

# Solving Equations

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Use the guess-and-check method to solve. Show your work.

1.  $x + 8 = 11$

2.  $5y - 9 = 16$

Solve by working backward. Show your work.

3.  $x - 4 = 9$

4.  $3y + 4 = 10$

Solve the equation by using the Properties of Equality.

5.  $6c + 3 = 45$

6.  $11 - a = -23$

7.  $\frac{2}{3} + y = \frac{1}{4}$

8.  $\frac{7}{8}w = 14$

Solve.

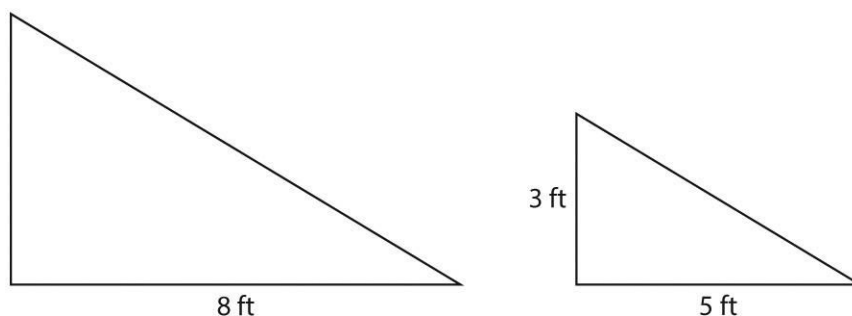
9. Houston, Texas has an average annual rainfall about 5.2 times that of El Paso, Texas. If Houston gets about 46 inches of rain, about how many inches does El Paso get? Round to the nearest tenth.
10. Susan can run 2 city blocks per minute. She wants to run 60 blocks. How long will it take her to finish if she has already run 18 blocks?
11. Michaela pays her cell phone service provider \$49.95 per month for 500 minutes. Any additional minutes used cost \$0.15 each. In June, her phone bill is \$61.20. How many additional minutes did she use?

## Modeling Quantities

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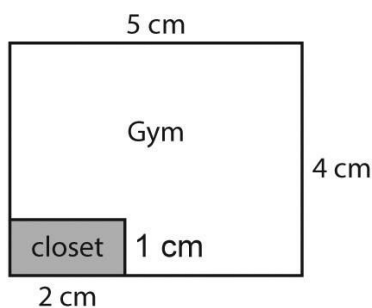
### *Use ratios to solve the problems.*

The diagram below represents a tree and a mailbox and their shadows. The heights of the triangles represent the heights of the objects, and the longer sides represent their shadows.



1. What is the height of the tree? \_\_\_\_\_

### **Use the diagram below for 2–5.**



2. If 1 cm represents 10 m, what are the actual measurements of the gym including the closet? \_\_\_\_\_
3. What are the actual measurements of the closet? \_\_\_\_\_
4. If 1 cm represents 12 m, what are the actual measurements of the gym including the closet? \_\_\_\_\_
5. What is the area of the gym? \_\_\_\_\_

### **Solve.**

**Selena rides her bicycle to work. It takes her 15 minutes to go 3 miles.**

6. If she continues at the same rate, how long will it take her to go 8 miles?
7. How many feet will she travel in 3 minutes?

## Modeling with Expressions

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**Identify the terms and coefficients of each expression.**

1.  $4a + 3c + 8$

terms: \_\_\_\_\_

coefficients: \_\_\_\_\_

2.  $9b + 6 + 2g$

terms: \_\_\_\_\_

coefficients: \_\_\_\_\_

3.  $8.1f + 15 + 2.7g$

terms: \_\_\_\_\_

coefficients: \_\_\_\_\_

4.  $7p - 3r + 6 - 5s$

terms: \_\_\_\_\_

coefficients: \_\_\_\_\_

5.  $3m - 2 - 5n + p$

terms: \_\_\_\_\_

coefficients: \_\_\_\_\_

6.  $4.6w - 3 + 6.4x - 1.9y$

terms: \_\_\_\_\_

coefficients: \_\_\_\_\_

**Interpret the meaning of the expression.**

7. Frank buys  $p$  pounds of oranges for \$2.29 per pound and the same number of pounds of apples for \$1.69 per pound. What does the expression  $2.29p - 1.69p$  represent?

8. Kathy buys  $p$  pounds of grapes for \$2.19 per pound and one pound of kiwi for \$3.09 per pound. What does the expression  $2.19p - 3.09$  represent?

**Write an expression to represent each situation.**

9. Eliza earns \$400 per week plus \$15 for each new customer she signs up. Let  $c$  represent the number of new customers Eliza signs up. Write an expression that shows how much she earns in a week.
10. Max's car holds 18 gallons of gasoline. Driving on the highway, the car uses approximately 2 gallons per hour. Let  $h$  represent the number of hours Max has been driving on the highway. Write an expression that shows how many gallons of gasoline Max has left after driving  $h$  hours.
11. A man's age today is three years less than four times the age of his oldest daughter. Let  $a$  represent the daughter's age. Write an expression to represent the man's age.

## Creating and Solving Equations

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**Write an equation for each description.**

1. 4 times a number is 16.

2. A number minus 11 is 12.

3.  $\frac{9}{10}$  times a number plus 6 is 51.

4. 3 times the sum of  $\frac{1}{3}$  of a number and 8 is 11.

**Write and solve an equation to answer each problem.**

5. Jan's age is 3 years less than twice Tritt's age. The sum of their ages is

30. Find their ages.

6. Iris charges a fee for her consulting services plus an hourly rate that is

$1\frac{1}{5}$  times her fee. On a 7-hour job, Iris charged \$470. What is her fee and her hourly rate?

7. When angles are complementary, the sum of their measures is 90 degrees. Two complementary angles have measures of  $2x - 10$  degrees and  $3x - 10$  degrees. Find the measures of each angle.

8. Bill wants to rent a car. Rental Company A charges \$35 per day plus \$0.10 per mile driven. Rental Company B charges \$25 per day plus \$0.15 per mile driven. After how many miles driven will the price charged by each company be the same?

9. Katie, Elizabeth, and Siobhan volunteer at the hospital. In a week, Katie volunteers 3 hours more than Elizabeth does and Siobhan volunteers 1 hour less than Elizabeth. Over 3 weeks, the number of hours Katie volunteers is equal to the sum of Elizabeth's and Siobhan's volunteer hours in 3 weeks. Complete the table to find out how many hours each person volunteers each week.

Volunteer	Volunteer Hours per week	Volunteer Hours over 3 weeks
Katie		
Elizabeth		
Siobhan		

## Solving for a Variable

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**Solve the equation for the indicated variable.**

1.  $x = 3y$  for  $y$

2.  $m + 5n = p$  for  $m$

3.  $12r - 6s = t$  for  $r$

4.  $21 = cd + e$  for  $d$

5.  $\frac{h}{j} = 15$  for  $j$

6.  $\frac{f-7}{9} = h$  for  $f$

**Solve the formula for the indicated variable.**

7. Formula for the perimeter of a rectangle:

$$P = 2a + 2b, \text{ for } b$$

8. Formula for the circumference of a circle:

$$C = 2\pi r, \text{ for } r$$

9. Formula for the sum of angles of a triangle:

$$A + B + C = 180, \text{ for } C$$

10. Formula for the volume of a cylinder:

$$V = \pi r^2 h, \text{ for } h$$

**Solve.**

11. Jill earns \$15 per hour babysitting plus a transportation fee of \$5 per job. Write a formula for  $E$ , Jill's earnings per babysitting job, in terms of  $h$ , the number of hours for a job. Then solve your formula for  $h$ .
12. A taxi driver charges a fixed rate of  $r$  to pick up a passenger. In addition, the taxi driver charges a rate of  $m$  for each mile driven. Write a formula to represent  $T$ , the total amount this taxi driver will charge for a trip of  $n$  miles.
13. Solve your formula from Problem 12 for  $m$ . Then find the taxi driver's hourly rate if his pickup rate is \$2 and he charges \$19.50 for a 7-mile trip.
14. Describe when the formula for simple interest  $I = prt$  would be more useful if it were rearranged.

## Creating and Solving Inequalities

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**Write an inequality for the situation.**

1. Cara has \$25 to buy dry pet food and treats for the animal shelter. A pound of dog food costs \$2 and treats are \$1 apiece. If she buys 9 pounds of food, what is the greatest number of treats she can buy?

**Solve each inequality for the value of the variable.**

2.  $2x \geq 6$

3.  $\frac{a}{5} < 1$

4.  $5x + 7 \geq 2$

5.  $5(z + 6) \leq 40$

6.  $5x \geq 7x + 4$

7.  $3(b - 5) < -2b$

**Write and solve an inequality for each problem.**

8. By selling old CDs, Sarah has a store credit for \$153. A new CD costs \$18. What are the possible numbers of new CDs Sarah can buy?
9. Ted needs an average of at least 70 on his three history tests. He has already scored 85 and 60 on two tests. What is the minimum grade Ted needs on his third test?
10. Jay can buy a stereo either online or at a local store. If he buys online, he gets a 15% discount, but has to pay a \$12 shipping fee. At the local store, the stereo is not on sale, but there is no shipping fee. For what regular price is it cheaper for Jay to buy the stereo online?

## Quantities and Modeling

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### That's the Ticket!

**There are 40 rows of seats in the Varsity Theater, with 20 seats in each row. During regular performances, all seats cost \$12.**

1. a. A movie rents for \$275 per performance. Explain how you could find the theater owner's profit for one performance if you knew the number of tickets sold. Ignore costs that are not mentioned.
- b. Write an expression for the theater owner's profit if  $n$  people buy tickets for a performance.
- c. Evaluate the expression if  $n = 124$ .

**For a special movie premiere, the theater owner decided to charge \$20 per ticket for the first  $r$  rows of the theater and \$15 for the remaining rows.**

2. Explain how you could find the owner's total income if you knew the value of  $r$  and you knew that all of the tickets were sold.
3. Suppose  $r = 16$ .
  - a. Find the income in the first  $r$  rows if all of the tickets were sold.
  - b. Find the income in the remaining  $r$  rows if all of the tickets were sold.
  - c. Find the total income for  $r = 16$ .
4. Write and simplify an expression for the owner's profit if tickets are priced at \$20 per ticket in the first  $r$  rows and \$15 per ticket in the remaining rows, if all the seats are sold.
5. Evaluate the expression you wrote in Question 4 for  $r = 16$  and show that the result equals your answer for Question 3c.

## Quantities and Modeling

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### *Put it all together*

1. What is the solution to  $4\left(\frac{1}{2}x + 7\right) = 12$ ?
2. A water bottle contains 1.5 liters of water. Approximately how many gallons of water does the bottle contain? (1 liter = 0.264 gallons)
  - A 0.39 gal
  - B 1.2 gal
  - C 1.8 gal
  - D 5.8 gal
3. Find the solution for  $-2.5x + 5 < -2.5$  on the number line.
4. Solve  $4(t - 7) = 12 - t$ . What is the solution?
5. Joe sold 15 T-shirts for a total of \$82.50. What is the unit price?
6. The scale on a map of Texas shows that 1 inch represents 20 miles. The actual distance from Austin to Dallas is 195 miles. On the map, how many inches apart are the two cities?
7. What best describes the solutions of  $-2 > 5x - 37$ ?
  - A Numbers greater than 7
  - B Numbers greater than 6
  - C Numbers less than 7
  - D Numbers less than 6



8. Solve  $1\frac{1}{3} = \frac{y}{3} - 9$ .

9. Solve  $9(x + 5) \geq 81$

10. Candice paid her parents \$45 for rent and divided the rest of her paycheck evenly into a checking account, a savings account, and a retirement fund. She put \$192 into her savings account.

a. Write an equation to represent the situation.

b. How much was Candice paid?

11. The formula Selena uses to charge her clients for tutoring is  $t = 25 + 13.5h - 0.25h$ .

Solve for  $h$ .

12. Solve  $-2(x + y) = 7$  for  $y$ .

13. What are the terms of the expression  $-10z + 2y - 6z$ ? What are the coefficients?

14. Solve the compound inequality  $-2 < x + 3 \leq 4$  and graph the solution.

