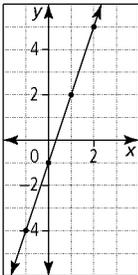


Chapter 3 BLM Answers

BLM 3-2 Chapter 3 Prerequisite Skills

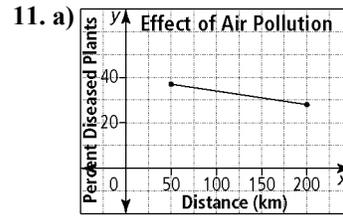
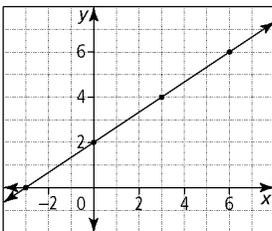
1. a) $8x^2 - 4x$ b) $4x^2 + 25x - 21$
 c) $4x^2 - 20x + 25$ d) $-x^2 + 3x + 13$
2. a) -3 b) $m = \frac{3}{2}$ c) $y = \frac{3}{2}x - 3$
- d) all real numbers or $\{y \mid y \in \mathbb{R}\}$ e) 2
3. Example: $(14, -1.2), (19, -3.2)$
4. a) $3x + 4y - 8 = 0$ b) $2x + y + 2 = 0$
5. a) $y = -3x + 4; m = -3; y\text{-intercept} = 4$
 b) $y = \frac{3}{7}x - \frac{1}{7}; m = \frac{3}{7}; y\text{-intercept} = -\frac{1}{7}$
- c) $y = \frac{3}{4}x; m = \frac{3}{4}; y\text{-intercept} = 0$
6. a) $5x + y - 2 = 0; A = 5, B = 1, C = -2$
 b) $-2x + 3y + 21 = 0; A = -2, B = 3, C = 21$
 c) $3x - 16y - 4 = 0; A = 3, B = -16, C = -4$
7. a) Label the horizontal axis x and the vertical axis $g(x)$. b) -14
 c) Yes. If you substitute $x = 5$, you get $g(5) = 7$.
 d) g is the set of all real numbers
8. a) 9 b) $\frac{81}{4}$ c) $\frac{49}{16}$
9. a) 1 b) 3 c) 2
10. a) The y -intercept could have a value of -1 .

| | | | | | |
|-----|----|----|---|---|---|
| x | -1 | 0 | 1 | 2 | 3 |
| y | -4 | -1 | 2 | 5 | 8 |



- b) The y -intercept could have a value of 2.

| | | | | | |
|-----|----|---|---|---|----------------|
| x | -3 | 0 | 3 | 6 | 7 |
| y | 0 | 2 | 4 | 6 | $\frac{20}{3}$ |



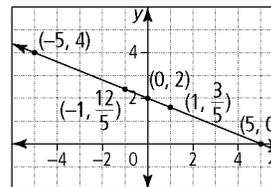
- b) $p(50) = 37; p(150) = 31; p(200) = 28$
 c) $\{p(x) \mid 28 \leq p(x) \leq 37\}$

BLM 3-3 Chapter 3 Warm-Up

Section 3.1

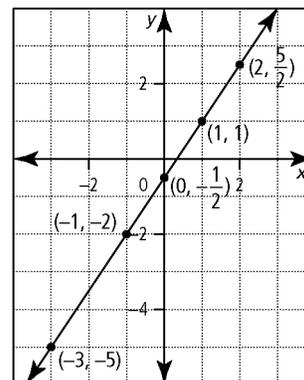
1. a) $-\frac{1}{2}$ b) -4 c) $y = -\frac{1}{2}x - 2$
- d) $\{y \mid y \in \mathbb{R}\}$ or y is all real numbers
 e) $x = -6$
2. a) $a = 1, p = 0, q = -3$ b) $a = -4, p = 0, q = 9$
 c) $a = 2, p = 18, q = -6$ d) $a = -7, p = -3, q = 2$
3. a)

| | | | | | |
|--------|----|----------------|---|---------------|---|
| x | -5 | -1 | 0 | 1 | 5 |
| $f(x)$ | 4 | $\frac{12}{5}$ | 2 | $\frac{3}{5}$ | 0 |



- b)

| | | | | | |
|-----|----|----|----------------|---|---------------|
| x | -3 | -1 | 0 | 1 | 2 |
| y | -5 | -2 | $-\frac{1}{2}$ | 1 | $\frac{5}{2}$ |



4. a) 7 b) 10 c) 6
 5. 2

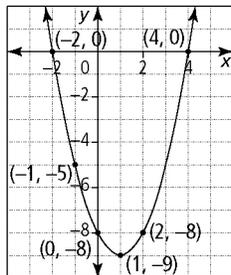


Section 3.2

1. $p = 3$; $q = 2$; a is negative

2. a)

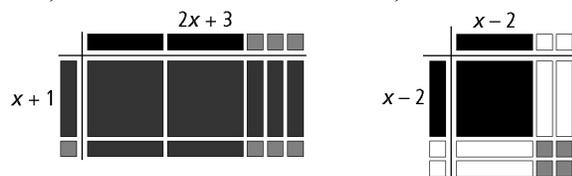
| | | | | | | |
|-----|----|----|----|----|----|---|
| x | -2 | -1 | 0 | 1 | 2 | 4 |
| y | 0 | -5 | -8 | -9 | -8 | 0 |



b) (1, -9) c) $x = 1$ d) -8 e) -2 and 4 f) $y \geq -9$

3. a) $2x^2 + 5x + 3$

b) $x^2 - 4x + 4$



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

Section 3.3

1. a) $y = 3x^2 - x - 5$; $a = 3$, $b = -1$, $c = -5$

b) $h(x) = x^2 - 4x - 5$; $a = 1$, $b = -4$, $c = -5$

c) $y = -3x^2 + 6x + 2$; $a = -3$, $b = 6$, $c = 2$

2. a) Let $x = 0$ and solve for y .

b) g has a maximum at 5

c) (5, 1) d) -16 e) $x = 5$

3. a) $y = -3x^2$ opens downward and the parabola is narrower

b) $y = \frac{1}{4}x^2$ has a wider parabola

c) $y = x^2 - 3$ is shifted 3 units downward

d) $y = (x - 3)^2$ is shifted 3 units to the right

4. a) $y = (x + 2)^2 + 1$ has its vertex at (-2, 1); opens upward, so has no x -intercept

b) $y = 3x^2 - 3$ has its vertex at (0, -3); opens upward, so has 2 x -intercepts

c) $y = -2(x - 3)^2$ has its vertex at (3, 0); opens downward, so has 1 x -intercept

5. a) 2 x -intercepts; y -intercept is likely negative, but could be positive or zero

b) 1 x -intercept; y -intercept is positive or zero

6. a) $(3x - 2)(x - 2)$

b) Add or combine like pieces of the rectangle.

c) $3x^2 - 8x + 4$

BLM 3-4 Section 3.1 Extra Practice

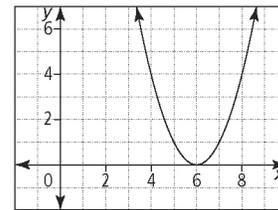
1. a) The graph can be obtained by applying a change in width about the x -axis by a factor of 3. The graph opens upward, has a minimum y -value of 0, and the range is $y \geq 0$.

b) The graph can be obtained by applying a change in width about the x -axis by a factor of 5, and then a reflection in the x -axis. The graph opens downward, has a maximum y -value of 0, and the range is $y \leq 0$.

c) The graph can be obtained by applying a vertical translation up 8 units. The graph opens upward, has a minimum y -value of 8, and the range is $y \geq 8$.

d) The graph can be obtained by applying a vertical translation down 5 units. The graph opens upward, has a minimum y -value of -5, and the range is $y \geq -5$.

2. a) The graph of $y = (x - 6)^2$ can be obtained from $y = x^2$ by applying a horizontal translation 6 units to the right.

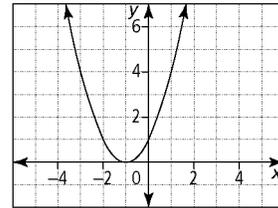


vertex: (6, 0); axis of symmetry: $x = 6$;

domain: $x \in \mathbb{R}$; range: $y \geq 0$; x -intercept: $x = 6$;

y -intercept: $y = 36$

b) The graph of $y = (x + 1)^2$ can be obtained by applying a horizontal translation 1 unit to the left.

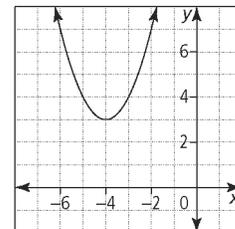


vertex: (-1, 0); axis of symmetry: $x = -1$;

domain: $x \in \mathbb{R}$; range: $y \geq 0$; x -intercept: $x = -1$;

y -intercept: $y = 1$

c) The graph of $y = (x + 4)^2 + 3$ can be obtained by applying a horizontal translation 4 units to the left and a vertical translation 3 units up.



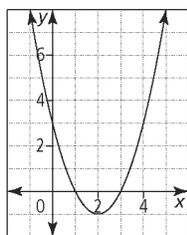
vertex: (-4, 3); axis of symmetry: $x = -4$;

domain: $x \in \mathbb{R}$; range: $y \geq 3$; x -intercept: none;

y -intercept: $y = 19$



d) The graph of $y = (x - 2)^2 - 1$ can be obtained by applying a horizontal translation 2 units to the right and a vertical translation 1 unit down.



vertex: $(2, -1)$; axis of symmetry: $x = 2$;
domain: $x \in \mathbb{R}$; range: $y \geq -1$; x-intercepts: $x = 1$
and 3 ; y-intercept: $y = 3$

3. a) $y = 0.5x^2$ **b)** $y = -0.5x^2$
c) $y = 0.5(x + 6)^2$ **d)** $y = 0.5x^2 - 3$

4. a) The graph can be obtained from the graph of $f(x) = x^2$ by applying a horizontal translation 7 units to the left, and a vertical translation 3 units down.

b) The graph can be obtained from the graph of $f(x) = x^2$ by applying a change in width about the x-axis by a factor of 2, a reflection in the x-axis, and a vertical translation 5 units up.

c) The graph can be obtained from the graph of $f(x) = x^2$ by applying a change in width about the x-axis by a factor of $\frac{1}{3}$, a reflection in the x-axis, and a horizontal translation 3 units to the right.

d) The graph can be obtained from the graph of $f(x) = x^2$ by applying a change in width about the x-axis by a factor of 4, a horizontal translation 2 units to the left, and a vertical translation 1 unit down.

| 5. | a) | b) | c) | d) |
|-------------------------------|--------------------|--------------------|--------------------|--------------------|
| Vertex | $(5, 1)$ | $(-2, 0)$ | $(-4, -5)$ | $(0, 3)$ |
| Axis of symmetry | $x = 5$ | $x = -2$ | $x = -4$ | $x = 0$ |
| Direction | upward | downward | upward | downward |
| Max/min | min $y = 1$ | max $y = 0$ | min $y = -5$ | max $y = 3$ |
| Domain | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ |
| Range | $y \geq 1$ | $y \leq 0$ | $y \geq -5$ | $y \leq 3$ |
| Number of x-intercepts | 0 | 1 | 2 | 2 |

6. a) $y = 3(x - 2)^2$ **b)** $y = -2(x + 2)^2 + 3$

c) $y = \frac{1}{2}(x - 3)^2 - 2$ **d)** $y = -1(x - 4)^2 + 1$

7. a) $f(x) = -2(x - 5)^2$ **b)** $f(x) = \frac{2}{3}(x - 2)^2 - 6$

BLM 3-5 Section 3.2 Extra Practice

1. a) Yes. The function fits the standard form of a quadratic function with $a = 1$, $b = -15$, and $c = 0$.

b) $y = x^2 - 16$ Yes. The function fits the standard form of a quadratic function with $a = 1$, $b = 0$, and $c = -16$.

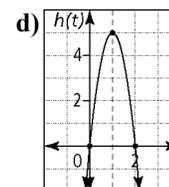
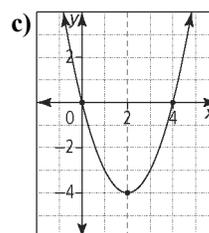
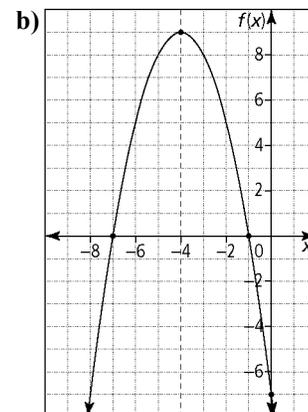
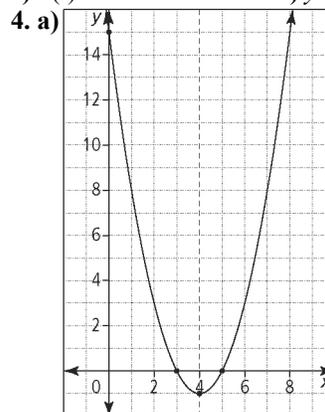
c) Yes. The function fits the standard form of a quadratic function with $a = -4.9$, $b = 0$, and $c = 400$.

d) No. The function does not fit the standard form of a quadratic function.

| 2. | a) | b) |
|-------------------------|--------------------|--------------------|
| Vertex | $(-1, -4)$ | $(-1, 9)$ |
| Axis of symmetry | $x = -1$ | $x = -1$ |
| x-intercepts | -3 and 1 | -4 and 2 |
| y-intercept | -3 | 8 |
| Direction | upward | downward |
| Max/min | min $y = -4$ | max $y = 9$ |
| Domain | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ |
| Range | $y \geq -4$ | $y \leq 9$ |

3. a) $y = x^2 + 14x + 39$ **b)** $f(x) = -6x^2 - 3x + 30$

c) $h(t) = -9t^2 - 18t + 41$ **d)** $y = 8x^2 + 26x + 15$

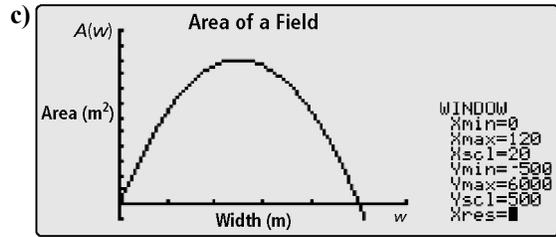


| | a) | b) | c) | d) |
|-------------------------|--------------------|--------------------|--------------------|--------------------|
| Vertex | $(4, -1)$ | $(-4, 9)$ | $(2, -4)$ | $(1, 5)$ |
| Axis of symmetry | $x = 4$ | $x = -4$ | $x = 2$ | $t = 1$ |
| x-intercepts | 3 and 5 | -1 and -7 | 0 and 4 | 0 and 2 |
| y-intercept | 15 | -7 | 0 | 0 |
| Direction | upward | downward | upward | downward |
| Max/min | min: -1 | max: 9 | min: -4 | max: 5 |
| Domain | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ | $t \in \mathbb{R}$ |
| Range | $y \geq -1$ | $f(x) \leq 9$ | $y \geq -4$ | $h(t) \leq 5$ |

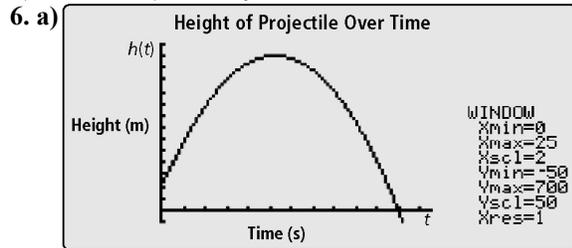


5. a) $w =$ width; 2 width $+ length = 200$ m of fencing, so length $= 200 - 2w$

b) $A(w) = w(200 - 2w)$ or $A(w) = -2w^2 + 200w$



d) 5000 m^2 e) 50 m by 100 m



b) 100 m ; this represents the initial height of the projectile

c) 21.9 s ; this represents the time that the projectile is in the air

d) 651.25 m ; occurs at 10.5 s

BLM 3-6 Section 3.3 Extra Practice

1. a) 25 ; $(x - 5)^2$ b) 16 ; $(x + 4)^2$ c) 36 ; $(x - 6)^2$
d) 1 ; $(x + 1)^2$

2. a) $y = (x + 1)^2 - 5$; $(-1, -5)$

b) $y = (x - 3)^2 + 4$; $(3, 4)$

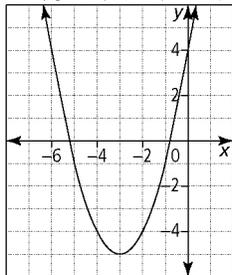
c) $y = (x + 4)^2 - 10$; $(-4, -10)$

d) $y = (x + 12)^2 - 90$; $(-12, -90)$

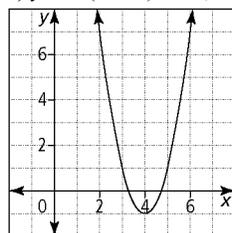
3. a) $y = 3(x - 2)^2 + 1$ b) $y = -2(x + 5)^2 - 6$

c) $y = 6(x - 4)^2 - 96$ d) $y = -4(x + 7)^2$

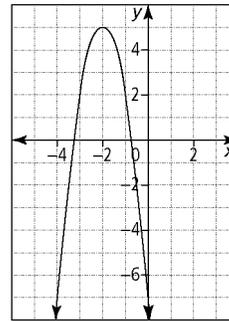
4. a) $y = (x + 3)^2 - 5$; min of -5 when $x = -3$



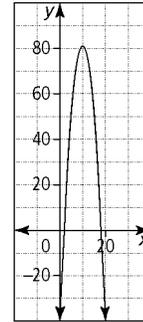
b) $y = 2(x - 4)^2 - 1$; min of -1 when $x = 4$



c) $y = -3(x + 2)^2 + 5$;
max of 5 when $x = -2$



d) $y = -1(x - 9)^2 + 81$;
max of 81 when $x = 9$



| | a) | b) | c) | d) |
|-------------------------|--------------------|--------------------|--------------------|------------------------------|
| Vertex | $(-5, -9)$ | $(-1, 6)$ | $(-7.5, 4.5)$ | $(\frac{1}{3}, \frac{2}{3})$ |
| Axis of symmetry | $x = -5$ | $x = -1$ | $x = -7.5$ | $x = \frac{1}{3}$ |
| Max/min | min $y = -9$ | max $y = 6$ | min $y = 4.5$ | min $y = \frac{2}{3}$ |
| Domain | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ | $x \in \mathbb{R}$ |
| Range | $y \geq -9$ | $y \leq 6$ | $y \geq 4.5$ | $y \geq \frac{2}{3}$ |

6. a) $R(x) = (1200 + 100x)(6.00 - 0.30x)$

b) 4 weeks; $\$7680$

c) Example: Assume that yield increases will remain constant at 100 bushels per week; assume price will decrease at 30¢ each week.

BLM 3-7 Chapter 3 Test

1. B 2. A 3. C 4. A 5. D

6. a) x b) y c) y

7. a) r and s b) t

8. a) $f(x) = \frac{1}{3}(x + 4)^2 + 2$

b) $f(x) = -\frac{x^2}{3} + 5$

9. a) $y = (x - 2)^2 + 8$; vertex $(2, 8)$

b) $y = -\frac{1}{4}(x + 8)^2 - 2$; vertex $(-8, -2)$

10. vertex: $(6, -21)$; axis of symmetry: $x = 6$;
direction of opening: upward; domain: $x \in \mathbb{R}$;

range: $y \geq -21$; x -intercepts: $(6 \pm \sqrt{42}, 0)$;

y -intercept: $(0, -3)$

11. a) $R = -50x^2 + 400x + 12\,000$ b) $\$80$

c) $\$12\,800$ d) 40 seats

