

Chapter 3 BLM Answers

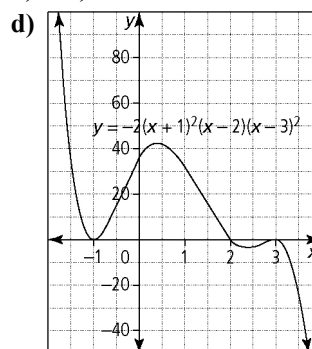
BLM 3-1 Prerequisite Skills

1. **a)** $6x^2 - 9x + 8$ **b)** $-14y^2 - y - 16$
c) $a^2 - 18ab + 5b^2$ **d)** $4y^4 - 14y^3 - 53y^2 - 41y - 6$
2. **a)** $3ab$ **b)** $27m^2n$ **c)** $4a^2bc$ **d)** p^3q^3
3. **a)** $(y-2)(3y+4)$ **b)** $(a-4)(5a-2)$
c) $(c-4)(2x+7)$ **d)** $(2y+1)(y^3-5)$
4. **a)** $(4x-3)(x-2)$ **b)** $(2m-3)(m+3)$
c) $(a+3b)(a+8b)$ **d)** $3(2x+y)(x-y)$
5. **a)** $n = 10$; $(x+5)^2$ or $n = -10$; $(x-5)^2$ **b)** $n = 132$;
 $(6t+11)^2$ or $n = -132$; $(6t-11)^2$
6. **a)** $\frac{2}{3}$; $c \neq 0, 5$ **b)** $\frac{3(2w+3)}{2(3w+2)}$; $w \neq 0, -\frac{2}{3}$
c) $\frac{(x+7)}{(2x-1)}$; $x \neq \frac{1}{2}$ **d)** $-\frac{1}{2}$; $a \neq -2, 3$
e) $\frac{2r}{p}$; $r \neq 0$ and $p \neq 0$ **f)** $\frac{5(x+y)}{(x-y)}$, $x \neq y$
7. **a)** $\frac{d-10}{4}$, $d \neq -10$ **b)** $\frac{a-1}{a-3}$, $a \neq \pm 3, -1$
c) $\frac{1}{2}$, $x \neq \pm 5, 4$ **d)** $\frac{p+1}{3}$, $p \neq \frac{3}{2}, \frac{1}{2}, 1, -3$
8. **a)** $\frac{w-2}{3}$, $w \neq -2, -\frac{3}{2}$ **b)** $\frac{v^2}{v+3}$, $v \neq -3, 0, 5$
c) $\frac{3x-1}{x+5}$, $x \neq -5, -\frac{1}{3}, 2$ **d)** $\frac{-2}{y-2}$, $y \neq \pm 1, -\frac{1}{2}, \frac{3}{4}, 2$
9. $h = \frac{x(x-2)}{x-3}$, $x \neq -4, 3$
10. **a)** $\frac{5x}{12}$ **b)** $1, y \neq 0$ **c)** $\frac{9x+34}{x^2-9}$, $x \neq \pm 3$
d) $1, a \neq \pm b$ **e)** $\frac{a}{(a-2)(a+3)}$, $a \neq -3, 2$
11. 80 km/h

BLM 3-3 Section 3.1 Extra Practice

1. **a)** Not a polynomial; the exponent of the variable is not a whole number: $\frac{1}{x} = x^{-1}$ **b)** degree = 2
c) degree = 6 **d)** Not a polynomial; the exponent of the variable is not a whole number: $\sqrt[3]{x} = x^{\frac{1}{3}}$
2. **a)** -1; 3 **b)** 9; 5 **c)** 3; 1 **d)** -2; 9
3. **a)** odd; neither **b)** even; minimum **c)** odd; neither **d)** even; maximum
4. **a)** 3; domain: $\{x | x \in \mathbb{R}\}$; range: $\{y | y \in \mathbb{R}\}$
b) 2; domain: $\{x | x \in \mathbb{R}\}$; range: $\{y | y \leq 9, y \in \mathbb{R}\}$

- c)** 4; domain: $\{x | x \in \mathbb{R}\}$; range: $\{y | y \geq -12.25, y \in \mathbb{R}\}$
d) 4; domain: $\{x | x \in \mathbb{R}\}$; range: $\{y | x \in \mathbb{R}\}$
5. **a)** 0, 1, 2, or 3; y-intercept = 3 **b)** 0, 1, 2, 3, or 4; y-intercept = 5 **c)** 0, 1, 2, 3, or 4; y-intercept = 1
d) 0, 1, or 2; y-intercept = 0
6. **a)** degree of 4, even-degree polynomial; opens downward, extends down into quadrant III and down into quadrant IV; maximum of four x-intercepts; has a maximum value; y-intercept = 5
b) degree of 5, odd-degree polynomial; extends up into quadrant I and down into quadrant III; maximum of 5 x-intercepts; no maximum or minimum values; y-intercept = 12
7. **a)** extends up into quadrant II and down into quadrant IV
b) 3 **c)** 36



8. **a)** quartic **b)** quintic **c)** cubic **d)** quadratic
9. **a)** 2 **b)** -4.9; constant = 60; The constant represents the height the object fell from.
c) The domain, t , must be greater than or equal to zero, because it represents time.
d) opens downward; lies only within quadrant I; points begin on the y-axis and end on the x-axis; maximum value = 60
10. 3.5 s

BLM 3-4 Section 3.2 Extra Practice

1. **a)** $\frac{x^2 - x - 15}{x - 4} = (x + 3) - \frac{3}{x - 4}$ **b)** $x \neq 4$
c) $x^2 - x - 15 = (x - 4)(x + 3) - 3$
d) To check, multiply the divisor by the quotient and add the remainder.
2. **a)**

$$\frac{x^4 - 3x^3 + 2x^2 + 55x - 11}{x + 3} = (x^3 - 6x^2 + 20x - 5) + \frac{4}{x + 3}$$
b) $x \neq -3$ **c)** To check, multiply the divisor by the quotient and add the remainder.



3. a) $3x + 1$ b) $2x^2 - 20x + 85$ c) $2w^3 - 3w^2 + 4w - 10$

4. a) 233 b) -7 c) 36

5. a) $4w^3 - 5w^2 + 3w - 4$ b) $x^3 + 4x^2 - 5$

c) $5y^3 - 5y^2 + 7y - 8$

6. a) 0 b) 179 c) -19

7. a) -25 b) -44 c) -65

8. a) -22 b) 0 c) 831

9. 2

10. 4 and -2

BLM 3-5 Section 3.3 Extra Practice

1. a) $x - 6$ b) $x + 7$ c) $x - 2$ d) $x + 5$

2. a) No b) No c) No d) Yes

3. a) No b) Yes c) No d) No

4. a) $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$ b) $\pm 1, \pm 2, \pm 3, \pm 6$

c) $\pm 1, \pm 5, \pm 25$ d) $\pm 1, \pm 2, \pm 5, \pm 10$

5. Example: Since the factors are $x + 3$, $x - 4$, and $x + 1$, the corresponding zeros of the function are -3, 4, and -1. The zeros can be confirmed by graphing $P(x)$ and using the trace or zero feature of a graphing calculator.

6. a) $(x - 1)(x - 2)(x + 5)$ b) $(x - 3)^2(x + 3)(x - 4)$

c) $(x + 1)(x - 4)(x - 6)$ d) $(x - 1)(x + 1)(x - 5)(x + 5)$

7. a) $(x + 1)(x - 4)(x + 4)$ b) $(x - 4)(x^2 + 2x + 2)$

c) $(k - 3)(k + 4)(k + 5)$ d) $(x - 5)(x^2 + 5x - 2)$

8. a) $(x + 4)(x + 2)(x + 1)(x - 3)$

b) $(x + 3)(x + 2)(x + 1)(x - 1)(x - 2)$

9. a) 2, -10 b) 28

10. a) 3 b) -72

BLM 3-6 Section 3.4 Extra Practice

1. a) -5, -2, 3, 6 b) ± 3 c) $-\frac{1}{3}, 4, 7$ d) 0, -2, -4

2. a) -3, 2, -4 b) $(-4, -3), (2, \infty)$

c) $(-\infty, -4), (-3, 2)$

3. a) 3 b) negative c) -4, -2, -3;

$(x + 4), (x + 2), (x + 3)$ d) positive intervals:

$x < -4$ and $-3 < x < -2$ negative interval: $-4 < x < -3$

and $x > -2$

4.

$y = x^3$	$y = (4x)^3$	$y = -2(4x)^3$	$y = -2(4(x + 1))^3 - 5$
(-2, -8)	(-0.5, -8)	(-0.5, 16)	(-1.5, 11)
(-1, -1)	(-0.25, -1)	(-0.25, 2)	(-1.25, -3)
(0, 0)	(0, 0)	(0, 0)	(-1, -5)
(1, 1)	(0.25, 1)	(0.25, -2)	(-0.75, -7)
(2, 8)	(0.5, 8)	(0.5, -16)	(-0.5, -21)

5.

$y = x^4$	$y = \left(\frac{1}{2}x\right)^4$	$y = \frac{1}{4}\left(\frac{1}{2}x\right)^4$	$y = \frac{1}{4}\left(\frac{1}{2}(x - 9)\right)^4 + 3$
(-2, -16)	(-4, -16)	(-4, -4)	(5, -1)
(-1, 1)	(-2, 1)	(-2, 0.25)	(7, 3.25)
(0, 0)	(0, 0)	(0, 0)	(9, 3)
(1, 1)	(2, 1)	(2, 0.25)	(11, 3.25)
(2, 16)	(4, 16)	(4, 4)	(13, 7)

6. a) 4 b) positive c) -6, -3, 1; $(x + 6), (x + 3),$

$(x - 1)$ d) positive intervals: $(-\infty, -6), (-6, -3),$

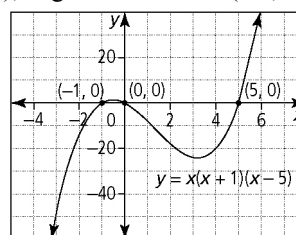
$(1, \infty)$; negative interval: $(-3, 1)$

7. a) -4, -1, 1 b) 3; starts in quadrant III and extends

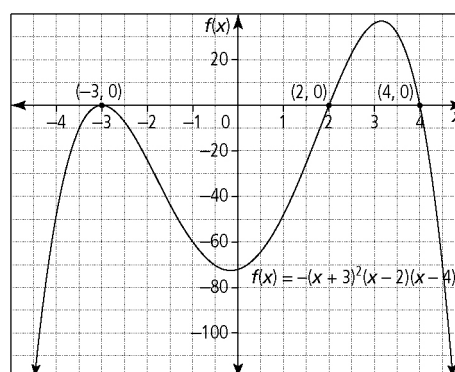
to quadrant I c) -4 d) positive intervals: $(-4, -1),$

$(1, \infty)$; negative intervals: $(-\infty, -4), (-1, 1)$

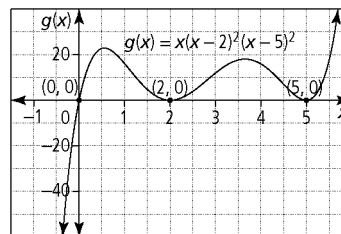
8. a)



b)



c)



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

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

10. -9, -8, -7

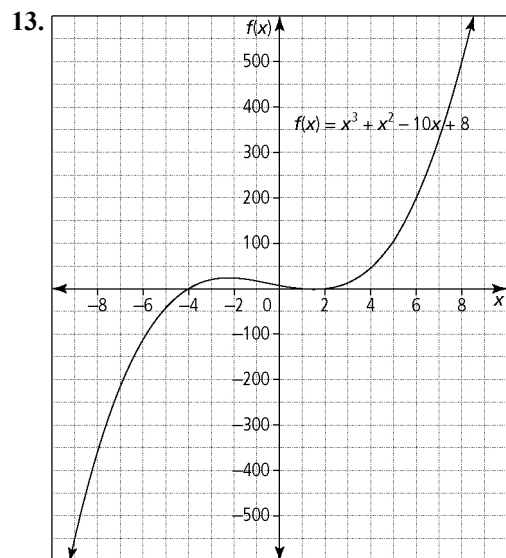
11. 3 cm by 3 cm by 15 cm

12. 12 cm by 12 cm by 7 cm



BLM 3-8 Chapter 3 Test

1. C
2. A
3. D
4. A
5. $k = 7$
6. $a = \frac{1}{2}$
7. $b = -8, c = 16$
8. 5 cm
9. $x = 4$
10. $\frac{x^3 - 5x^2 - x + 5}{x - 2} = x^2 - 3x - 7 + \frac{-9}{x - 2}$
11. $x(x + 1)(x + 3)(x - 4)$
12. $c = -4$; x-intercepts: 2, -2



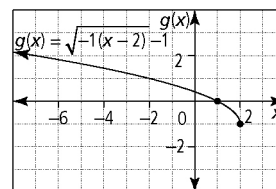
x-intercepts: -4, 1, 2; y-intercept: 8; zeros: -4, 1, 2;
positive intervals: $(-4, 1)$, $(2, \infty)$; negative intervals:
 $(-\infty, -4)$, $(1, 2)$

14. $g(x) = (x - 2)^3$

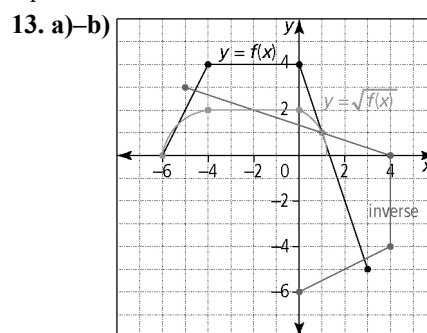
15. The domain $\{x \mid x \in \mathbb{R}\}$ does not change under this transformation. The range changes due to the reflection and the translation; it changes from $\{y \mid y \geq 0, y \in \mathbb{R}\}$ to $\{y \mid y \leq 1, y \in \mathbb{R}\}$.

BLM U1-2 Unit 1 Test

1. D
2. D
3. C
4. A
5. C
6. $\{y \mid y \leq 2, y \in \mathbb{R}\}$
7. (3, 4)
8. (2, 0)
9. $6 \pm \sqrt{5}$
10. -1, 2, 3
11. a) vertical stretch by a factor of 2 about the x-axis, a horizontal translation left 1 unit and then a vertical translation down 3 units.
b) $y = 2(x + 1)^2 - 3$ or $y = 2x^2 + 4x - 1$
or $y = (\sqrt{2}(x + 1))^2 - 3$
c) $\{y \mid y \geq -3, y \in \mathbb{R}\}$
d) $y = \pm \sqrt{\frac{1}{2}(x + 3)} - 1$
e) $x \geq -1$ or $x \leq -1$
12. a) $g(x) = \sqrt{-1(x - 2)} - 1$



- b) $x = 1$
- c) The x-intercept of the graph is the solution to the equation.

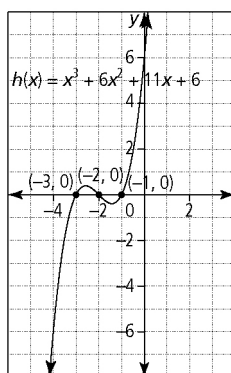


- c) The common invariant point is (1, 1). The inverse of (1, 1) is (1, 1) and the square root of 1 is 1.



14. a) $(x + 1)(x + 2)(x + 3)$

b)



The x -intercepts are -1 , -2 , and -3 .

c) $x = -1$, $x = -2$, and $x = -3$

d) The x -intercepts are the same as the solutions.

15. $a = 1$, $b = -6$

