

## Sections 2.1 and 2.2

1. Solve:

(a)  $x - 12 = -19$ .

(b)  $\frac{7x}{2} = 35$ .

(c)  $4c + 3 = 7c - 8$ .

(d)  $(2w - 5) - (8 - 3w) = 4w + 17 - w$ .

(e)  $3y - 5 - (2y - 4) = (y + 3) + (y - 7)$ .

2. Solve

(a)  $|5x + 7| = 2$ .

(b)  $|2x - 5| = |4x + 7|$

3. An 8-foot board is cut into 2 pieces. If one piece is  $x$  feet long, express the other length in terms of  $x$ .

4. With  $x$  representing the unknown number, write each of the following phrases as an algebraic expression and simplify.

(a) Seven times the sum of a number and 5.

(b) The sum of triple a number and 10, subtracted from 17.

## Section 2.3

1. Solve:  $3z - 7 = 4 - 5z$ .

2. Solve:  $\frac{3(y+3)}{5} = 2y + 6$ .

3. Solve:  $\frac{1}{3}(x - 7) + 5 = 6 - \frac{2}{5}(3x + 2)$ .

4. Solve:  $\frac{3}{2}(5x + 7) - 4 = \frac{2}{5}(3 - x) + 2$ .

5. Solve:  $4(2 + x) - 2 = 7x - 3(x - 2)$ .

6. If  $\frac{2}{3}$  is added to twice a number, the result is  $\frac{5}{6}$  subtracted from three times the number. Find the number.

## Section 2.4

1. Solve  $(4x + 3) - (5 - 2x) = 7x + 3$ .      2. Solve  $\frac{5}{2}(x - 3) = \frac{7}{5}(4 - 3x)$ .

3. Three times the sum of a number and  $-2$  is the same as 4 times the number. Find the number.

4. A 45-inch board is to be cut into three pieces so that the second piece is three times as long as the first piece and the third piece is 5 times as long as the first piece. If  $x$  represents the length of the first piece, find the lengths of all three pieces.

5. A mechanic gave an estimate for repairing a car. He charges \$62 per hour and the parts are expected to cost \$125. If the total estimate is \$280, how many hours does he expect the job to take?

6. A package delivery service delivered 30 packages. Each package weighed either 5 pounds or 8 pounds. If the total weight of all of the packages was 186 pounds, how many 8-pound packages were there?
7. A boat travels the same distance against the current in 4 hours as it does with the current in 1.25 hours. If the rate of the current is 2.75 mph, what is the boat's rate in still water?

## Section 2.5

1. Fill in the following table.

Percent	Decimal
57%	
	0.42
3.2%	
	0.0089

2. Find 17% of 112.
3. To the nearest hundredth of a percent, 57 is what percentage of 247?
4. To the nearest hundredth of a percent, 247 is what percentage of 57?
5. Solve  $\frac{4}{3}(2x - 3) + 5 = \frac{5}{2}(7x + 2) - \frac{1}{4}x$ . Write your answer as a reduced fraction.
6. A store owner increased the price of a \$50 item by 20%. Then the item did not sell well, so he decreased that price by 20%. What did the item then sell for?
7. Jennifer purchased two \$7.99 books at Border's. Her total bill, including tax, was \$17.32. What was the sales tax rate (to the nearest tenth of a percent)?
8. A hotel room rented for five nights costs \$706.25, including 13% in taxes. Find the cost of the hotel room for one night.
9. If \$1500 grew to \$1950 after 5 years, find the simple interest rate.
10. Perry is planning a vacation in Europe in 2 years. How much should he invest in a certificate of deposit that pays 3% simple interest to get the \$3500 that he needs for the trip? Round to the nearest dollar.

## Section 2.6

1. Solve  $3(4x - 5) + 7(x - 7) = 3(2 - 3x) + 14$
2. Solve  $|4x - 3| = |7x + 2|$ .
3. How long will it take a jet traveling at 480 miles an hour to fly the 5368 miles from San Francisco to London? Give your answer in hours and minutes.
4. The formula for converting from Celsius to Fahrenheit is  $F = \frac{9}{5}C + 32$ . Solve this formula for  $C$ .
5. In a triangle, the smallest angle is one-third of the largest angle, and the middle angle is  $37^\circ$  less than the largest angle. Find the angles.
6. A rectangle has length 6 inches and perimeter 38 inches. What is the area of the rectangle?
7. Solve for  $h$ :  $S = 4\ell w + 2wh$ .

## Section 2.7

1. Write the inequalities in interval notation and using the number line.
  - (a)  $-3 < x \leq 7$
  - (b)  $x > -7$
2. Solve the following inequalities and write the solution in interval notation and using the number line.
  - (a)  $4x - 3 \geq 8x + 6$
  - (b)  $-7x + 3 \leq -4$
  - (c)  $3(2x - 5) + 7(x + 4) < 5(7 - x) + 13$
  - (d)  $\frac{4}{5}(x + 3) > \frac{2}{3}(4 - x)$
  - (e)  $8 \leq 3(2 - 5x) < 16$
3. A family is going to drive 250 miles in two cars. The first car leaves home at 10:00 AM and drives at 60 miles per hour. The second car leaves at 10:30 AM. How fast does the second car need to travel in order to arrive at the destination first?

### Sections 3.1 and 3.2

1. Draw the Cartesian plane. Label the axes, the quadrants, and the origin. Then locate and label  $A(-2, 5)$  and  $B(4, -4)$ .
2. Graph  $y = -2x + 6$ . Find and label the  $x$ -intercept and the  $y$ -intercept.
3. The equation  $4x + 3y = 8$  has a line as its graph. Find the  $x$ -intercept and the  $y$ -intercept. Then graph the line.
4. What does the equation of a vertical line look like?
5. What does the equation of a horizontal line look like?
6. Graph  $y = \frac{1}{2}x$ . Find and label the  $x$ -intercept and the  $y$ -intercept.
7. The number of dentists in the United States can be estimated by the equation  $D = 3.58t + 140$ , where  $t$  is the number of years after 1980 and  $D$  is in thousands. Predict the number of dentists in the year 2007.
8. The number of sales that a salesman makes  $x$  days after being hired is given by the equation  $y = 12 - 0.3x$ . Find the  $x$ - and  $y$ -intercepts of the equation, and interpret them in the context of the problem.

### Section 3.3

1. Find the slope of the line through
  - (a)  $(5, -2)$  and  $(-3, 7)$ .
  - (b)  $(8, 2)$  and  $(-5, 2)$ .
  - (c) the origin and  $(0, 9)$ .
2. Determine if lines 1 and 2 are parallel, perpendicular, or neither.  
Line 1 passes through  $(2, -2)$  and  $(4, -8)$  and line 2 passes through  $(0, 7)$  and  $(3, 8)$ .
3. A line with slope  $-\frac{2}{5}$  passes through  $(3, -6)$ . Find two other points on the line.
4. Professional plumbers suggest that a sewer pipe should rise 0.25 inches for every horizontal foot. Find the recommended slope for a sewer pipe. Round to the nearest hundredth.
5. Consider the line with equation  $4x - 7y = 3$ . Find the  $x$ -intercept and the  $y$ -intercept. Then graph the line.
6. Competitive hiking trails are very steep. What is the grade of a competitive hiking trail which rises 1100 feet over a horizontal distance of 7520 feet? Give your answer to the nearest hundredth of a percent. (Note: The angle of elevation of this trail would be about  $8.3^\circ$ .)

### Section 3.4

1. Find the equation of the line with slope  $-\frac{5}{3}$  which passes through the point  $(0, -1)$ .
2. Use the slope-intercept form to graph  $y = \frac{2}{3}x + 5$ .
3. Are the following pair of lines parallel, perpendicular, or neither? Explain.

$$\begin{cases} 5x + 4y = 7 \\ 3x - y = 4 \end{cases}$$

4. Find the equation of the line with undefined slope which passes through the point  $(-3, 5)$ .
5. Find the equation of the line with slope  $-2$  and with y-intercept  $(0, 4)$ .
6. Diane's monthly bill for telephone service can be computed using a linear equation. When she makes no calls, the bill is \$17.50. When she makes 50 calls, the bill is \$21.50.
  - (a) Write a linear equation that gives Diane's monthly telephone bill in terms of  $x$ , the number of telephone calls she makes.
  - (b) What will Diane's bill be if she makes 75 calls in a month?

### Section 3.5

1.
  - (a) Find the equation of the line through  $(4, 3)$  and  $(-2, 6)$ .
  - (b) Find the equation of the line through  $(4, 3)$  which is perpendicular to the line from part (a).
2. Find the equation of the line through  $(-1, -2)$  and parallel to the line  $2x + 3y = 4$ .
3.
  - (a) Find the equation of the line through  $(6, 1)$  with slope 5.
  - (b) Find the x-intercept of the line from part (a).
  - (c) Find the y-intercept of the line from part (a).
  - (d) Graph the line discussed in this problem. (Label carefully.)
4. In January 2007, there were 71,000 registered gasoline-electric hybrid cars in the United States. In 2004, there were only 29,000 registered gasoline-electric hybrids.
  - (a) Write an equation describing the relationship between time and the number of registered gas-electric hybrids. (Use the number of years past 2004.)
  - (b) Use your equation to predict the number of registered gasoline-electric hybrids in 2010.

### Section 3.6

- In 2002, crude oil production by OPEC was about 28.7 million barrels per day. In 2007, crude oil production had risen to about 34.5 million barrels per day.
  - Find the linear equation for daily crude oil production  $y$  in terms of the number of years past 2002,  $x$ .
  - Use the equation from (a) to predict the daily crude oil production by OPEC in 2015.
  - In what year would production be 50 million barrels per day?
- Solve  $3(2 - 4x) - 5(3x - 7) = 9x + 4$ .
- The equation of one line is  $y = \frac{2}{3}x + 5$  and the equation of a second line is  $2x + 3y = 7$ . Are the lines parallel, perpendicular, or neither?
- Solve  $|4x + 3| = |5x - 2|$ .

### Section 10.5

- Graph  $4x - 5y \geq 10$ .
- Graph  $3x + 2y < 2$ .
- Graph  $x > 5$ .
- Graph  $5x + 3y \geq 0$ .
- Solve  $5(2 - x) \leq -8$ . Write your answer in interval notation.

### Section 4.2

- Solve by substitution.
  - $\begin{cases} 2x + 5y = 11 \\ 2y = 4 - x \end{cases}$
  - $\begin{cases} 2x + 10y = 3 \\ 3x + 15y = 7 \end{cases}$
  - $\begin{cases} 12x + 15y = 21 \\ 20x + 25y = 35 \end{cases}$
  - $\begin{cases} 3x + 5y = 7 \\ 2x - 3y = 8 \end{cases}$
- Find the  $x$ -intercept and the  $y$ -intercept of the line  $5x + 3y = 6$ .
  - Graph the linear inequality  $5x + 3y < 6$ .
- Solve the inequality  $\frac{2}{3}(x + 2) < \frac{1}{5}(2x + 7)$ . Write your answer in interval notation.

### Section 4.3

1. Solve by Addition.

$$(a) \begin{cases} 2x + 5y = 11 \\ 2y = 4 - x \end{cases}$$

$$(b) \begin{cases} 2x + 10y = 3 \\ 3x + 15y = 7 \end{cases}$$

$$(c) \begin{cases} 12x + 15y = 21 \\ 20x + 25y = 35 \end{cases}$$

$$(d) \begin{cases} 3x + 5y = 7 \\ 2x - 3y = 8 \end{cases}$$

2. Are the lines  $6x - 4y = -3$  and  $2x - 3y = -21$  parallel, perpendicular, or neither?
3. 15 is what percent of 8400? Give your answer to the nearest one-hundredth of a percent.

### Section 4.4

**Solve. Check your setup before solving each problem!**

1. A first number plus three times a second number is  $-17$ . Five times the first number plus twice the second totals 6. Find the numbers.
2. Pamela requires 3 hours to swim 15 miles downstream on the Illinois River. The return trip upstream takes 5 hours. Find Pamela's speed in still water and the speed of the current.
3. Four large cheeseburgers and two chocolate shakes cost a total of \$7.90. Two shakes cost 15 cents more than one cheeseburger. What is the cost of a cheeseburger? A shake?
4. Dennis has a jar containing 327 coins, all of which are either quarters or dimes. The total value of the coins is \$50.55. How many of each type of coin do they have?
5. A shopkeeper has two types of coffee beans on hand. One type sells for \$5.20 a pound, the other for \$5.80 a pound. How many pounds of each type must be mixed to produce 16 pounds of a blend that sells for \$5.50 a pound?

### Section 5.1

Evaluate/Simplify.

1.  $5^2$

2.  $-4^4$

3.  $\frac{4^2}{3^3}$

4.  $(2x^4)(5x^5)(3x^7)$

5.  $\frac{(a^2b^4)(a^5b^6)}{a^6b^5}$

6.  $\frac{x^3y^7}{xy^4}$

7.  $\frac{x^{15}y^6}{x^5y^2}$

8. How much is in an account after 2 years if \$2500 is invested at 1.5% interest compounded annually?
9. Solve  $3(3 - 2x) - 4(5 - x) = x + 5$ .
10. Consider the line whose equation is  $y = 3x + 4$ .
  - (a) What is the slope of the line?
  - (b) What is the y-intercept of the line?
  - (c) Use the slope and the y-intercept to find a second point on the line.
  - (d) What is the x-intercept of the line?
  - (e) Graph the line.

### Section 5.2

Evaluate/Simplify.

1.  $(a^3b^4)^7$
2.  $\left(-\frac{3ab^2}{c^3}\right)^4$
3. Solve the inequality  $\frac{3}{5}(x + 2) - \frac{7}{2}(3 - x) \leq 6$ . Write your answer in interval notation.
4. Solve  $9 - |7x - 6| = 4$ .
5. Simplify  $\frac{(4a^2b^3)^4(-3a^5b^2)^3}{(6a^4b^3)^5}$ .  
Write your answer two ways: (i) with positive exponents only, and (ii) as a non-fraction.
6. A chemist needs to prepare 12 ounces of a 9% hydrochloric acid solution. Find the amount of a 4% solution and the amount of a 12% solution that he should mix.

### Section 5.3

Simplify. Write your answer without any negative exponents.

1.  $(x^3y^2)^2$
2.  $\frac{x^7y^2}{x^7y^6}$
3.  $\frac{(3p^2q)^3(-2pq^2)^4}{(-3pq)^2}$
4.  $\left(\frac{-2w^3z^3}{wz}\right)^3 (-3wz^2)^3$
5.  $-4^{-2}$
6.  $(-4)^{-2}$

7.  $(5^{-3})^{-2}$

8.  $\frac{p^6}{p^{-4}}$

9.  $\frac{(3a)^{-2}(2ab^{-1})^0}{(2a^{-2}b^3)^{-2}}$

10.  $\left(\frac{1}{3}\right)^{-2}$

11.  $\left(\frac{x^{-3}x^2}{x^{-1}}\right)^{-4}$

12.  $\left(\frac{p^{-2}q^{-3}}{3p^2q^{-4}}\right)^{-3} (9p^2q)^{-2}$

**Section 5.4**

1. Write in scientific notation.

(a) 0.00258

(b) 3,456,000

2. Write as a decimal.

(a)  $5.76 \times 10^{-5}$

(b)  $8.123 \times 10^7$

3. Calculate. Give your answer two ways – as a decimal and in scientific notation.

(In decimal notation, tell me how many 0's there are.)

(a)  $(4.7 \times 10^{16})(9.6 \times 10^{-3})$

(b)  $\frac{8.7 \times 10^{-5}}{2.5 \times 10^4}$

4. Simplify. Write your answer without any negative exponents.

(a)  $(x^{-3}y^2)^{-4}$

(d)  $-7^4$

(b)  $\left(\frac{3x^2y^{-2}}{2x^{-4}y^3}\right)^4$

(e)  $\frac{(5c)^{-3}}{(4c^5)^{-2}}$

(c)  $(-5)^{-4}$

(f)  $\left(\frac{4c^2d^{-3}}{8c^{-2}d^4}\right)^{-5} \left(\frac{c^4}{6d^5}\right)^2$

**Section 5.5**

1. For each expression, determine if it is a polynomial. If it is not, explain why not.

(a)  $5x^2y^3 - \frac{7}{y^2}$

(c)  $\frac{1}{17}x + 3$

(b)  $4x^{-2} + 5x^2 + 17$

(d)  $\sqrt{x^2 + 25}$

2. Consider the polynomial  $8x^3 - 7x^2 + 3x^5 + 6$ . Determine its degree and the leading coefficient. Is this a monomial, binomial, trinomial, or none of these?

3. If  $P(x) = 8x^2 - 7x + 3$ , find

(a)  $P(1)$

(b)  $P(-2)$

(c)  $P(0)$

4. Simplify

(a)  $(5x^2 + x + 9) - (2x^2 - 9)$

(b)  $(-3x + 8) + (-3x^2 + 3x - 5)$

(c)  $(9xyz + 4x - y) + (-9xyz - 3x + y + 2)$

5. A ball is thrown upward with an initial velocity of 25 feet per second from the top of a 200-foot tall building. The height (in feet) of the ball at any time  $t$  can be described by the polynomial function  $P(t) = -16t^2 + 25t + 200$ . Find the height of the ball when  $t = 1$  second and  $t = 3$  seconds.

6. Solve  $\begin{cases} 4x - 3y = 7 \\ x + 2y = 2 \end{cases}$

7. Find the  $y$ -intercept of the line through the points  $(3, 5)$  and  $(4, -3)$ .

### Sections 5.6

In Problems 1–10, compute. Simplify your answers.

1.  $2x(4xy + 3x^2y)$

6.  $(2x^2 + x - 3)(x^2 + 5x + 2)$

2.  $(2x + 5)(3x - 7)$

7.  $(2x + 7y)(3x - 5y)$

3.  $(3x^2 + 1)^2$

8.  $(3x + 2)(4x + 5)$

4.  $(x + 2)(3x^2 - 2x - 5)$

9.  $(5x - 1)^2$

5.  $(2x + 1)^3$

10.  $(4x - 3)(4x + 3)$

11. Graph the inequality  $3y - 4x \geq 8$ .

### Section 6.1

1. Find the GCF.

(a) 12, 18, 90

(b)  $p^7q^{12}$ ,  $p^3q^8$ ,  $p^5q^6$

2. Factor out the GCF.

(a)  $-12a^3x + 28a^2x$

(b)  $30x^2y + 18xy^2$

3. Factor by grouping

(a)  $3x + 6 + xy + 2y$

(b)  $2xy - 10x - 3y + 15$

4. Factor completely.

(a)  $x(y^2 + 4) - 5(y^2 + 4)$

(b)  $-18x^7y^5 - 30x^8y^4$

(c)  $30x^2y - 40x^2 - 6y + 8$

5. Solve  $3(4x + 5) + 6 = 7(8 - 9x) + 10$ .

6. Simplify  $\left(\frac{(a^2b^{-3})^{-2}(a^{-4}b^5)}{a^{-7}b^8}\right)^9$ .

## Section 6.2

In problems 1 – 10, factor completely.

1.  $x^2 - 11x + 30$

6.  $x^2 - 10x + 24$

2.  $x^2 + 12x + 32$

7.  $3x^2y + 3xy - 12y$

3.  $x^2 + 3x - 10$

8.  $x^2 + 7x + 3$

4.  $x^2 + 11x + 24$

9.  $x^2 - 4xy - 5y^2$

5.  $x^2 - 5x - 6$

10.  $6x^3 + 54x^2 + 120x$

11. Solve  $-2(x + 4) + 7 < 3$ . Write your answer in interval notation.

12. What is the equation of a line through the origin which has slope -3?

13. Find the slope of the line through  $(-5, 7)$  and  $(9, 2)$ .

## Section 6.4

In problems 1 – 9, factor completely.

1.  $3x^2 + 17x + 10$

6.  $4y^2 + 20y + 25$

2.  $8y^2 - 19y + 6$

7.  $2x^2 + 3x - 4$

3.  $12x^2 + 11x - 5$

8.  $9x^2 - 30xy + 25y^2$

4.  $8x^2 - 4x + 6$

9.  $8x^2 + 14x - 9$

5.  $4x^3 - 15x^2 + 9x$

10. What is the equation of a line which passes through  $(4, -2)$  and is perpendicular to the line  $x=3$ ?

11. Find the amount of 20% acid solution and the amount of 45% acid solution that should be combined to prepare 100 ml (milliliters) of a 30% solution.

## Section 6.5

In problems 1 – 6, factor completely.

1.  $49a^2 - 25$

4.  $x^3 + 125$

2.  $100 - a^2b^2$

5.  $25x^2 + 16$

3.  $3k^3 - 24$

6.  $4y^4 - 36y^2$

7. The area of a trapezoid with parallel sides having length  $a$  and  $b$  and height  $h$  is

$$A = \frac{1}{2}(a + b)h.$$

Solve for  $b$ .

8. Write 0.0000000075 in scientific notation.

9. To the nearest tenth of a percent, 89 is what percent of 145?

10. A doctor's prescription calls for a daily intake of 40 mg of Vitamin C and 30 mg of Vitamin D. The pharmacy stocks two compounds that can be used: one contains 20% Vitamin C and 30% Vitamin D, the other 40% Vitamin C and 20% Vitamin D. How many milligrams of each compound should be mixed to fill the prescription.

## Section 6.7

In problems 1 – 8, solve.

1.  $3x(x + 5) = 0$

5.  $6x^3 - 10x - 4x^2 = 0$

2.  $(4x - 5)(3x + 1) = 0$

6.  $x^2 + 9x = -18$

3.  $18x^2 - 15x + 2 = 0$

7.  $(2x + 3)(x^2 - 10x + 25) = 0$

4.  $x^2 - 4x = 12$

8.  $x^2 + 8x - 5 = -21$

9. Susan decided to go to the store, which is 8 kilometers from her house. She ran at a rate of 7 kilometers per hour for part of the way and then walked at the rate of 3 kilometers per hour the rest of the way. If the total trip took 2 hours, how many kilometers did she run?

## Section 11.1

1. Find

(a)  $\sqrt{144}$

(c)  $\sqrt[3]{64}$

(b)  $\sqrt{9}$

(d)  $\sqrt[3]{-216}$

2. Use your calculator to find to two decimal places.

(a)  $\sqrt{91}$

(d)  $\sqrt[9]{-51}$

(b)  $\sqrt[3]{50}$

(e)  $\sqrt[10]{100}$

(c)  $\sqrt[3]{-11}$

3. Simplify. Do not assume that the variables are positive.

(a)  $\sqrt[4]{\frac{x^{12}y^{16}}{z^{20}}}$

(b)  $\sqrt[3]{-8a^6b^9}$

4. Simplify. Assume that the variables are positive.

(a)  $\sqrt[5]{243x^{10}y^{15}z^{35}}$

(b)  $\sqrt[6]{a^{24}b^{48}c^{30}}$

5. Two cars leave an intersection at the same time, one heading north and the other heading east. At the end of two hours, one car has travelled 86 miles and the cars are 160 miles apart. How far (to the nearest tenth of a mile) has the other car travelled?

6. Solve  $\begin{cases} 2x = 4y - 7 \\ 3x - 6y = 5 \end{cases}$

### Sections 12.1 and 12.2

In problems 1 – 7, solve. Give your answers exactly and then to the nearest hundredth.

1.  $2m^2 + 5m = 4$

2.  $3m^2 - 2m = 7$

3.  $2x^2 - 3x + 2 = 0$

4.  $\frac{2}{5}y^2 = \frac{6}{5}y - \frac{3}{5}$

5.  $\frac{x^2}{3} - x = \frac{5}{3}$

6.  $(7x + 4)^2 = 18$

7.  $6x^2 + 13x - 5 = 0$

8. Simplify  $\left(\frac{(a^2b^{-3})(a^4b^2)^{-2}}{a^{-4}b^3}\right)^3$ .

9. Solve  $\begin{cases} 6x - 9y = 12 \\ 15y - 10x = -20 \end{cases}$

### Section 6.7 (Part 2)

1. The daily cost  $C$  in dollars of producing  $x$  items in a factory is given by  $C(x) = -\frac{x^2}{10} + 100x - 24000$ . How many items must be produced so that the daily cost is \$1000?

- Find the dimensions of a rectangle whose length is 2 more than 3 times its width if its area is 85 square feet.
- A man jumps off a diving board into a pool. The equation  $h(t) = -16t^2 + 40$  gives the height  $h$  in feet the man is above the pool  $t$  seconds after he jumps. How far above the pool is the diving board, and how long does it take the man to hit the water?
- The rate of the current of a stream is 4 mph. Daniel rowed his boat downstream a distance of 9 miles and then back upstream to his starting point. If the complete trip took 10 hours, what was Daniel's rate in still water? (Hint: Solve for  $t$  in  $d = rt$ .)

### Section 7.1

In Problems 1 – 4, write each rational expression in lowest terms.

1.  $\frac{4x^8y^2}{14x^5y^9}$

3.  $\frac{x^2 + x - 6}{x^2 - 4x + 4}$

2.  $\frac{x - 5}{25 - x^2}$

4.  $\frac{x^3 + 64}{4 + x}$

5. Consider  $\frac{t^2 + 7}{t^2 - 9t + 20}$ .

- What is the domain of the rational function given above?
  - Evaluate the rational function at  $t = 3$ .
- Solve  $12x^2 - 19x = 18$  by factoring.
  - Solve  $|x + 3| = |5x - 7|$ .
  - Give the quadratic formula and the general equation it solves.
    - Use the quadratic formula to solve  $3x^2 - 9x + 4 = 0$ . Give answer(s) exactly and then to the nearest hundredth.

### Section 7.2

In Problems 1 – 7, simplify.

1.  $\frac{x^2 - y^2}{xy - y^2} \cdot \frac{y^2}{x^2 + xy}$

4.  $\frac{16 - x^2}{x^2 + 8} \div \frac{4 - x}{2x^2 + 16}$

2.  $\frac{3x^2}{x^2 - 1} \div \frac{x^5}{(x + 1)^2}$

5.  $\frac{a^2 - ab}{6a^2 + 6ab} \div \frac{a^3 - b^3}{a^2 - b^2}$

3.  $\frac{9x^8y^2}{42xy^5} \cdot \frac{6}{x^5}$

6.  $\frac{a^2 + ac + ba + bc}{a - b} \div \frac{a + c}{a + b}$

7. (a) Convert 25 square feet to square inches.  
 (b) Convert 1080 square inches to square feet.  
 (c) Convert 45 mph to feet per second.
8. The monetary units in Batmanus are bams, pows, sockos, and kerbloories. If 15 bams are the same as 4 pows, 9 pows are the same as 3 sockos, and 20 sockos are the same as 7 kerbloories, how many kerbloories are equal to 7200 bams?

### Section 7.3

1. Find the LCD of  $\frac{4}{9x^3}$  and  $\frac{7}{12x^4}$ .
2. Find the LCD of  $\frac{5}{27x}$  and  $\frac{7x}{3x+6}$ .
3. Find the LCD of  $\frac{5x+1}{2x^2-9x-5}$  and  $\frac{3x}{2x^2+7x+3}$ .
4. Rewrite  $\frac{15a}{3x^2y}$  so that the denominator is  $33x^4y^3z$ .
5. Simplify  $\frac{8n^2-18}{2n^2-5n+3} \div \frac{6n^2+7n-3}{n^2-9n+8}$ .
6. Solve each equation. Give answers exactly and then to the nearest hundredth.
  - (a)  $5x^2 - 3x = 7$
  - (b)  $6x^2 - 19x + 15 = 0$

### Section 7.4

In Problems 1 – 8, simplify.

1.  $\frac{7m}{2n} + \frac{9m}{2n}$
2.  $\frac{3y^2}{y-4} - \frac{32+y^2}{y-4}$
3.  $\frac{a}{a^2-5a-14} - \frac{7}{a^2-5a-14}$
4.  $\frac{5}{4(x+1)} - \frac{3}{7x}$
5.  $\frac{x}{x^2-25} + \frac{5}{25-x^2}$
6.  $\frac{-3}{x^2-4x+3} - \frac{2}{x-1}$
7.  $\frac{5}{x^2-9} + \frac{2}{x^2-x-12}$
8.  $\frac{5a-15}{21} \div \frac{9-a^2}{14a}$

### Section 7.5

In Problems 1 – 7, simplify.

1.  $\frac{\frac{4}{x}}{\frac{5}{2x}}$
2.  $\frac{3-\frac{2}{x}}{x-\frac{4}{9x}}$
3.  $\frac{5a^{-1}-3b^{-2}}{a^{-1}+b^{-1}}$
4.  $\frac{\frac{1}{2}-\frac{1}{3}}{\frac{3}{4}+\frac{2}{5}}$

$$5. \frac{2 - \frac{x}{y}}{\frac{x^2}{y^2} - 4}$$

$$6. \frac{\frac{x+1}{x-1} - \frac{2}{x-2}}{\frac{x}{x-1} + \frac{x}{x-2}}$$

$$8. \text{ Solve } (6x + 1)(x - 2) = 8.$$

$$7. \frac{2x^{-1} - y^{-1}}{y^{-3} - 8x^{-3}}$$

## Section 7.6

In Problems 1 – 4, solve.

$$1. \frac{a-1}{6} + \frac{a+1}{10} = a - 3$$

$$2. \frac{4}{x} - \frac{5}{x+3} = 1$$

$$3. \frac{3}{3x-2} - \frac{7}{x+1} = \frac{5}{3x^2+x-2}$$

$$4. \frac{x+1}{x+3} - \frac{2}{x-2} = \frac{3x-16}{(x+3)(x-2)}$$

5. Solve the inequality  $-3(x + 2) > 12$ . Write your answer in interval notation.

$$6. \begin{cases} 3x - 4y = 10 \\ 4x + 3y = 5 \end{cases}$$

$$7. \text{ Simplify } \left( \frac{(a^{-1}b^2)^{-3}}{a^4b^{-5}} \right)^6.$$

## Section 7.7

- In a local district, the ratio of Democrats to Republicans is 5 to 7. If there are 2100 Republicans in the district, how many Democrats are there?
- To mix weed killer correctly with water, it is necessary to mix 3 tablespoons of weed killer with 2 gallons of water. Find how many gallons of water are needed to mix with the entire box if it contains 40 tablespoons of weed killer.
- It takes Carol 3 hours to paint a small room and it takes John 5 hours to paint the same room. If the two work together, find how long it takes to complete the job.
- One pipe fills a storage pool in 10 hours. A second pipe fills the same pool in 15 hours. When a third pipe is added and all three are used to fill the pool, it takes only 5 hours. Find how long it takes the third pipe to do the job alone.
- In a certain country, the units of currency are the droogs, the dreeps, and the dribbles. If 5 droogs are equivalent to 4 dreeps, and 7 dreeps are equivalent to 25 dribbles, how many dribbles are in 28 droogs?
- A train can make a 480 kilometer trip in the same time that a car can make a 320 kilometer trip. If the train travels 40 kilometers per hour faster than the car, how long does it take the car to make its trip?