Chapter 6 BLM Answers

BLM 6–3 Chapter 6 Prerequisite Skills

1. a) $\dfrac{3}{2}$ **b)** 3 **c)** $\dfrac{12}{5}$ or $2\dfrac{2}{5}$ **d)** $\dfrac{1}{4}$ **e)** $\dfrac{1}{14}$ **f)** $\dfrac{1}{3}$

2. a) $\dfrac{1}{1}=1$ **b)** $\dfrac{49}{9}$ **c)** $\dfrac{85}{21}$ **d)** $\dfrac{18}{13}$

3. a) $\dfrac{1}{10}$ **b)** $\dfrac{1}{8}$ **c)** $\dfrac{1}{9}$ **d)** $\dfrac{3}{4}$ **e)** $\dfrac{16}{9}$ **f)** $\dfrac{17}{33}$

4. a) $\dfrac{5}{12}$ **b)** 4 **c)** $\dfrac{9}{14}$ **d)** $\dfrac{12}{5}$

5. a) $x^2 + 3x - 10$ **b)** $c^2 - d^2$
c) $x^2 - 6x + 9$ **d)** $24j^2 - 6k^2$

6. a) $6n^2 - 9n + 8$ **b)** $-f^2 + 4f - 29$
c) $4b^2 + 5bd + 6b - 5d + d^2$ **d)** $40x^2 - 90x - 50$

7. a) 60 **b)** 288 **c)** 100 **d)** 147

8. a) $6x^2$ **b)** $12xy$ **c)** $\dfrac{3}{8}x^2$ **d)** rs^3t

9. a) $(3y + 4)(y - 2)$ **b)** $(5a + 2)(a - 4)$
c) $(x - 3)(3x - 8)$ **d)** $(y^3 - 5)(2y + 1)$

10. a) $(x + 2)(x + 5)$ **b)** $2(r - 4s)(r - 3s)$
c) $(4x - 3)(x - 2)$ **d)** $(2m - 3)(m + 3)$
e) $(3q + 2)(4q + 3)$ **f)** $(a + 3b)(a + 8b)$

11. a) $(b - 11)(b + 11)$ **b)** $4(t - 5)(t + 5)$
c) $10xy(x - 3)(x + 3)$ **d)** $2x(3x + 2)(3x + 2)$
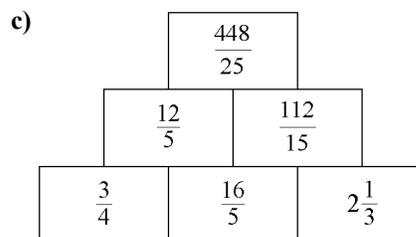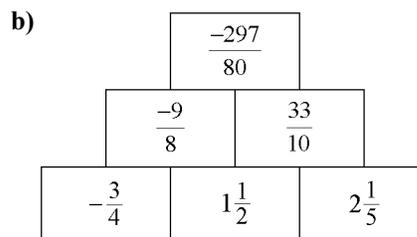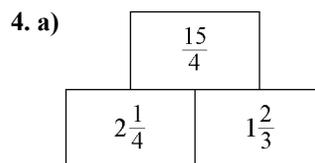**e)** $(x^2 + 4)(x + 2)(x - 2)$ **f)** $(x - 3)(x - 3)(x + 3)(x + 3)$

BLM 6–4 Chapter 6 Warm-Up

Section 6.1

1. a) 28 **b)** 25 **c)** -24 **d)** $\dfrac{9}{4}$ **e)** -1

2. a) 4 **b)** $4 - 3xy$

c) $-z(2x - y)$ or $-2xz + yz$ **d)** $\dfrac{-x+2}{3}$ or $\dfrac{x-2}{-3}$

3. a) 1 **b)** -1 **c)** greater than 1

4. a) $x = \dfrac{4}{3}$ **b)** $x = \pm 5$

c) $x = 3$ or $x = 1$ **d)** $x = \dfrac{32}{9}$

5. a)　　$9(x^2 - 9)$　　　　or　　　$(3x - 9)(3x + 9)$
　　　$= 9(x - 3)(x + 3)$　　　$= 3(x - 3)(3)(x + 3)$
　　　　　　　　　　　　　　　$= 9(x - 3)(x + 3)$

b)　　$x(x^2 - 4x - 5)$　or　　$(2x + 2)(x - 5)$
　　　$= 2(x - 5)(x + 1)$　　　$= 2(x + 1)(x - 5)$

6. a) $3x(x - 2y + y^2)$ **b)** $2(x - y)^2$ **c)** $(3x - 4)(3x + 4)$
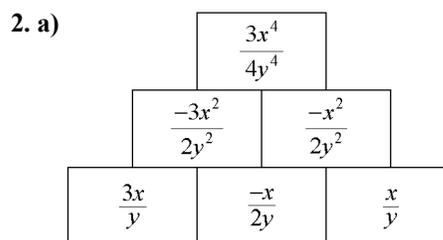**d)** $3(x - 0.1)(x + 0.1)$ **e)** $5(2x + 1)(x - 3)$

Section 6.2

1. a) $\dfrac{-3}{7}$ **b)** $\dfrac{7}{5}$ **c)** $\dfrac{1}{3x}$ **d)** $\dfrac{y-3}{3x}$ **e)** $\dfrac{-4}{x+y}$

2. a) $y \neq 0$ **b)** $x \neq -3$ **c)** $m \neq 4$ and $m \neq -\dfrac{1}{2}$

d) $x \neq -1$ and $x \neq \dfrac{3}{2}$ **e)** $t \neq \pm 5$

3. a) $\dfrac{x(y-3)}{4x}$ **b)** $\dfrac{1}{a+3}$

c) $\dfrac{(x+2)(x+4)}{(x-4)(x+4)}$ **d)** $\dfrac{3c-9f}{12d}$

4. a)

	$\dfrac{15}{4}$	
$2\dfrac{1}{4}$		$1\dfrac{2}{3}$

b)

		$\dfrac{-297}{80}$		
	$\dfrac{-9}{8}$		$\dfrac{33}{10}$	
$-\dfrac{3}{4}$		$1\dfrac{1}{2}$		$2\dfrac{1}{5}$

c)

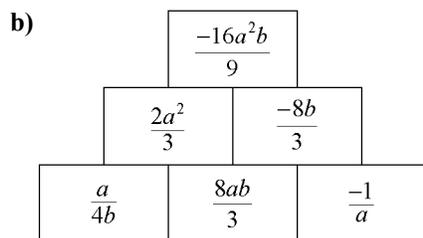|		$\dfrac{448}{25}$		
	$\dfrac{12}{5}$		$\dfrac{112}{15}$	
$\dfrac{3}{4}$		$\dfrac{16}{5}$		$2\dfrac{1}{3}$

5. a) $\dfrac{5x}{2y}$, $x \neq 0, y \neq 0$ **b)** $\dfrac{x}{x+3}$, $x \neq \pm 3$

c) $x + 2$, $x \neq \dfrac{5}{2}$ **d)** $\dfrac{2x+1}{x-4}$, $x \neq \dfrac{1}{2}$, $x \neq 4$

Section 6.3

1. a) $\dfrac{-9}{12}$ **b)** $\dfrac{-6x+8}{-4x}$ **c)** $\dfrac{(x-1)(x-2)}{(x+2)(x-2)}$

d) Examples: $\left(\dfrac{x}{1}\right)\left(\dfrac{1}{3}\right)$ or $\left(\dfrac{x}{5}\right)\left(\dfrac{5}{3}\right)$ or $\left(\dfrac{x}{x}-1\right)\left(x-\dfrac{1}{3}\right)$.

2. a)

		$\dfrac{3x^4}{4y^4}$		
	$\dfrac{-3x^2}{2y^2}$		$\dfrac{-x^2}{2y^2}$	
$\dfrac{3x}{y}$		$\dfrac{-x}{2y}$		$\dfrac{x}{y}$

b)

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              ┌──────────┐
              │ -16a²b   │
              │    9     │
         ┌────┴────┬─────┴────┐
         │  2a²    │   -8b    │
         │   3     │    3     │
    ┌────┴────┬────┴────┬─────┴────┐
    │   a     │   8ab   │   -1     │
    │   4b    │    3    │    a     │
    └─────────┴─────────┴──────────┘
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3. a) 12 **b)** 18 **c)** 24 **d)** 120

4. a) $\dfrac{5}{2p}$, $p \neq 0, r \neq 0$ **b)** $\dfrac{-1}{4y^2}$, $x \neq 0, y \neq 0$

c) $\dfrac{3(x-3)}{x}$, $x \neq 0, x \neq -3$ **d)** $\dfrac{a+5}{a+4}$, $a \neq -1, -4, 1, 7$

5. a) $-6t$ **b)** y^3, $x \neq 0, y \neq 0$

c) $\dfrac{-1}{3(x-b)}$, $x \neq b, x \neq -b$ **d)** $\dfrac{w}{w-1}$, $w \neq 0, 1, 5$

e) $\dfrac{x}{x+1}$, $x \neq 0, -1, -4, 4$

Section 6.4

1. a) $A = 5, B = 6$ **b)** $A = -1, B = 4$
c) $A = 4, B = 3y$ **d)** $A = x - 1, B = x^2$
2. a) $10y$ **b)** $(x-2)(x+2)$ **c)** $x(x-6)(x+6)$

3. a) $x = \dfrac{7}{12}$ **b)** $x = \pm 2$

c) $x = 5$ and $x = 1$ **d)** $x = \dfrac{1}{2}$ and $x = 3$

4. a) Let n be the number. Then, $n + \dfrac{1}{n} = 4$.

b) Let x be the length. The width is $(x - 3)$.
So, $x(x - 3) = 12$

c) Let C be the cost of the drink, in cents. The cost of the snack is $C - 50$. So, $C + 2(C - 50) = 500$.

BLM 6–5 Section 6.1 Extra Practice

1. a) multiplication; (xy^2) **b)** multiplication; $(x + 5)$
c) division; (a) **d)** division; $(x - 2)$
2. a) $x \neq -3$ **b)** $x \neq 0, y \neq 0$ **c)** $x \neq -4, 5$

d) $x \neq \dfrac{-5}{3}$ **e)** $a \neq 0, 3$ **f)** $m \neq -2, -3$

3. a) $\dfrac{3}{x-5}$, $x \neq \pm 5$ **b)** $\dfrac{x+2}{5x}$, $x \neq 0, 7$

c) $\dfrac{x+3}{3(x-3)}$, $x \neq \pm 3$ **d)** $\dfrac{3x}{3x+1}$, $x \neq \dfrac{1}{4}, \dfrac{-1}{3}$

e) $\dfrac{5(x+1)}{2(2x+1)}$, $x \neq \dfrac{-1}{2}, 5$ **f)** $\dfrac{4xy}{x+4}$, $x \neq -4, y \neq 9$

4. a) $\dfrac{3r}{5st}$, $r \neq 0, s \neq 0, t \neq 0$ **b)** $\dfrac{3}{x+2}$, $x \neq \pm 2$

c) $\dfrac{c}{c+1}$, $c \neq -1, d \neq 0$ **d)** $\dfrac{-1}{4}$, $c \neq 7m$

e) $\dfrac{x}{x-5}$, $x \neq -1, 5$ **f)** $\dfrac{y+1}{y}$, $y \neq 0, 3$

5. a) $\dfrac{3x-1}{x+4}$, $x \neq -4$ **b)** $\dfrac{1+a}{4(1-a)}$, $a \neq \pm 1$

c) $\dfrac{2x+1}{5(x-3)}$, $x \neq -2, 3$ **d)** $\dfrac{4x}{x-2}$, $x \neq 2, \dfrac{-1}{3}$

e) $\dfrac{-4t(t+2)}{3+2t}$, $t \neq \dfrac{-3}{2}, 2$ **f)** $\dfrac{5x^2}{2x-5}$, $x \neq \dfrac{-1}{3}, \dfrac{5}{2}$

6. $\dfrac{x+1}{4x+1}$ does not reduce. The non-permissible values

are $x \neq \dfrac{-1}{4}, \dfrac{4}{3}$.

BLM 6–6 Section 6.2 Extra Practice

1. a) $\dfrac{3y}{2x}$, $x \neq 0, y \neq 0$ **b)** $\dfrac{x^2y}{2(x+y)}$, $x \neq -y$

c) $\dfrac{x+2}{4}$, $x \neq 3$ **d)** $x, x \neq -1, \pm 6$

2. a) $\dfrac{x-4}{x+2}$, $x \neq \pm 2$ **b)** $\dfrac{5}{y+3}$, $y \neq \pm 5, 1, -3$

c) $x, x \neq \pm 3, 2, \dfrac{-5}{2}$ **d)** $\dfrac{5(3x+1)}{4(3x-1)}$, $x \neq \pm \dfrac{5}{2}, -4, \dfrac{1}{3}$

3. a) $\dfrac{a^3}{bc}$, $a \neq 0, b \neq 0, c \neq 0$ **b)** $\dfrac{x+1}{x+3}$, $x \neq \dfrac{-5}{3}, -3$

c) $\dfrac{3}{4a}$, $a \neq 0, 4$ **d)** $\dfrac{2(x+3)}{3x^2}$, $x \neq 0, 3$

4. $x \neq -5, -4, -1, 1, 3$; The non-permissible values for the original expression are $-5, -4$, and 3. The non-permissible values for the reciprocal of the second term are -1 and 1.

5. a) $4(a + 2)$, $a \neq 0, \pm 2, b \neq 0$

b) $\dfrac{-x^2}{2(x-1)}$, $x \neq \dfrac{-4}{5}, 0, 1$ **c)** $\dfrac{x+7}{x+1}$, $x \neq -6, -1, 7$

d) $1 - 3y, y \neq \pm 3, \dfrac{-1}{3}$

6. a) $\dfrac{4x}{5(x-1)(x+1)}$, $x \neq \pm 1, 0$

b) $\dfrac{(x+2)(x-12)}{12x(x-3)}$, $x \neq \pm 2, -12, 0, 3$

c) $\dfrac{-x(x-3)}{x-1}$, $x \neq \pm 3, 0, 1, -9$ **d)** $\dfrac{1}{4}$, $x \neq \pm 4, -1, 0$

7. a) The width is $x - 1$. **b)** $x \neq -\dfrac{1}{2}, x \neq 1$

c) The non-permissible values are $x \leq 1$ because a value of x of 1 would result in a length of zero, and any smaller value would result in a negative length.

8. a) $\dfrac{x^2 + 6x + 9}{x^2 - 3x}$ **b)** $\dfrac{x - 3}{x}$

c) Example: Both the product and quotient share two non-permissible values: $x \neq 0$ and 3. This is because both have the same original expressions. To determine the quotient you must multiply the reciprocal of the divisor, so neither the numerator nor denominator of the divisor can equal zero. Therefore, the quotient has a third non-permissible value: -3.

BLM 6–7 Section 6.3 Extra Practice

1. a) $20xy$ **b)** $(x + 4)(3x + 1)$ **c)** $(x + 6)(x - 6)$

2. a) $\dfrac{5x - 4}{3x}$, $x \neq 0$ **b)** $\dfrac{3x^2 + x + 1}{x + 5}$, $x \neq -5$

c) $\dfrac{4}{x - 2}$, $x \neq \pm 2$

3. a) $\dfrac{3a^2 + 15a + 28}{21a^2}$, $a \neq 0$

b) $\dfrac{xy - 4y - 15x^2 - 5x}{5xy^2}$, $x \neq 0, y \neq 0$

c) $\dfrac{56x + 35 + 20y - 7x^2}{35xy^2}$, $x \neq 0, y \neq 0$

4. a) $\dfrac{5x + 11}{(x - 5)(x + 7)}$, $x \neq -7, 5$

b) $\dfrac{2xy + 9x}{7y(y + 3)}$, $y \neq 0, -3$

c) $\dfrac{4x^2 - 2x - 1}{(x + 1)(x - 1)}$, $x \neq \pm 1$

d) $\dfrac{2x^2 + 13x - 6}{(x + 2)(x - 5)(x + 6)}$, $x \neq -2, -6, 5$

5. a) $\dfrac{-3}{a - 3}$, $a \neq \pm 3$ **b)** $\dfrac{3y(3y - 1)}{(y - 2)(y + 2)(y + 3)}$, $y \neq \pm 2, -3$

c) $\dfrac{2(x - 8)}{(x - 2)(x + 2)^2}$, $x \neq \pm 2$ **d)** $\dfrac{2}{(x - 4)(x - 1)}$, $x \neq 1, 4, 7$

6. a) $\dfrac{5}{3(x - 6)}$, $x \neq -1, 6$ **b)** $\dfrac{(x + 3)^2}{(x - 1)(x + 1)}$, $x \neq \pm 1, 7$

c) $\dfrac{x^2 + 5x - 22}{(x + 3)(x + 2)(x - 5)}$, $x \neq -3, -2, 5$

d) $\dfrac{x^2 + 19x - 6}{(x - 3)(x + 5)}$, $x \neq -5, 3$

7. a) $\dfrac{x + 1}{x - 1}$, $x \neq 0, 1$ **b)** $\dfrac{x}{3(x - 4)}$, $x \neq 3, 4$

c) $\dfrac{-1}{(4 + h)(4)}$, $h \neq 0, -4$

BLM 6–8 Section 6.4 Extra Practice

1. a) 2   **b)** $\dfrac{3}{2}, a \neq 0$ **c)** $\dfrac{9}{2}, x \neq 0$ **d)** $\dfrac{1}{6}, -2$

e) $\dfrac{3}{4}, -2, x \neq 0$ **f)** $-6, x \neq 0$

2. a) $x = \dfrac{-3}{4}, x \neq -3$ **b)** $x = -\dfrac{3}{5}, x \neq 0, 1$

c) $x = \dfrac{9}{2}, 1, x \neq 0, 3$ **d)** $x \neq \pm 2, x = 0$

3. a) $x = -2, x \neq \dfrac{-3}{5}$ **b)** $x = -5, x \neq 3, 5$

c) $x = \dfrac{-4}{7}, x \neq 2, -4$ **d)** $x = -\dfrac{1}{2}, 2, x \neq 0, -1$

4. a) $x = -1, x \neq \pm 3$ **b)** $x = 7, x \neq -1, 2$

c) $x = -1, x \neq -2, 3$ **d)** $x = 4, \dfrac{2}{3}, x \neq -\dfrac{3}{2}, 2$

5. a) $x = \pm 1.27, x \neq \dfrac{-3}{2}$ **b)** $x = -0.71, 4.21, x \neq 0$

c) no solution, $x \neq 0, \dfrac{3}{2}, \dfrac{-2}{3}$

d) $x = -20.44, 0.44, x \neq \pm 5$
6. a) No. 1 is a non-permissible value in the second term, so $x \neq 1$.

b) $x = \dfrac{-3}{7}$

7. 3 and 9 or -6 and 18
8. 60 km/h and 90 km/h

BLM 6–9 Chapter 6 Test

1. D   **2.** D   **3.** B   **4.** B   **5.** B   **6.** C   **7.** D

8. $x \neq \dfrac{3}{2}, -3; \dfrac{(x - 3)}{(2x - 3)}$ **9.** $\dfrac{2x^2 - 3x + 3}{(x - 6)(x - 3)}$ **10.** 8

11. Example: $\dfrac{x - 1}{\sqrt{x + 3}}$ does not belong because it is not a rational expression.

12. a) $x \neq -5, -4, 0, 6$ **b)** $\dfrac{(x - 5)(x - 6)}{x(x + 5)}$

13. a) $15 + x$ **b)** $\dfrac{15 + x}{x}$ **c)** $\dfrac{15 + x}{x} = 1.25$; 60 buckets

14. No. Example: Restrictions on a variable in an expression come from the denominator of the factored form before any of the common factors in the numerator and denominator are simplified.
15. Example: Mary cannot cancel $3y$ from the denominator and from one term in the numerator. However, she can divide each term by $3y$, which results in $\dfrac{5y - 1}{1}$, or $5y - 1$.

16. 2; Example: I first found the LCD on each side of the equation and then performed the required operations: addition on the left side and subtraction on the right. I then used multiplication to eliminate the denominator on each side of the equation. Finally, I isolated the variable, and solved.

17. a) $x \neq -1, -2, -3$

b) $-\dfrac{1}{2}, -2$

c) -2 is not a solution because it is a non-permissible value.   **d)** $-\dfrac{1}{2}$.