

# HOW TO USE STAY SHARP MATH

The STAY SHARP MATH Skill Sharpener System was developed by a team of experienced math teachers with over 100 years of combined experience teaching elementary through college level mathematics.

Mathematical concepts build upon each other. To achieve success in mathematics, recall of prior topics is essential. STAY SHARP MATH helps you build the solid foundation necessary to succeed.

The STAY SHARP MATH Skill Sharpener System was designed to be flexible. Here are some of the ways students use STAY SHARP MATH.

## SUMMER MATH REVIEW

*(Use the grade that you have just completed.)*

Use STAY SHARP MATH two to four times a week for eight weeks. Each week contains two lessons, a quiz, and a cumulative review. Students find the most success when they set a weekly routine.

## SUPPLEMENTING CLASSWORK

Do you need help recalling previously learned math topics? Keep math topics fresh by completing a STAY SHARP MATH section once or twice a week. Track your progress with the quizzes and final test.

## **RESOURCE FOR MATH TUTORS**

STAY SHARP MATH is a structured program that math tutors can use to guide their instruction and easily track student progress.

## **SUMMER SCHOOL PROGRAM**

STAY SHARP MATH is an excellent program for middle school summer school. Teachers use the lesson topics to guide their instruction. The lessons and cumulative reviews are used as classwork and homework. The eight quizzes and final test provide ongoing assessment.

Visit our website for additional resources.

**[www.staysharpmath.com](http://www.staysharpmath.com)**

# Ratio and Proportion

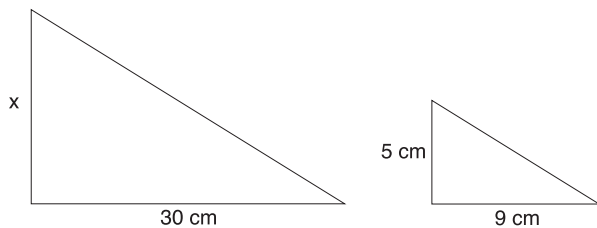
1. Lacey paid \$2.94 for 3 oranges. At this rate, what will she pay for 8 oranges?

2. Solve the following proportion.

$$\frac{8}{22} = \frac{12}{x}$$

3. A purple paint is made by mixing 2 parts of blue with 3 parts of red. How much red paint should be used if 5 gallons of blue is used?

4. The figures below are similar. Find length  $x$ .



5. Find  $x$ :

$$\frac{3x}{5} = \frac{24}{10}$$

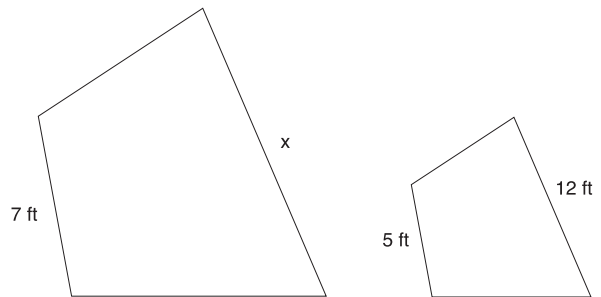
6. A car uses 12 gallons of gasoline to travel 264 miles. How far can it travel on 20 gallons of gasoline?

7. The ratio of boys to girls in Mrs. Kelley's third period class is 4 to 5. If there are 27 students in the class, how many are girls?

8. A pump moves 64 gallons of water in 4 minutes. At this rate, how many gallons of water will be moved in 1 hour?

9. In a recent survey, people were asked the question, "Do you prefer regular or diet soda?" The people surveyed preferred regular soda by a ratio of 4 to 1. Based on these results, if you surveyed 120 people, how many would you expect to prefer regular soda?

10. The figures below are similar. Find length  $x$ .



11.  $\frac{9}{10} \times \frac{1}{3}$

12.  $2\frac{2}{5} - 1\frac{1}{3}$

13.  $\frac{6}{7} \div \frac{2}{3}$

14.  $\frac{18}{19} + \frac{1}{2}$

# Linear Relationships

1. The following table represents a linear relationship. Find the value of  $p$ .

$x$	$y$
0	7
1	9
2	11
3	$p$
4	15

3. Which ordered pair is a solution of  $y = 3x - 1$ ?

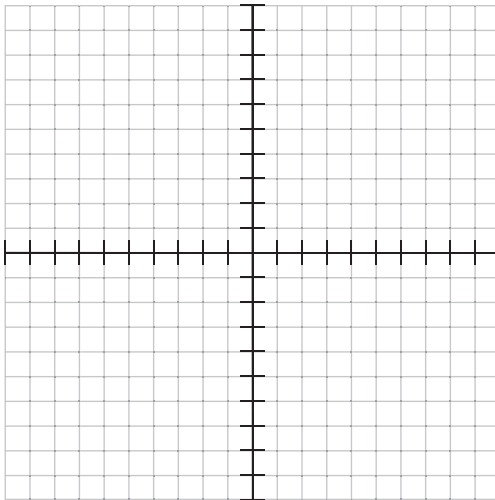
- a. (3, 4)    b. (6, 1)  
c. (0, 3)    d. (2, 5)

4. What is the slope of the line

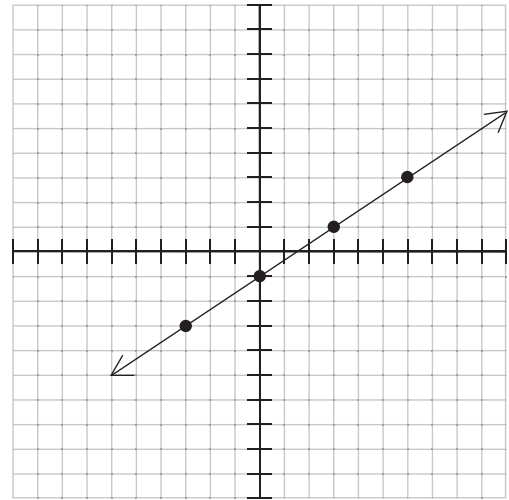
$$y = \frac{1}{3}x + 4?$$

2. Graph the following equation.

$$y = 2x + 3$$



5. Find the slope of the line below.

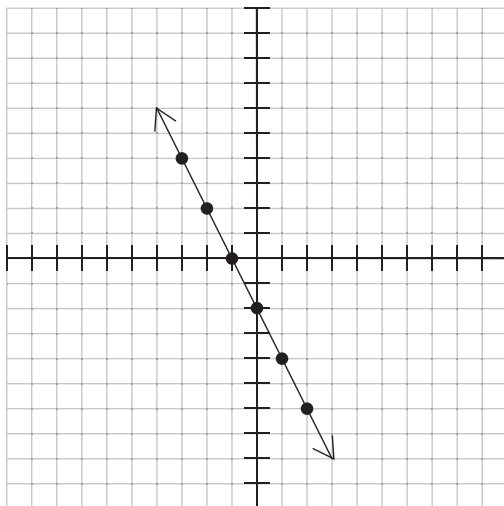


6. What is the y-intercept of the line  $y = 5x + 9$ ?

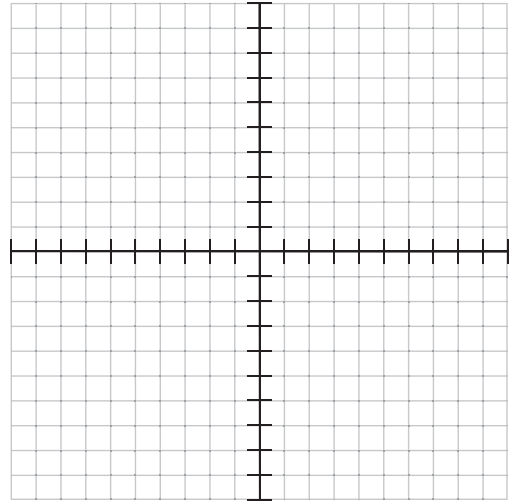
7. The ordered pair  $(4, p)$  is a solution to the equation  $y = \frac{1}{2}x + 3$ . Find the value of  $p$ .

8. A custom t-shirt manufacturer charges a \$50 set-up fee plus \$6 per t-shirt to print t-shirts for sports teams. Write an equation to find the total cost,  $C$ , of purchasing  $n$  t-shirts.

9. Find the y-intercept of the line below.



10. Graph the equation  $y = \frac{3}{2}x - 2$ .



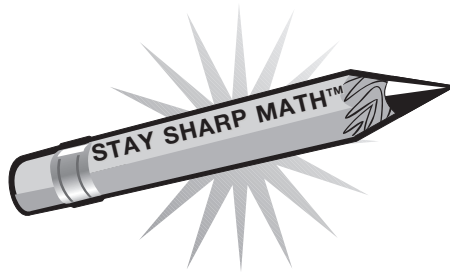
11.  $\frac{7}{10} \times \frac{3}{4}$

12.  $\frac{2}{9} + \frac{1}{6}$

13.  $2\frac{1}{4} \div 5$

14.  $\frac{7}{8} - \frac{2}{5}$

# QUIZ 6

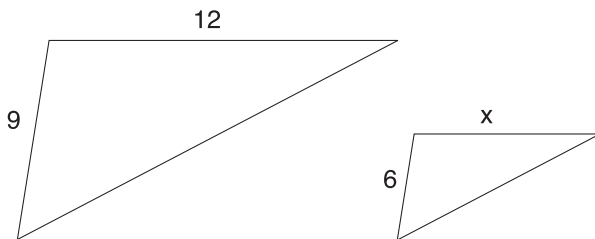


1. Liam ran 4 miles in 26 minutes. At this rate, how long will it take him to run 6 miles?

7. The table below represents a linear relationship. Find the value of  $v$ .

$x$	$y$
0	0
1	0.2
2	0.4
3	0.6
4	0.8
5	$v$

2. The figures below are similar. Find length  $x$ .



3. What is the slope of the line  $y = 5x - 10$ ?

8. Find  $x$ .

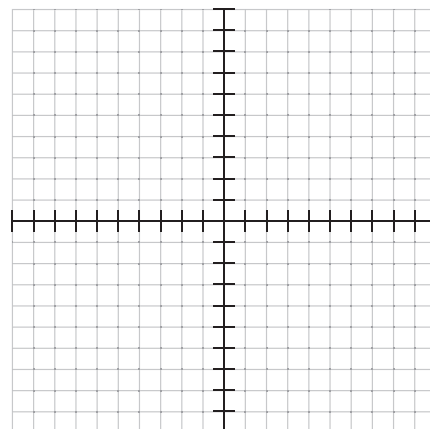
$$\frac{2x}{3} = \frac{28}{42}$$

4. The ordered pair  $(3, p)$  is a solution to the equation  $y = 8x - 12$ . Find the value of  $p$ .

9. What is the  $y$ -intercept of the line  $y = 8x - 2$ ?

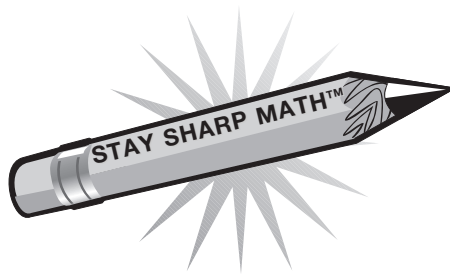
5. The ratio of cats to dogs at the pet store is 3 to 5. There are 18 cats at the store. How many dogs are there?

10. Graph the equation  $y = 3x - 4$ .



6. Find  $x$ :

$$\frac{10}{11} = \frac{33}{x}$$



# CUMULATIVE REVIEW

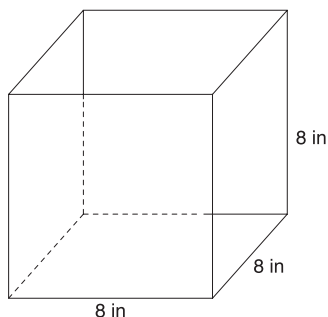
## 6

1. 3 cups = \_\_\_\_\_ ounces

7. Find the mean of the following numbers:

25, 23, 26, 28

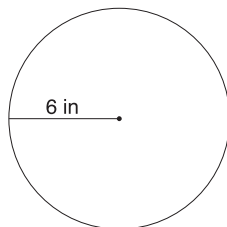
2. Find the surface area of the figure below.



8.  $5\frac{1}{2} - 3\frac{2}{3}$

9. Write 0.97 as a fraction.

3. Find the area.



10.  $|-67|$

11. Write  $5.14 \times 10^4$  in standard notation.

4. What percent of 80 is 66?

12.  $5(-2x + 9)$

5.  $\frac{x}{5} + 3 = 10$

13.  $4 + 3^2 \times 2 - 8$

6. Find 28% of 300.

14.  $-19 - (-25)$

# SOLUTIONS

8.  $113.04 \text{ cm}^3$

$$\begin{aligned} V &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}(3.14)(3^3) \\ &= \frac{4}{3}(3.14)(27) \\ &= 113.04 \text{ cm}^3 \end{aligned}$$

9.  $1440 \text{ minutes}$

$$\begin{aligned} 1 \text{ day} &= 24 \text{ hours} = 1440 \text{ minutes} \\ (24 \times 60 &= 1440) \end{aligned}$$

10.  $600 \text{ cm}^2$  All six faces of a cube are squares of the same dimensions. The faces of a cube with side length of 10 cm each have an area of  $100 \text{ cm}^2$ . There are six identical faces. Therefore, the surface area of the cube is  $600 \text{ cm}^2$  ( $100 \times 6 = 600$ ).

## CUMULATIVE REVIEW 5 (P. 26)

1.  $0.125$   $\frac{1}{8} = 1 \div 8 = 0.125$

2.  $30$

3.  $23$   $4 - (-19) = 4 + 19 = 23$

4.  $-5$

5.  $81$   $9^2 = 9 \times 9 = 81$

6. **894** The absolute value of a number is the distance of the number from zero. Distances are always positive, so the absolute value of any number is positive.

7.  $27x - 18$  Distribute the 9 to both terms inside the parentheses.  
 $9(3x - 2) = (9)(3x) - (9)(2) = 27x - 18$

8. **90** The order of operations specifies that exponents are done before multiplication.  
 $5 \times 2 \times 3^2 = 5 \times 2 \times 9 = 90$

9.  $9$

$$\begin{aligned} 4x - 10 &= 26 \\ 4x - 10 + 10 &= 26 + 10 \\ 4x &= 36 \\ \frac{4x}{4} &= \frac{36}{4} \\ x &= 9 \end{aligned}$$

10.  $80 \text{ in}^2$

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2}(20)(8) \\ &= 80 \end{aligned}$$

11. **35** Order the numbers from least to greatest. The middle number is the median.  
 21, 21, 34, 35, 37, 55, 98

12.  $56 \text{ in}^3$

$$\begin{aligned} V &= lwh \\ &= (7)(4)(2) \\ &= 56 \end{aligned}$$

13.  $\frac{9}{10}$

$$\begin{aligned} \frac{3}{5} &= \frac{2}{3}x \\ \left(\frac{3}{2}\right)\frac{3}{5} &= \left(\frac{3}{2}\right)\frac{2}{3}x \\ \frac{9}{10} &= x \end{aligned}$$

14.  $1.92$

$$\begin{aligned} \frac{\text{part}}{\text{whole}} &= \frac{\%}{100} \\ \frac{x}{24} &= \frac{8}{100} \\ 100x &= (8)(24) \\ 100x &= 192 \\ \frac{100x}{100} &= \frac{192}{100} \\ x &= 1.92 \end{aligned}$$

## RATIO AND PROPORTION (P. 27)

1.  $\$7.84$

$$\begin{aligned} \frac{\text{oranges}}{\$} &= \frac{3}{\$2.94} = \frac{8}{x} \\ 3x &= 23.52 \\ \frac{3x}{3} &= \frac{23.52}{3} \\ x &= 7.84 \end{aligned}$$

2.  $33$

$$\begin{aligned} \frac{8}{22} &= \frac{12}{x} \\ 8x &= 264 \\ \frac{8x}{8} &= \frac{264}{8} \\ x &= 33 \end{aligned}$$

# SOLUTIONS

3. 7.5 gallons

$$\begin{array}{r} \text{blue} \\ \text{red} \end{array} \quad \frac{2}{3} = \frac{5}{x}$$

$$2x = 15$$

$$\frac{2x}{2} = \frac{15}{2}$$

$$x = 7.5$$

4. 16.67 cm

$$\frac{x}{30} = \frac{5}{9}$$

$$9x = 150$$

$$\frac{9x}{9} = \frac{150}{9}$$

$$x = 16.\bar{6}$$

5. 4

$$\frac{3x}{5} = \frac{24}{10}$$

$$(3x)(10) = (5)(24)$$

$$30x = 120$$

$$\frac{30x}{30} = \frac{120}{30}$$

$$x = 4$$

6. 440 miles

$$\begin{array}{r} \text{miles} \\ \text{gallons} \end{array} \quad \frac{264}{12} = \frac{x}{20}$$

$$12x = 5280$$

$$\frac{12x}{12} = \frac{5280}{12}$$

$$x = 440$$

7. 15 girls

$$\begin{array}{r} \text{girls} \\ \text{total} \end{array} \quad \frac{5}{9} = \frac{x}{27}$$

$$9x = 135$$

$$\frac{9x}{9} = \frac{135}{9}$$

$$x = 15$$

8. 960 gallons

$$\begin{array}{r} \text{gallons} \\ \text{minutes} \end{array} \quad \frac{64}{4} = \frac{x}{60}$$

$$4x = 3840$$

$$\frac{4x}{4} = \frac{3840}{4}$$

$$x = 960$$

9. 96 people

$$\begin{array}{r} \text{regular} \\ \text{total} \end{array} \quad \frac{4}{5} = \frac{x}{120}$$

$$5x = 480$$

$$\frac{5x}{5} = \frac{480}{5}$$

$$x = 96$$

10. 16.8 ft

$$\frac{7}{x} = \frac{5}{12}$$

$$5x = 84$$

$$\frac{5x}{5} = \frac{84}{5}$$

$$x = 16.8$$

11.  $\frac{3}{10}$  Multiply straight across. Simplify the answer.

$$\frac{9}{10} \times \frac{1}{3} = \frac{9}{30} = \frac{3}{10}$$

12.  $1\frac{1}{15}$  A common denominator is 15.

$$2\frac{2}{5} \times \frac{3}{3} = \frac{6}{15}$$

$$- 1\frac{1}{3} \times \frac{5}{5} = \frac{5}{15}$$

$$1 \quad \frac{1}{15}$$

13.  $1\frac{2}{7}$  Invert (flip) the second fraction and multiply. Simplify the answer.

$$\frac{6}{7} \div \frac{2}{3} = \frac{6}{7} \times \frac{3}{2} = \frac{18}{14} = 1\frac{4}{14} = 1\frac{2}{7}$$

14.  $1\frac{17}{38}$  A common denominator is 38. Simplify the answer.

$$\frac{18}{19} \times \frac{2}{2} = \frac{36}{38}$$

$$+ \frac{1}{2} \times \frac{19}{19} = \frac{19}{38}$$

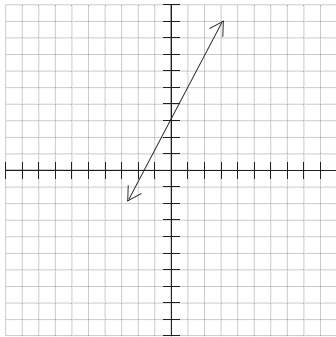
$$\frac{55}{38} = 1\frac{17}{38}$$

# SOLUTIONS

## Linear Relationships (P. 28)

1. **13** Notice the pattern in the table. As the  $x$  values increase by 1, the  $y$  values increase by 2. Increase 11 by 2 to find the value of P. P is 13.

2.



3. **d** Substitute the ordered pairs into the equation. The ordered pair, which makes a true statement, is a solution.

$$(3, 4) \rightarrow 4 = 3(3) - 1$$

$$4 \neq 8$$

$$(6, 1) \rightarrow 1 = 3(6) - 1$$

$$1 \neq 17$$

$$(0, 3) \rightarrow 3 = 0 - 1$$

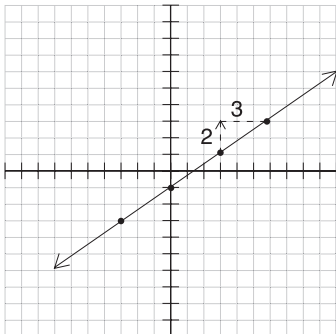
$$3 \neq -1$$

$$(2, 5) \rightarrow 5 = 3(2) - 1$$

$$5 = 5$$

4.  $\frac{1}{3}$  The equation is written in the  $y = mx + b$  form. The coefficient of  $x$  is the slope ( $m$ ). The slope is  $\frac{1}{3}$ .

5.  $\frac{2}{3}$  Find any two points on the line. Count the "rise" and "run" to get from one point to the other. In the example shown below, the "rise" is 2 and the "run" is 3. The slope is  $\frac{\text{rise}}{\text{run}} = \frac{2}{3}$ . It doesn't matter which two points you choose to calculate the rise and run, the ratio of rise to run will always simplify to  $\frac{2}{3}$ .



6. **(0, 9)** The equation is written in the form  $y = mx + b$  where  $b$  is the  $y$ -intercept. The constant,  $b$ , in the given equation is 9. Therefore, the  $y$ -intercept (where the line crosses the  $y$ -axis) is  $(0, 9)$ .

7. **5** Substitute 4 into the equation for  $x$  and solve for  $y$ .

$$y = \frac{1}{2}x + 3$$

$$y = \frac{1}{2}(4) + 3$$

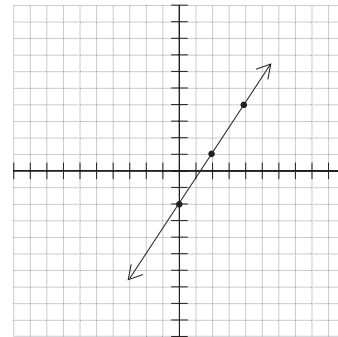
$$y = 2 + 3$$

$$y = 5$$

8.  **$C = 50 + 6n$**

9. **(0, -2)** The graph crosses the  $y$ -axis at  $(0, -2)$ .

10.



11.  $\frac{21}{40}$  Multiply straight across.

$$\frac{7}{10} \times \frac{3}{4} = \frac{21}{40}$$

12.  $\frac{7}{18}$  A common denominator is 18.

$$\frac{2}{9} \times \frac{2}{2} = \frac{4}{18}$$

$$+ \frac{1}{6} \times \frac{3}{3} = \frac{3}{18}$$

$$\frac{7}{18}$$

13.  $\frac{9}{20}$  Convert the mixed number to an improper fraction and write 5 as a fraction. Next, invert (flip) the second fraction and multiply.

$$2\frac{1}{4} \div 5 = \frac{9}{4} \div \frac{5}{1} = \frac{9}{4} \times \frac{1}{5} = \frac{9}{20}$$

# SOLUTIONS

14.  $\frac{19}{40}$  A common denominator is 40.

$$\begin{array}{r} \frac{7}{8} \times \frac{5}{5} = \frac{35}{40} \\ - \frac{2}{5} \times \frac{8}{8} = \frac{16}{40} \\ \hline \frac{19}{40} \end{array}$$

## QUIZ 6 (P. 30)

1. **39 minutes**

$$\begin{array}{r} \frac{\text{miles}}{\text{minutes}} \quad \frac{4}{26} = \frac{6}{x} \\ 4x = 156 \\ \frac{4x}{4} = \frac{156}{4} \\ x = 39 \end{array}$$

2. **8**

$$\begin{array}{r} \frac{12}{9} = \frac{x}{6} \\ 9x = 72 \\ \frac{9x}{9} = \frac{72}{9} \\ x = 8 \end{array}$$

3. **5** The equation is in the form  $y = mx + b$  where  $m$  is the slope of the line. In the equation  $y = 5x - 10$ , the slope (coefficient of  $x$ ) is 5.
4. **12** Substitute 3 for  $x$  in the equation. Solve for  $y$ .

$$\begin{array}{l} y = 8x - 12 \\ y = 8(3) - 12 \\ y = 24 - 12 \\ y = 12 \end{array}$$

5. **30**

$$\begin{array}{r} \frac{\text{cats}}{\text{dogs}} \quad \frac{3}{5} = \frac{18}{x} \\ 3x = 90 \\ \frac{3x}{3} = \frac{90}{3} \\ x = 30 \end{array}$$

6. **36.3**

$$\begin{array}{r} \frac{10}{11} = \frac{33}{x} \\ 10x = 363 \\ \frac{10x}{10} = \frac{363}{10} \end{array}$$

$$x = 36.3$$

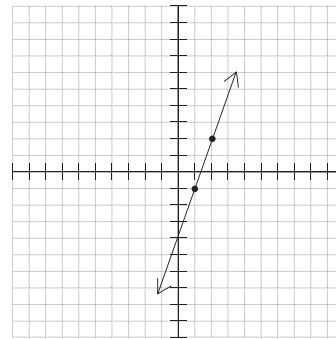
7. **1.0** As the  $x$  values increase by 1, the  $y$  values increase by 0.2. Follow the pattern to see that  $v$  is 1.0 ( $0.8 + 0.2 = 1.0$ ).

8. **1**

$$\begin{array}{r} \frac{2x}{3} = \frac{28}{42} \\ 84x = 84 \\ \frac{84x}{84} = \frac{84}{84} \end{array}$$

9. **(0, 2)** The equation is written in the form  $y = mx + b$  where  $b$  is the  $y$ -intercept. Therefore, the  $y$ -intercept is  $(0, 2)$ .

- 10.



## CUMULATIVE REVIEW 6 (P. 31)

1. **24 ounces**

$$\begin{array}{l} 1 \text{ cup} = 8 \text{ ounces} \\ 3 \text{ cups} = 24 \text{ ounces} (3 \times 8 = 24) \end{array}$$

2. **384 in<sup>2</sup>** The figure is a cube, so all six faces are the same. The area of each face is  $64 \text{ in}^2$  ( $8 \times 8 = 64$ ). There are six faces, so the surface area of the cube is  $384 \text{ in}^2$  ( $64 \times 6 = 384$ ).

3. **113.04 in<sup>2</sup>**

$$\begin{array}{l} A = \pi r^2 \\ = (3.14)(6^2) \\ = (3.14)(36) \\ = 113.04 \end{array}$$

4. **82.5%**

$$\begin{array}{r} \frac{\text{part}}{\text{whole}} = \frac{\%}{100} \\ \frac{66}{80} = \frac{x}{100} \\ 80x = 6600 \\ \frac{80x}{80} = \frac{6600}{80} \\ x = 82.5 \end{array}$$

# SOLUTIONS

5. 35

$$\begin{aligned}\frac{x}{5} + 3 &= 10 \\ \frac{x}{5} + 3 - 3 &= 10 - 3 \\ \frac{x}{5} &= 7 \\ (5)\frac{x}{5} &= 7(5) \\ x &= 35\end{aligned}$$

6. 84

$$\begin{aligned}\frac{\text{part}}{\text{whole}} &= \frac{\%}{100} \\ \frac{x}{300} &= \frac{28}{100} \\ 100x &= 8400 \\ \frac{100x}{100} &= \frac{8400}{100} \\ x &= 84\end{aligned}$$

7. 25.5 Find the sum of the numbers and divide by the number of numbers.

$$\frac{25 + 23 + 26 + 28}{4} = \frac{102}{4} = 25.5$$

8.  $1\frac{5}{6}$  The common denominator is 6.

$$\begin{aligned}4\frac{1}{2} \times \frac{3}{3} &= \frac{9\cancel{3}}{6} \\ -3\frac{2}{3} \times \frac{2}{2} &= \frac{4}{6} \\ \hline 1 &= \frac{5}{6}\end{aligned}$$

9.  $\frac{97}{100}$  The last digit is in the hundredths place, so the denominator is 100.

10. 67 The absolute value of a number is the distance that number is from zero. Distance is always positive. Therefore, the absolute value of any number is always positive.

11. 51,400 Move the decimal point four places to the right.

12.  $-10x + 45$  Distribute the 5 to each of the terms inside the parentheses.

$$\begin{aligned}5(-2x + 9) &= (5)(-2x) + (5)(9) \\ &= -10x + 45\end{aligned}$$

13. 14 Use the proper order of operations to simplify.

Parentheses

Exponents

Multiplication\*

Division\*

Addition\*\*

Subtraction\*\*

Complete the operations in the order shown.

\* Multiplication and division are done in the same step, left to right.

\*\* Addition and subtraction are done in the same step, left to right.

$$\begin{aligned}4 + 3^2 \times 2 - 8 \\ &= 4 + 9 \times 2 - 8 \\ &= 4 + 18 - 8 \\ &= 22 - 8 \\ &= 14\end{aligned}$$

14. 6

$$-19 - (-25) = -19 + 25 = 6$$

## Multi-STEP EQUATIONS (P. 32)

1. 3

$$\begin{aligned}3(2a - 1) &= 15 \\ 6a - 3 &= 15 \\ 6a - 3 + 3 &= 15 + 3 \\ 6a &= 18 \\ \frac{6a}{6} &= \frac{18}{6} \\ a &= 3\end{aligned}$$

2.  $\frac{1}{3}$

$$\begin{aligned}9x + 1 &= 12x \\ 9x - 9x + 1 &= 12x - 9x \\ 1 &= 3x \\ \frac{1}{3} &= \frac{3x}{3} \\ \frac{1}{3} &= x\end{aligned}$$

3. 7

$$\begin{aligned}5(q + 1) &= 40 \\ 5q + 5 &= 40 \\ 5q + 5 - 5 &= 40 - 5 \\ 5q &= 35 \\ \frac{5q}{5} &= \frac{35}{5} \\ q &= 7\end{aligned}$$