

## 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)**  $x \neq \frac{-5}{3}$  **e)**  $a \neq 0, 3$  **f)**  $m \neq -2, -3$
3. **a)**  $\frac{3}{x-5}, x \neq \pm 5$  **b)**  $\frac{x+2}{5x}, x \neq 0, 7$   
**c)**  $\frac{x+3}{3(x-3)}, x \neq \pm 3$  **d)**  $\frac{3x}{3x+1}, x \neq \frac{1}{4}, \frac{-1}{3}$   
**e)**  $\frac{5(x+1)}{2(2x+1)}, x \neq \frac{-1}{2}, 5$  **f)**  $\frac{4xy}{x+4}, x \neq -4, y \neq 9$
4. **a)**  $\frac{3r}{5st}, r \neq 0, s \neq 0, t \neq 0$  **b)**  $\frac{3}{x+2}, x \neq \pm 2$   
**c)**  $\frac{c}{c+1}, c \neq -1, d \neq 0$  **d)**  $\frac{-1}{4}, c \neq 7m$   
**e)**  $\frac{x}{x-5}, x \neq -1, 5$  **f)**  $\frac{y+1}{y}, y \neq 0, 3$
5. **a)**  $\frac{3x-1}{x+4}, x \neq -4$  **b)**  $\frac{1+a}{4(1-a)}, a \neq \pm 1$   
**c)**  $\frac{2x+1}{5(x-3)}, x \neq -2, 3$  **d)**  $\frac{4x}{x-2}, x \neq 2, \frac{-1}{3}$   
**e)**  $\frac{-4t(t+2)}{3+2t}, t \neq \frac{-3}{2}, 2$  **f)**  $\frac{5x^2}{2x-5}, x \neq \frac{-1}{3}, \frac{5}{2}$
6.  $\frac{x+1}{4x+1}$  does not reduce. The non-permissible values are  $x \neq \frac{-1}{4}, \frac{4}{3}$ .

## Section 6.2 Extra Practice

1. **a)**  $\frac{3y}{2x}, x \neq 0, y \neq 0$  **b)**  $\frac{x^2y}{2(x+y)}, x \neq -y$   
**c)**  $\frac{x+2}{4}, x \neq 3$  **d)**  $x, x \neq -1, \pm 6$
2. **a)**  $\frac{x-4}{x+2}, x \neq \pm 2$  **b)**  $\frac{5}{y+3}, y \neq \pm 5, 1, -3$   
**c)**  $x, x \neq \pm 3, 2, \frac{-5}{2}$  **d)**  $\frac{5(3x+1)}{4(3x-1)}, x \neq \pm \frac{5}{2}, -4, \frac{1}{3}$
3. **a)**  $\frac{a^3}{bc}, a \neq 0, b \neq 0, c \neq 0$  **b)**  $\frac{x+1}{x+3}, x \neq \frac{-5}{3}, -3$   
**c)**  $\frac{3}{4a}, a \neq 0, 4$  **d)**  $\frac{2(x+3)}{3x^2}, x \neq 0, 3$
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)**  $\frac{-x^2}{2(x-1)}, x \neq \frac{-4}{5}, 0, 1$  **c)**  $\frac{x+7}{x+1}, x \neq -6, -1, 7$   
**d)**  $1 - 3y, y \neq \pm 3, \frac{-1}{3}$
6. **a)**  $\frac{4x}{5(x-1)(x+1)}, x \neq \pm 1, 0$   
**b)**  $\frac{(x+2)(x-12)}{12x(x-3)}, x \neq \pm 2, -12, 0, 3$   
**c)**  $\frac{-x(x-3)}{x-1}, x \neq \pm 3, 0, 1, -9$  **d)**  $\frac{1}{4}, x \neq \pm 4, -1, 0$
7. **a)** The width is  $x - 1$ . **b)**  $x \neq -\frac{1}{2}, x \neq 1$   
**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)**  $\frac{x^2+6x+9}{x^2-3x}$  **b)**  $\frac{x-3}{x}$   
**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:  $-3$ .

### Section 6.3 Extra Practice

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### Section 6.4 Extra Practice

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

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

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

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

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

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

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

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

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

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

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)  $x = \frac{-3}{7}$

7. 3 and 9 or  $-6$  and 18

8. 60 km/h and 90 km/h