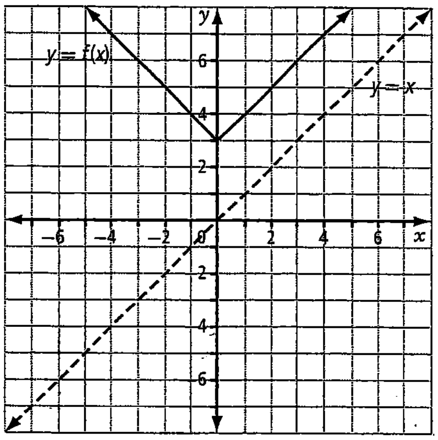
1. Graph the inverse relation of each function below. Determine whether the inverse is a function. Identify any invariant points.

a)



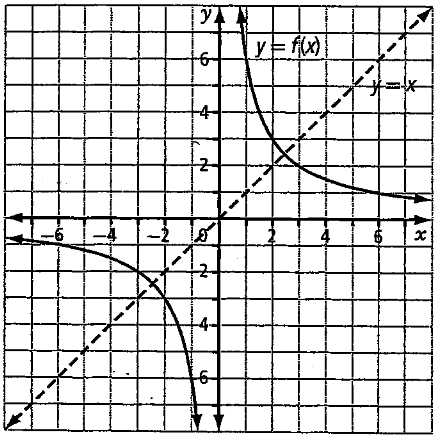
The inverse of $f(x)$ ________ a function.
(*is* or *is not*)

b)



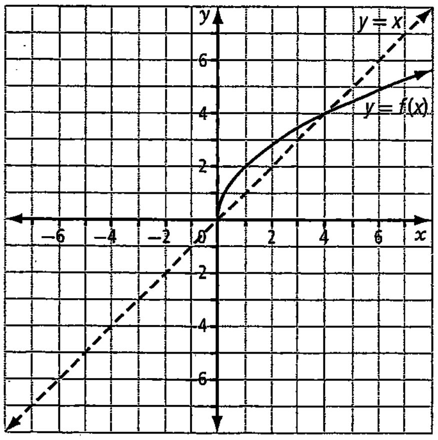
The inverse of $f(x)$ ________ a function.
(*is* or *is not*)

c)



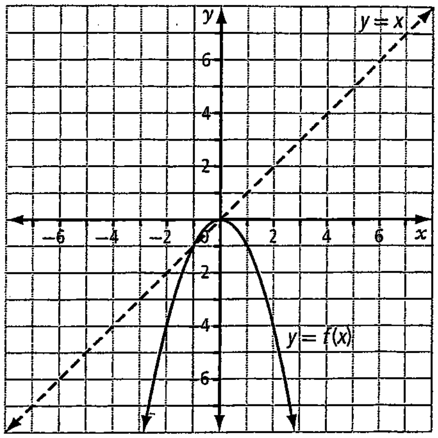
The inverse of $f(x)$ ________ a function.
(*is* or *is not*)

d)



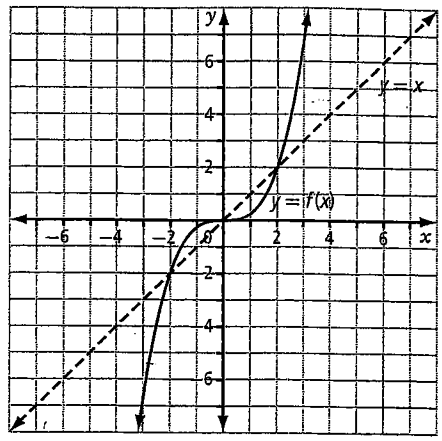
The inverse of $f(x)$ ________ a function.
(*is* or *is not*)

e)



The inverse of $f(x)$ ________ a function.
(*is* or *is not*)

f)



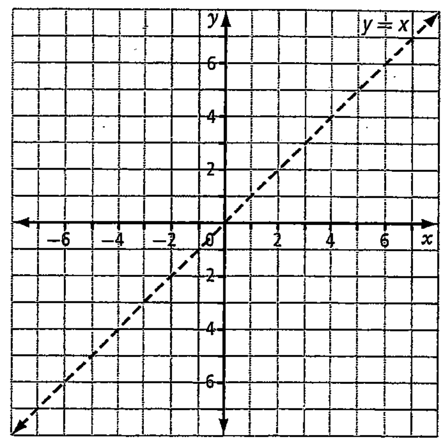
The inverse of $f(x)$ ________ a function.
(*is* or *is not*)

2. Determine algebraically the inverse of each function. Verify by sketching the graph of the function and its inverse.

a) $f(x) = x - 4$

Steps:

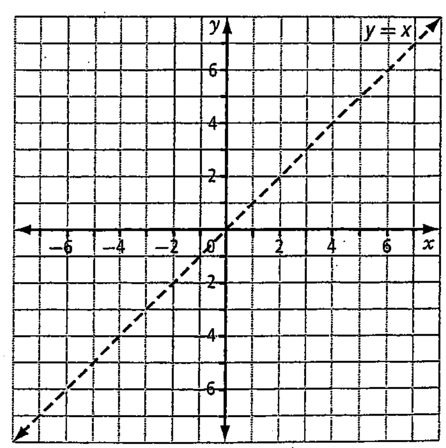
1. Substitute y for $f(x)$.
2. Interchange x and y.
3. Solve for y.



4. Restrict the domain if necessary. Then, substitute $f^{-1}(x)$ for y.

The inverse of $f(x) = x - 4$ is $f^{-1}(x) =$ ____________.

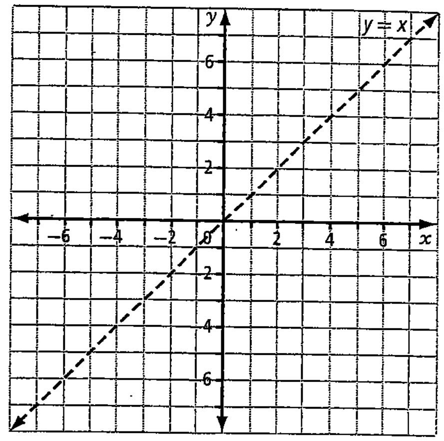
b) $f(x) = -6x - 2$



The inverse of $f(x) = -6x - 2$ is

$f^{-1}(x) =$ ____________.

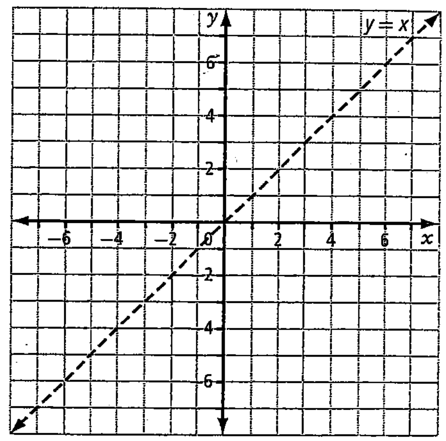
c) $f(x) = \frac{3}{5}x - 3$



The inverse of $f(x) = \frac{3}{5}x - 3$ is

$f^{-1}(x) =$ ________________.

d) $f(x) = \frac{1}{2}(x + 6)$

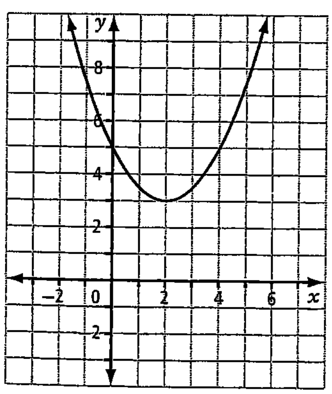


The inverse of $f(x) = \frac{1}{2}(x + 6)$ is

$f^{-1}(x) =$ ________________.

3. For each graph, identify a restricted domain for which the function has an inverse that is also a function.

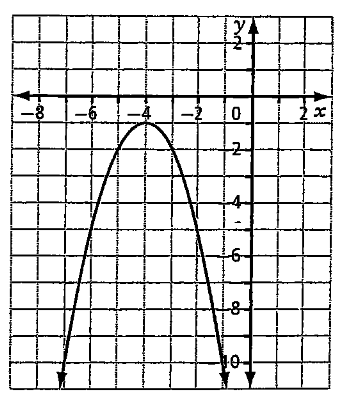
a)



Axis of symmetry: ________________

Domain: ________________

b)

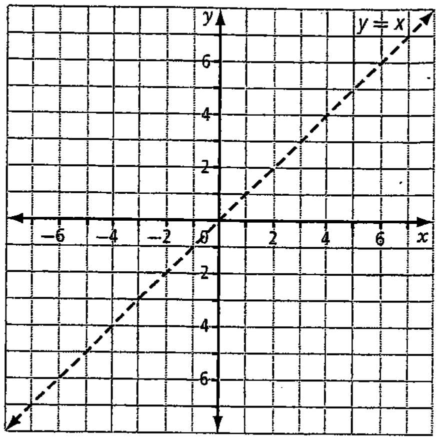


Axis of symmetry: ________________

Domain: ________________

4. Determine algebraically the inverse of each function. Restrict the domain of the base function so that the inverse is a function. Verify by sketching the graph of the function and its inverse.

a) $f(x) = -x^2 + 6$



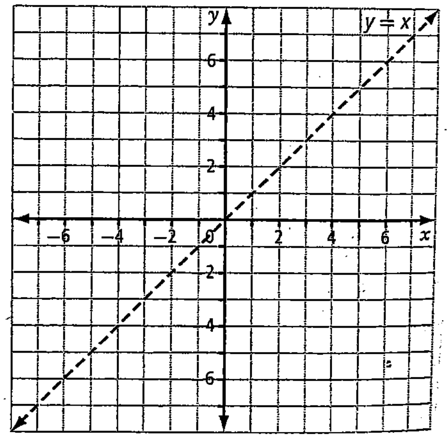
Steps:

1. Substitute y for $f(x)$.
2. Interchange x and y.
3. Solve for y.

4. Restrict the domain if necessary. Then, substitute $f^{-1}(x)$ for y.

The inverse of $f(x) = -x^2 + 6$, ________________, is $f^{-1}(x) =$ ____________________.

b) $f(x) = \frac{1}{2}x^2 + 4$



Steps:

1. Substitute y for $f(x)$.
2. Interchange x and y.
3. Solve for y.

4. Restrict the domain if necessary. Then, substitute $f^{-1}(x)$ for y.

The inverse of $f(x) = \frac{1}{2}x^2 + 4$, ________________, is $f^{-1}(x) =$ ____________________

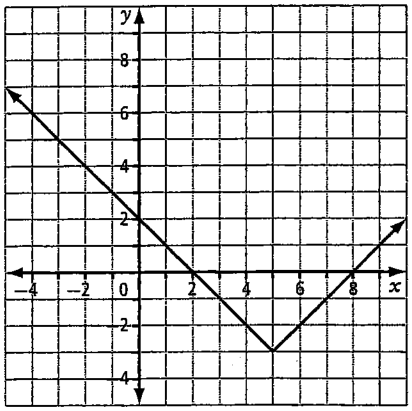
For more practice with quadratics, try #12 on page 54 of *Pre-Calculus 12*.

Chapter 1 Review

1.1 Horizontal and Vertical Translations, pages 1–8

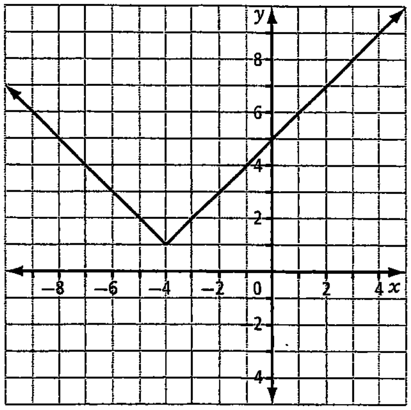
1. Write an equation to represent each translation of the function $y = |x|$.

a)



Equation: ________________

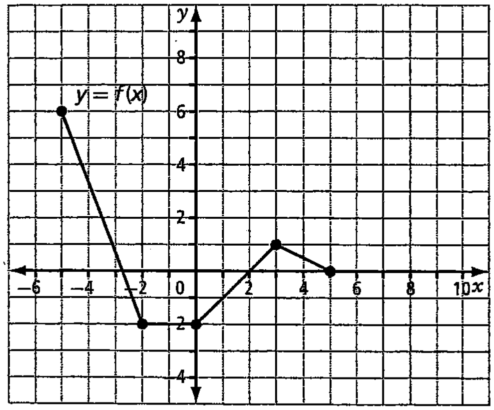
b)



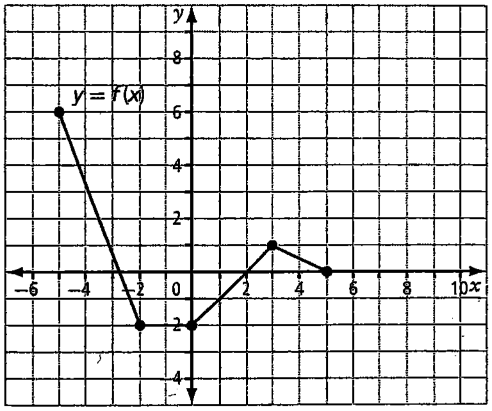
Equation: ________________

2. For $y = f(x)$ as shown, graph the following.

a) $y - 2 = f(x - 3)$



b) $y + 2 = f(x + 1)$



1.2 Reflections and Stretches, pages 9–17

3. The key point $(12, -5)$ is on the graph of $y = f(x)$. Determine the coordinates of its image point under each transformation.

a) $y = -f(x)$

$(x, y) \rightarrow$

$(12, -5) \rightarrow$

b) $y = f(-4x)$

$(x, y) \rightarrow$

$(12, -5) \rightarrow$

c) $y = 2f\left(\frac{1}{3}x\right)$

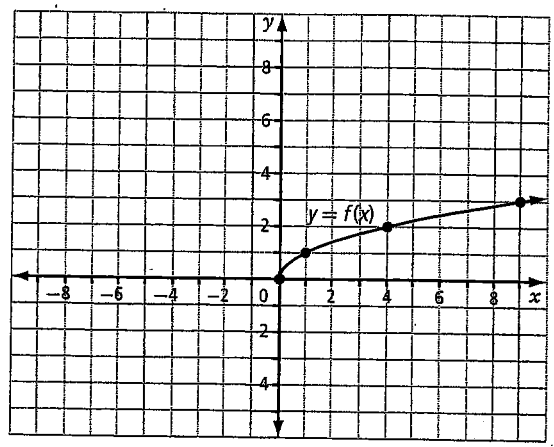
$(x, y) \rightarrow$

$(12, -5) \rightarrow$

4. Describe the following transformations of $y = f(x)$ and sketch a graph of each transformation.

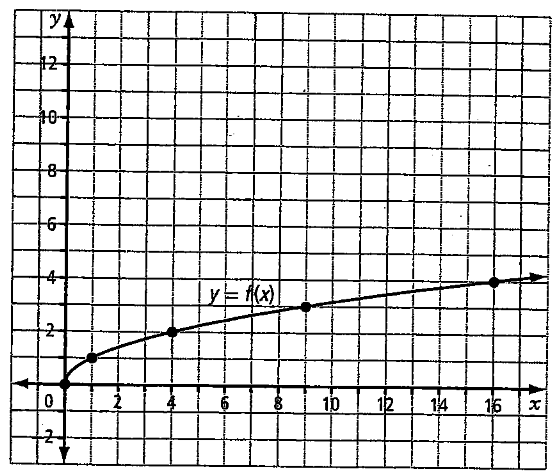
a) $y = -f(-x)$

Description:



b) $y = 3f(2x)$

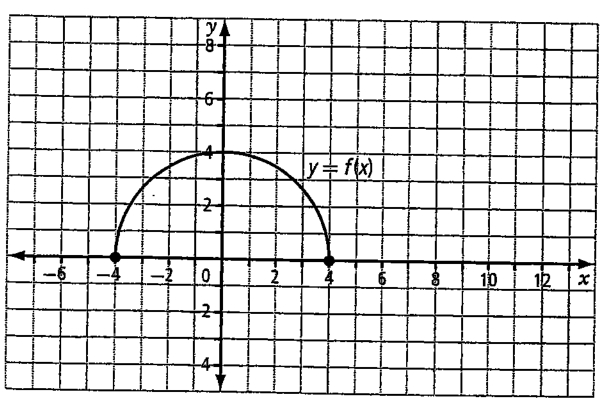
Description:



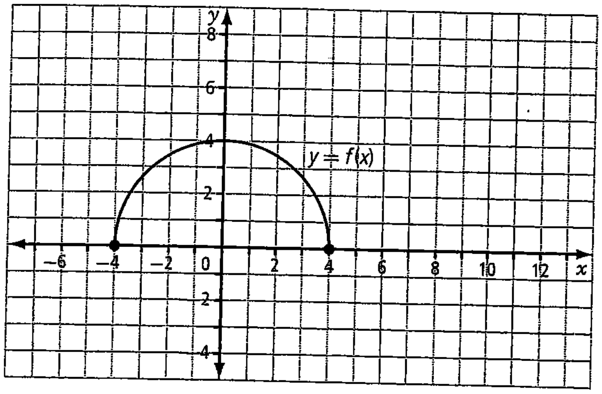
1.3 Combining Transformations, pages 18–25

5. The graph of the function $y = f(x)$ is given. Graph each of the following transformations of the function. Show each stage of the transformation in a different colour.

a) $y - 5 = \frac{1}{2}f\left(\frac{2}{3}(x - 6)\right)$



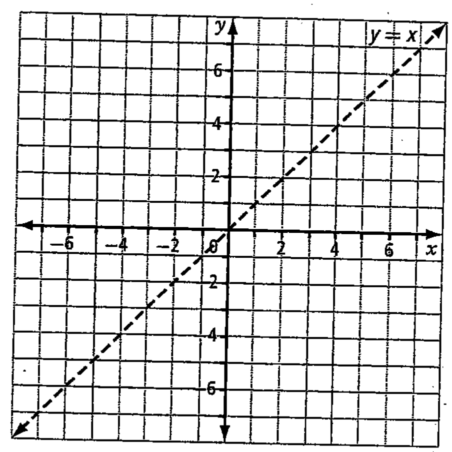
b) $y = -f(4x + 12)$



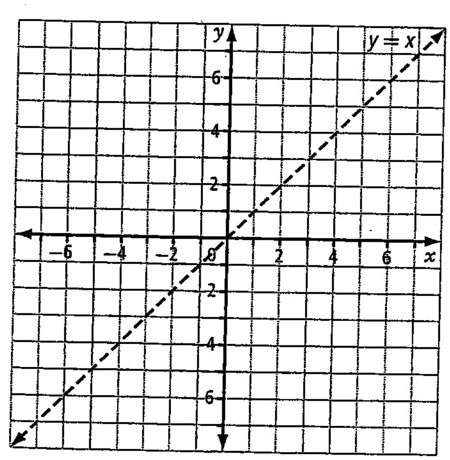
1.4 Inverse of a Relation, pages 26–34

6. Determine algebraically the inverse of each function. If necessary, restrict the domain so that the inverse of $f(x)$ is also a function. Verify by sketching the graph of the function and its inverse.

a) $f(x) = -\frac{1}{2}x + 5$



b) $f(x) = 2(x - 1)^2$



Answers

Chapter 1

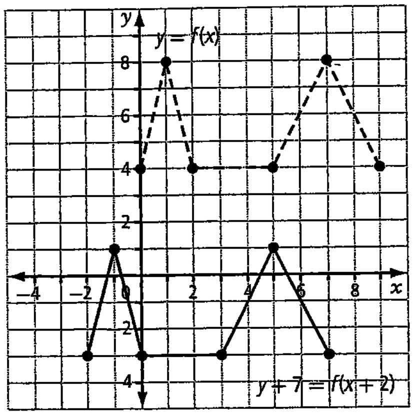
1.1 Horizontal and Vertical Translations, pages 1–8

1. **a)** $h = 10, k = 0$ **b)** $h = -2, k = 3$
c) $h = 17, k = 13$ **d)** $h = -1, k = -7$
e) $h = 0, k = 4$

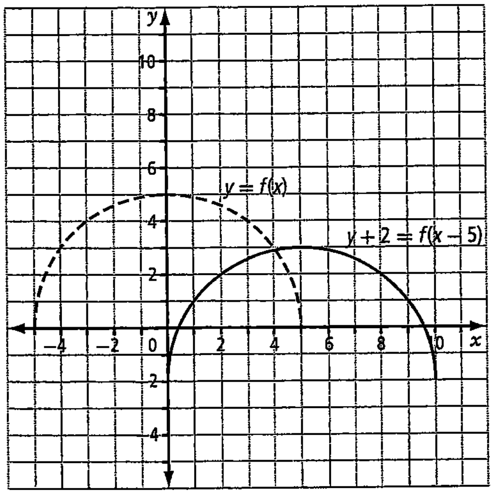
2. **a)** $y + 5 = (x - 2)^2$ **b)** $y + 5 = |x - 2|$
c) $y + 5 = \frac{1}{x - 2}, x \neq 2$

3. **a)** $(x, y) \rightarrow (x + 25, y)$; horizontal translation 25 units to the right
b) $(x, y) \rightarrow (x, y - 50)$; vertical translation 50 units down
c) $(x, y) \rightarrow (x - 20, y + 10)$; horizontal translation 20 units to the left and vertical translation 10 units up

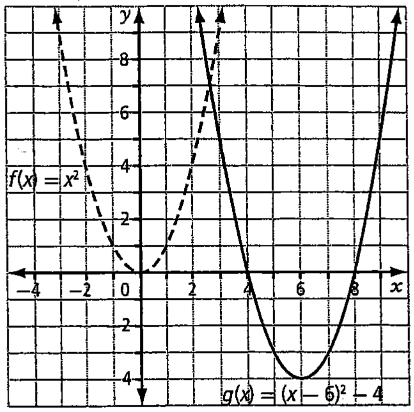
4. **a)** $(x, y) \rightarrow (x - 2, y - 7)$



b) $(x, y) \rightarrow (x + 5, y - 2)$

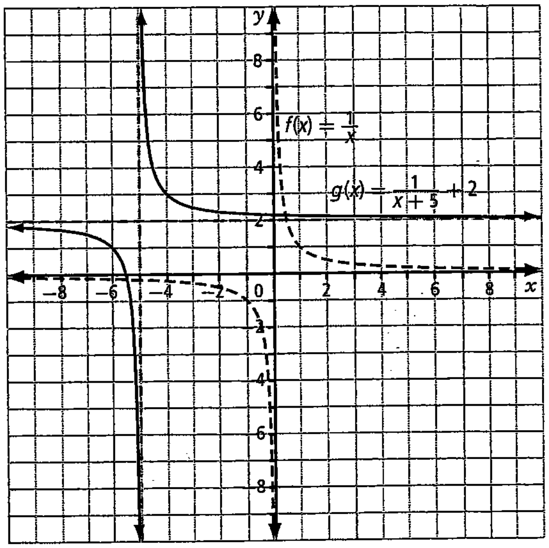


5. **a)** $h = 6, k = -4$ **b)** $(x, y) \rightarrow (x + 6, y - 4)$
c) $y = (x - 6)^2 - 4$
d)



e) (0, 0), (6, −4); vertex has coordinates (h, k)
f) domain of each function: $\{x \mid x \in \mathrm{R}\}$; range of $f(x)$: $\{y \mid y \geq 0, y \in \mathrm{R}\}$, range of $g(x)$: $\{y \mid y \geq -4, y \in \mathrm{R}\}$; in general, the range is $\{y \mid y \geq k, y \in \mathrm{R}\}$

6. **a)** $h = -5, k = 2$ **b)** $(x, y) \rightarrow (x - 5, y + 2)$
c) $y = \frac{1}{x + 5} + 2$
d)



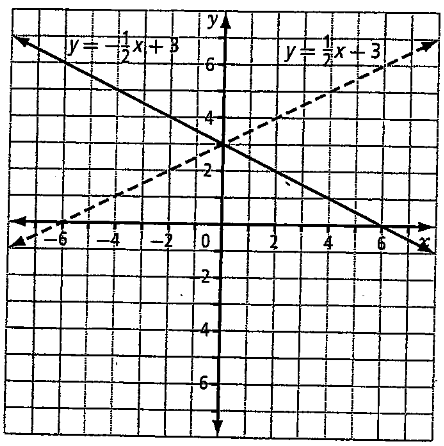
e) For $f(x)$: domain $\{x \mid x \neq 0, x \in \mathrm{R}\}$, range $\{y \mid y \neq 0, y \in \mathrm{R}\}$, asymptotes $y = 0$, $x = 0$; For $g(x)$: domain $\{x \mid x \neq -5, x \in \mathrm{R}\}$, range $\{y \mid y \neq 2, y \in \mathrm{R}\}$, asymptotes $y = 2$, $x = -5$; restriction on the domain of $g(x)$ is $x \neq h$, restriction on the range of $g(x)$ is $y \neq k$, asymptotes are at $x = h$ and $y = k$

7.

Function	Horizontal Translation: to the right 1 unit	Horizontal Translation: to the left 3 units	Vertical Translation: up 2 units	Vertical Translation: down 4 units
Quadratic $y = x^2$	$y = (x - 1)^2$ $(x, y) \rightarrow (x + 1, y)$ vertex at (1, 0)	$y = (x + 3)^2$ $(x, y) \rightarrow (x - 3, y)$ vertex at (−3, 0)	$y - 2 = x^2$ $(x, y) \rightarrow (x, y + 2)$ vertex at (0, 2)	$y + 4 = x^2$ $(x, y) \rightarrow (x, y - 4)$ vertex at (0, −4)
Absolute value $y = \|x\|$	$y = \|x - 1\|$ $(x, y) \rightarrow (x + 1, y)$ vertex at (1, 0)	$y = \|x + 3\|$ $(x, y) \rightarrow (x - 3, y)$ vertex at (−3, 0)	$y - 2 = \|x\|$ $(x, y) \rightarrow (x, y + 2)$ vertex at (0, 2)	$y + 4 = \|x\|$ $(x, y) \rightarrow (x, y - 4)$ vertex at (0, −4)
Reciprocal $y = \frac{1}{x}$	$y = \frac{1}{x - 1}$ $(x, y) \rightarrow (x + 1, y)$ vertical asymptote; $x = 1$; horizontal asymptote: $y = 0$	$y = \frac{1}{x + 3}$ $(x, y) \rightarrow (x - 3, y)$ vertical asymptote; $x = -3$; horizontal asymptote: $y = 0$	$y - 2 = \frac{1}{x}$ $(x, y) \rightarrow (x, y + 2)$ vertical asymptote; $x = 0$; horizontal asymptote: $y = 2$	$y + 4 = \frac{1}{x}$ $(x, y) \rightarrow (x, y - 4)$ vertical asymptote; $x = 0$; horizontal asymptote: $y = -4$
Any function $y = f(x)$	$y = f(x - 1)$ $(x, y) \rightarrow (x + 1, y)$	$y = f(x + 3)$ $(x, y) \rightarrow (x - 3, y)$	$y - 2 = f(x)$ $(x, y) \rightarrow (x, y + 2)$	$y + 4 = f(x)$ $(x, y) \rightarrow (x, y - 4)$

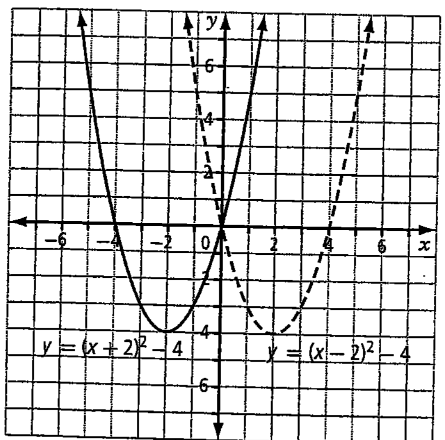
1.2 Reflections and Stretches, pages 9–17

1. a)



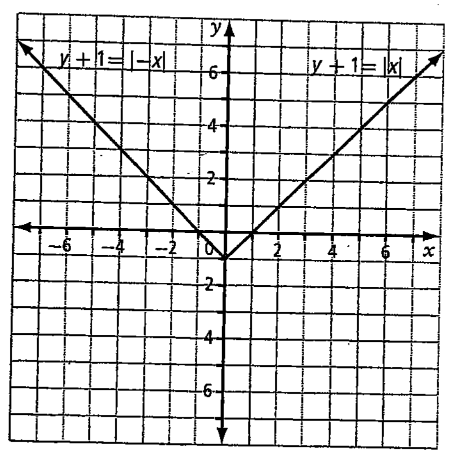
$y = -\frac{1}{2}x + 3$; same y-intercept, different x-intercepts, opposite slopes, same domain and range

b)



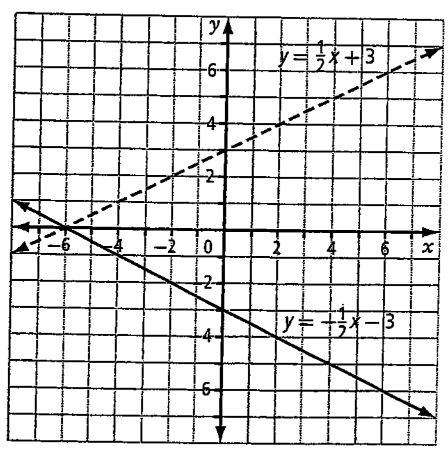
$y + 4 = (x + 2)^2$; same y-intercept, different x-intercepts, same domain and range, same shape, same orientation, vertex has opposite x-coordinate (h) but same y-coordinate (k)

c)



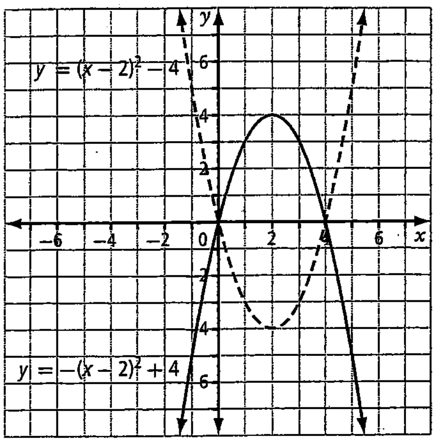
$y + 1 = |-x|$; reflection maps to the original graph

2. a)



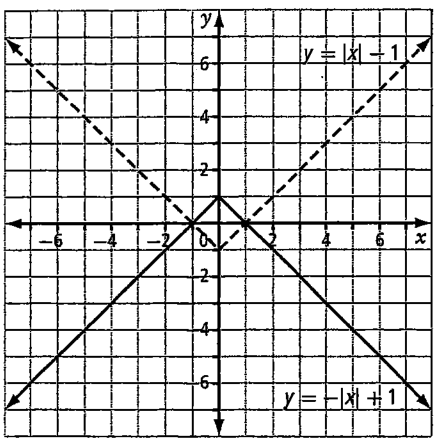
$y = -\frac{1}{2}x - 3$; same x-intercept, different y-intercepts, opposite slopes, same domain and range

b)



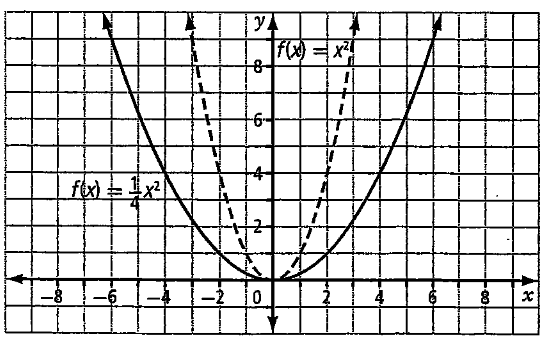
$y - 4 = -(x-2)^2$; same y-intercept, same x-intercepts (zeros), different orientation, one has a maximum value and one has a minimum value, same shape, vertex has same x-coordinate (h) and opposite y-coordinate (k)

c)

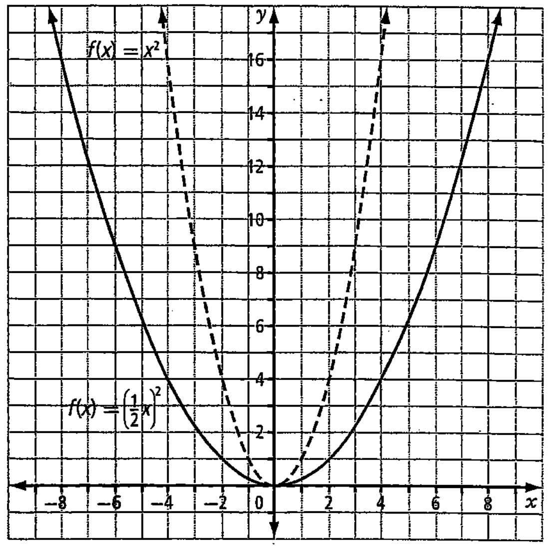


$y - 1 = -|x|$; same x-intercepts (zeros), different y-intercepts, different orientation, one has a maximum value and one has a minimum value, same shape, vertex has same x-coordinate (h) and opposite y-coordinate (k)

3. **a)** $(x, y) \rightarrow \left(x, \frac{1}{4}y\right)$; $f(x) = \frac{1}{4}x^2$



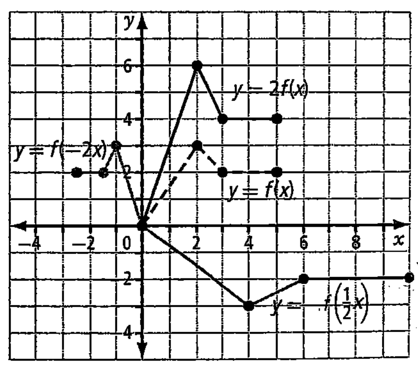
b) $(x, y) \rightarrow (2x, y)$; $f(x) = \left(\frac{1}{2}x\right)^2$



4. **a)** $\left(\frac{1}{2}x\right)^2 = \left(\frac{1}{2}\right)^2(x)^2 = \frac{1}{4}x^2$

b) Example: Given $f(x) = x^2$, any horizontal stretch by a factor of p is equivalent to a vertical stretch by a factor of $\frac{1}{p^2}$.

5. **a)** $y = 2f(x)$ **b)** $y = -f\left(\frac{1}{2}x\right)$ **c)** $y = f(-2x)$



6. Answers may vary.

1.3 Combining Transformations, pages 18–25

1. Steps i) and ii) may be reversed and the answer will still be correct.

a) i) reflection in the y-axis, ii) vertical stretch by a factor of 4, iii) translation 5 units down

b) i) horizontal stretch by a factor of $\frac{1}{2}$, ii) reflection in the x-axis, iii) translation 7 units to the left

c) i) horizontal stretch by a factor of 4, ii) vertical stretch by a factor of 1.75, iii) translation 1.5 units to the right

d) i) horizontal stretch by a factor of $\frac{1}{3}$ and reflection in the y-axis, ii) vertical stretch by a factor of $\frac{1}{2}$ and reflection in the x-axis, iii) translation 3 units up and 1 unit to the left

2. **a)** $y + 7 = -f\left(\frac{1}{6}x\right)$

b) $y = \frac{1}{2}|-(x-3)|$

c) $y + 4 = -\frac{1}{9}(x-10)^2$ or $y + 4 = -\left[\frac{1}{3}(x-10)\right]^2$

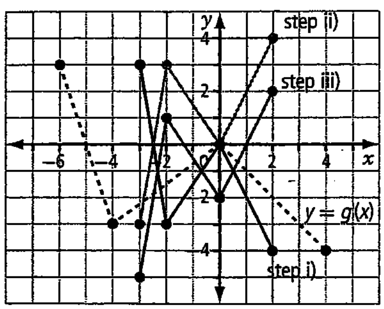
3. **a)** (6, 6)

b) (−11, −10)

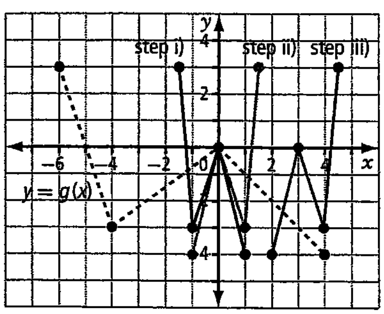
c) (18, 30)

4. (3, −12), (−14, 8), and (24, −24)

5. **a)** i) horizontal stretch by a factor of $\frac{1}{2}$, ii) reflection in the x-axis, iii) translation 2 units down

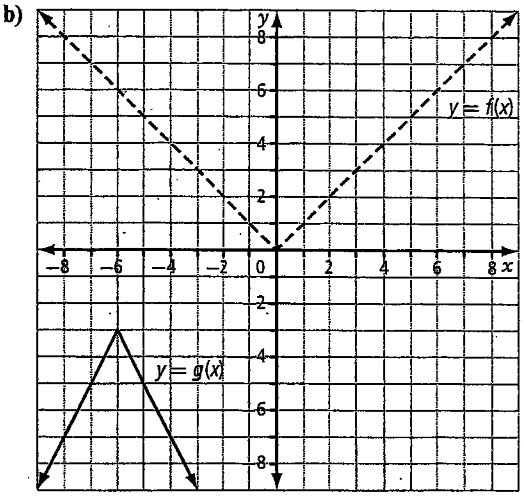


b) i) horizontal stretch by a factor of $\frac{1}{4}$,
ii) reflection in the y-axis,
iii) translation 3 units to the right



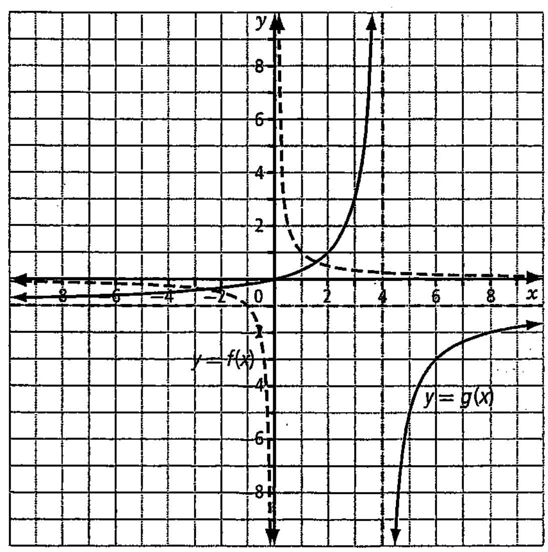
6. **a)** $y = -2|x + 6| - 3$

b)



7. **a)** $y = -\dfrac{1}{\frac{1}{4}(x-4)} - 1$ or $y = -\dfrac{4}{x-4} - 1$

b)



8. $y - 7 = -2f(x + 5)$

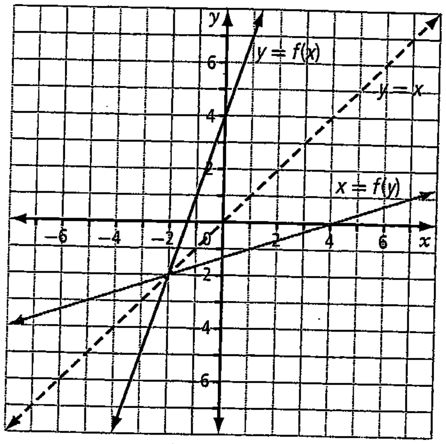
9. $y = 2f\left(-\frac{1}{2}x\right)$

10. $y = f(-2x) + 3$

11. Answers may vary.

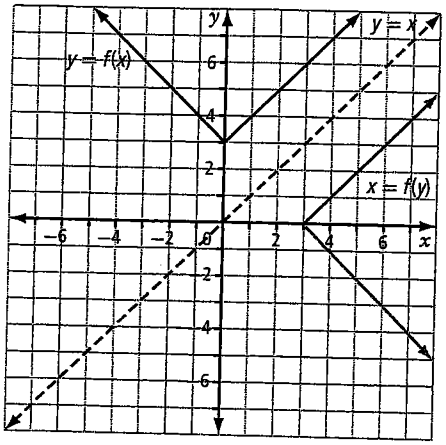
1.4 Inverse of a Relation, pages 26–34

1. a)



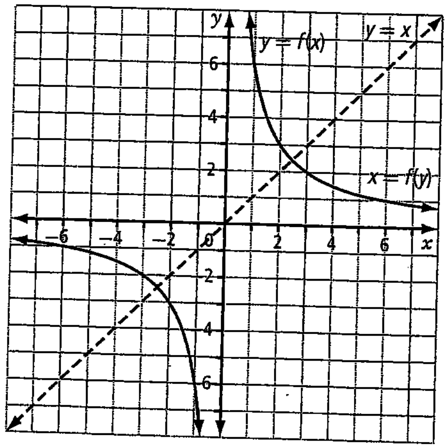
The inverse of $f(x)$ is a function; invariant point at (−2, −2).

b)



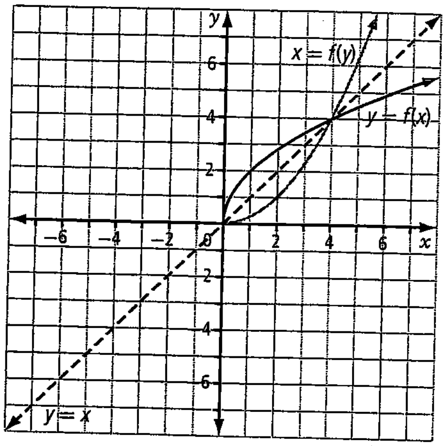
The inverse of $f(x)$ is not a function.

c)



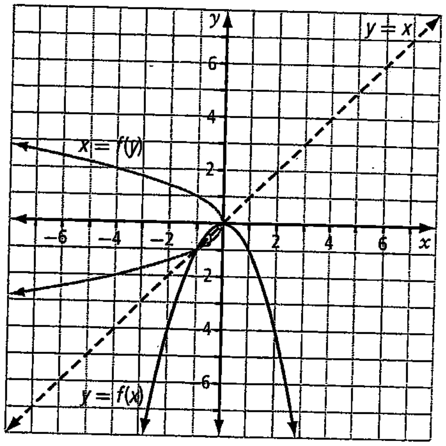
The inverse of $f(x)$ is a function; invariant points at approximately (2.5, 2.5) and (−2.5, −2.5).

d)



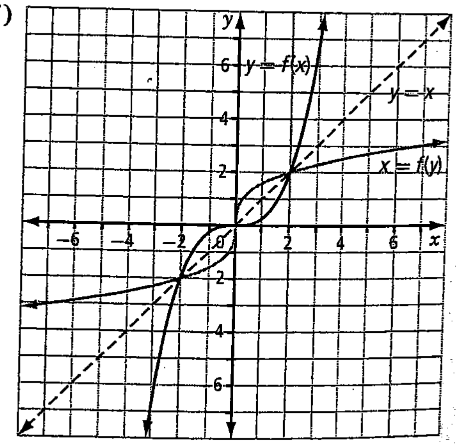
The inverse of $f(x)$ is a function; invariant points at (0, 0) and (4, 4).

e)



The inverse of $f(x)$ is not a function; invariant points at (−1, −1) and (0, 0).

f)



The inverse of $f(x)$ is a function; invariant points at (−2, −2), (0, 0), and (2, 2).

2. a) $f^{-1}(x) = x + 4$ b) $f^{-1}(x) = -\frac{1}{6}x - \frac{1}{3}$
c) $f^{-1}(x) = \frac{5}{3}x + 5$ d) $f^{-1}(x) = 2x - 6$

3. Examples: a) $\{x \mid x \geq 2, x \in R\}$ or $\{x \mid x \leq 2, x \in R\}$
b) $\{x \mid x \geq -4, x \in R\}$ or $\{x \mid x \leq -4, x \in R\}$

4. a) For $f(x) = -x^2 + 6, x \geq 0$, the inverse is $f^{-1}(x) = \sqrt{-(x-6)}$. For $f(x) = -x^2 + 6, x \leq 0$, the inverse is $f^{-1}(x) = -\sqrt{-(x-6)}$.
b) For $f(x) = \frac{1}{2}x^2 + 4, x \geq 0$, the inverse is $f^{-1}(x) = \sqrt{2(x-4)}$. For $f(x) = \frac{1}{2}x^2 + 4, x \leq 0$, the inverse is $f^{-1}(x) = -\sqrt{2(x-4)}$.

5. $y = \pm\sqrt{x+2} - 3$

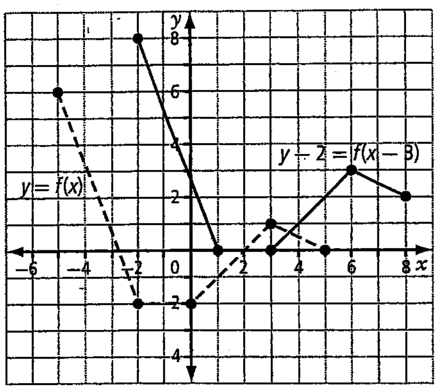
6. a) $42 < x < 105$
b) $f^{-1}(x) = \sqrt{\frac{x}{0.01634}} + 26.643$, where x = CRL, in millimetres
c) 14.3 weeks

7. Answers may vary.

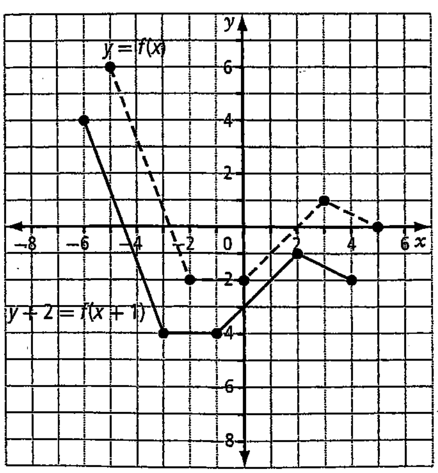
Chapter 1 Review, pages 35–37

1. a) $y + 3 = |x - 5|$ b) $y - 1 = |x + 4|$

2. a)

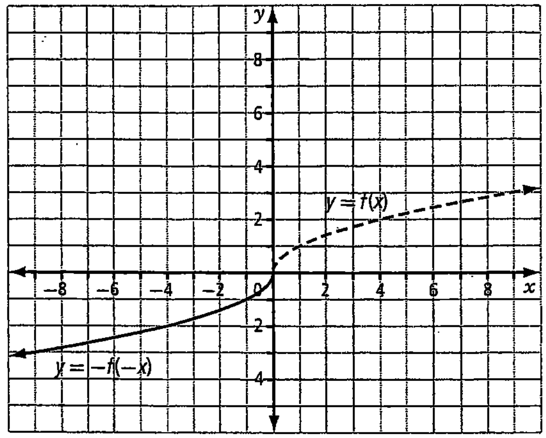


b)

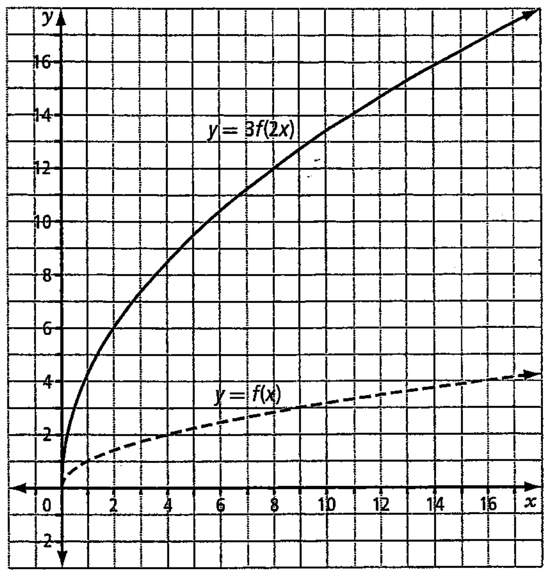


3. a) (12, 5) b) (−3, −5) c) (36, −10)

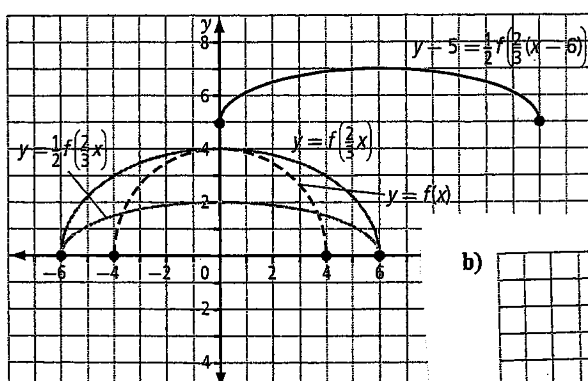
4. a) reflection in the y-axis and reflection in the x-axis



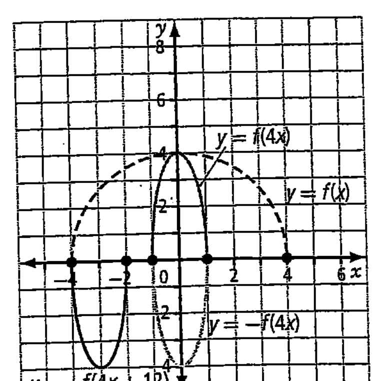
b) horizontal stretch by a factor of $\frac{1}{2}$, vertical stretch by a factor of 3



5. a)



b)



6. a) $f^{-1}(x) = -2x + 10$
b) Example: restricted domain of $f(x)$: $\{x \mid x \geq 1, x \in R\}$, $f^{-1}(x) = \sqrt{\frac{1}{2}x} + 1$