Chapter 1 BLM Answers

BLM 1–1 Chapter 1 Prerequisite Skills
1. a) vertex (3, 4), minimum; axis of symmetry \( x = 3 \); opens upward; domain \( \{x \mid x \in \mathbb{R}\} \); range \( \{y \mid y \geq 4, y \in \mathbb{R}\} \)
   b) vertex \((-5,-7)\), minimum; axis of symmetry \( x = -5 \); opens upward; domain \( \{x \mid x \in \mathbb{R}\} \); range \( \{y \mid y \geq -7, y \in \mathbb{R}\} \)
   c) vertex (0, 15), maximum; axis of symmetry \( x = 0 \); opens downward; domain \( \{x \mid x \in \mathbb{R}\} \); range \( \{y \mid y \leq 15, y \in \mathbb{R}\} \)
   d) vertex \((-\frac{1}{2},-\frac{23}{13})\), maximum; axis of symmetry \( x = \frac{1}{2} \); opens downward; domain \( \{x \mid x \in \mathbb{R}\} \); range \( \{y \mid y \leq -\frac{23}{13}, y \in \mathbb{R}\} \)

2. a) \( y = (x - 12)^2 - 134 \) b) \( y = 5(x + 4)^2 - 107 \)
   c) \( y = -2(x - 2)^2 + 8 \) d) \( y = -30(x + 1)^2 + 135 \)

3. a) 

4. a) 7 b) 5 c) -6 d) 9

5. a) 
   b)
6. a) \( x = -3.5, 5.5 \)  

b) \( x = \frac{3}{2}, x = 4 \)  
c) \( x = -3, -1.73, 1.73, 3 \)

7. a) \( x = -\frac{7}{2}, -\frac{11}{2} \)  
b) \( x = 1.5, 4 \)  
c) \( x = -3\sqrt{3}, -\sqrt{3}, 3 \)  
d) \( x = -1, 5 \)

8. a) asymptote at \( x = \frac{7}{4} \); \( x \neq \frac{7}{4} \)  
b) asymptote at \( x = \frac{5}{2} \); \( x \neq \frac{5}{2} \)  
c) asymptotes at \( x = 4, -4 \); \( x \neq \pm 4 \)
asymptotes at $x = 3, -2; x \neq 3, -2$

BLM 1–2 Section 1.1 Extra Practice

1. a) $y = f(x)$ is a translation of $f(x)$ 3 units up; $y + 2 = f(x)$ is a translation of $f(x)$ 2 units down

2. a) $y = f(x + 4)$ is a translation of $f(x)$ 4 units left, and $y = f(x - 5)$ is a translation of $f(x)$ 5 units right

3. a) $(x, y) \rightarrow (x + 3, y + 6)$ b) $(x, y) \rightarrow (x, y - 4)$ c) $(x, y) \rightarrow (x - 2, y + 4)$ d) $(x, y) \rightarrow (x + 1, y - 2)$

4. a) translation 2 units left, 3 units up b) translation 5 units right, 7 units down c) translation 4 units left d) translation 6 units up

5. a) A’(-5, 5), B’(-4, 8), C’(-1, 8), D’(2, 6) b) $y = f(x)$

6. a) translation left 1 unit, down 4 units b) $y + 4 = f(x + 1)$

7. a) $k = 2, h = -3; y - 2 = f(x + 3)^2$ b) $k = 1, h = 5; y + 1 = f|x - 5|$ c) $k = -5, h = 9; y + 5 = g(x - 9)$ d) $k = 9, h = -4; y - 9 = f\left(\frac{1}{x} + 4\right)$

8. 4 units down
c) $h(x)$ is a reflection of $f(x)$ in the $y$-axis.

d) $(0, 16)$

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

c) It is the graph of $y = f(x)$ after a vertical stretch about the $x$-axis by a factor of 2.

c) $A(-2, 0)$

4. a) $y = f(x)$

c) $(0, 3)$

5. a) $(x, y) \rightarrow (x, y)$

c) $(x, y) \rightarrow (-x, y)$

d) $(x, y) \rightarrow \left(\frac{1}{3}x, y\right)$

b) It is the graph of $y = f(x)$ after a horizontal stretch about the $y$-axis by a factor of 3.

c) A reflection in the $x$-axis, a vertical stretch about the $x$-axis by a factor of $\frac{1}{2}$

d) A reflection in the $y$-axis, a horizontal stretch about the $x$-axis by a factor of 2

e) A vertical stretch about the $x$-axis by a factor of $\frac{1}{4}$

f) A vertical stretch about the $x$-axis by a factor of 5

7. a reflection in the $x$-axis, a horizontal stretch about the $x$-axis by a factor of 3; $h(x) = -f\left(\frac{1}{3}x\right)$

8. The domain of $y = g(x)$ is $\{x \mid -8 \leq x \leq 16, x \in \mathbb{R}\}$; the range is $\{y \mid -2 \leq y \leq 4, y \in \mathbb{R}\}$.

9. The domain of $y = g(x)$ is $\{x \mid -4 \leq x \leq 6, x \in \mathbb{R}\}$; the range is $\{y \mid -12 \leq y \leq 6, y \in \mathbb{R}\}$.

10. $(-15, 0), (12, 0)$

BLM 1–4 Section 1.3 Extra Practice

1. a) B  b) C  c) D  d) A

2. a) $y = 3(-x + 3)^2 - 2$
3. a) The inverse of a), b), and d) are not functions. A vertical line intersects the graph of the inverse at more than one point. This means that the relation is not a function.

4. a) \( f^{-1}(x) = \frac{1}{3}x + 2 \)  
   b) \( f^{-1}(x) = 2x - 10 \)
   c) \( f^{-1}(x) = 3x - 12 \)
   d) \( f^{-1}(x) = \frac{1}{2}x - \frac{3}{2} \)

5. a) The inverse is a function.

The inverse is not a function.

6. a) \( f^{-1}(x) = \pm \sqrt{x - 4} \)
   b) \( f^{-1}(x) = \pm \sqrt{x + 7} \)
   c) \( f^{-1}(x) = \pm \sqrt{x - 5} + 2 \)
   d) \( f^{-1}(x) = \pm \sqrt{x + 9} + 5 \)

7. a) \( x \geq 0 \) or \( x \leq 0 \)
   b) \( x \geq -4 \) or \( x \leq -4 \)
   c) \( x \geq 3 \) or \( x \leq 3 \)
   d) \( x \geq 0 \) or \( x \leq 0 \)

8. a) 12  
   b) 6  
   c) 16  
   d) 8

9. a) The inverse is a function.

The inverse is not a function.

b) Restrict the domain to \( \{x \mid x \geq 5, x \in \mathbb{R}\} \); range: \( \{y \mid y \geq 5, y \in \mathbb{R}\} \)
   c) Restrict the domain to \( \{x \mid x \geq 3, x \in \mathbb{R}\} \) or \( \{x \mid x \leq 3, x \in \mathbb{R}\} \).
1. D
2. C
3. A
4. A
5. B
6. A
7. \{ y | y \geq 1, y \in \mathbb{R} \}
8. (0, -20)
9. \[ y = \frac{1}{3} f(2x) \]
10. \( k = 3.5 \)
11. a) vertical stretch by a factor of 2 about the x-axis; \( g(x) = 2\sqrt{x} \)
b) horizontal stretch by a factor of \( \frac{1}{4} \) about the y-axis; \( g(x) = \sqrt{4x} \)
12. a) vertical stretch by a factor of 3 about x-axis, horizontal stretch by a factor of \( \frac{1}{2} \) about the y-axis, reflection in the y-axis, horizontal translation 1 unit right, vertical translation 4 units up b) 
13. a) vertical stretch by a factor of 3 about x-axis, horizontal stretch by a factor of \( \frac{1}{2} \) about the y-axis, reflection in the y-axis, horizontal translation 1 unit right, vertical translation 4 units up b) 
14. a) y-intercept = \(-6k\); The original y-intercept is multiplied by the value of \( k \).
b) x-intercept = \( \frac{2}{m}, \frac{3}{m} \); The original x-intercept is multiplied by the value of \( \frac{1}{m} \).
15. a) \( y = (x - 1)^2 \) b) (0, 1) c) \( y = 1 \pm \sqrt{x} \)
d) \( x \leq 1 \) or \( x \geq 1 \)