

Solve each system of equations algebraically. (Examples 1 and 2)

1.  $y = x + 7$

$y = 4$   $(-3, 4)$

Show your work.  
 $4 = x + 7$   
 $-7 = x$   
 $-3 = x$

2.  $y = 2x + 7$

$y = 7$   $(0, 7.5)$

3.  $y = x - 9$

$y = -4x$   $(1.8, -7.2)$

4.  $x + 3y = 1$

$y = 2x + 5$   $(-2, 1)$


$x + 3(2x + 5) = 1$   
 $x + 6x + 15 = 1$   
 $7x + 15 = 1$   
 $-15 \quad +15$

$7x = -14$   
 $\frac{7x}{7} = \frac{-14}{7}$   
 $x = -2$

$y = (-2)(2) + 5$   
 $y = -4 + 5$   
 $y = 1$

5. Seven people went to the movies. The number of adults was one more than the number of children. Write a system of equations that represents the number of adults and children. Solve the system algebraically. Interpret the solution. (Examples 3 and 4)

**Sample answer:**  $y = x + 1$ ;  $y + x = 7$ ; (3, 4); Three children and four adults went to the movies.

6.  **Building on the Essential Question** How can you solve a system of equations? **Sample answer:** I can solve system of equations algebraically and by graphing the equations on the same coordinate plane.

Solve each system of equations algebraically. (Examples 3 and 4)

1.  $y = x + 5$   
 $y = 6$

(1, 6)

Show your work.

2.  $y = x + 12$   
 $y = -18$

(-30, -18)

3.  $y = x - 10$   
 $y = -12$

(-2, -12)

4.  $y = x + 15$   
 $y = 2x$

(15, 30)

$$\begin{array}{r} 2x = x + 15 \\ -1x \quad -1x \\ \hline x = 15 \end{array}$$

5.  $y = 2x - 3$   
 $x + y = 18$

(7, 11)

$$\begin{array}{l} x + (2x - 3) = 18 \\ 1x + 2x - 3 = 18 \\ 3x - 3 = 18 \\ 3x + 3 = 18 \end{array}$$

6.  $y = \frac{1}{4}x$   
 $x + 4y = 8$

(4, 1)

$$\begin{array}{l} x + 4(\frac{1}{4}x) = 8 \\ x + x = 8 \\ 2x = 8 \quad (x = 4) \end{array}$$

7.  $y = x + 12$   
 $4x + 2y = 27$

$(\frac{1}{2}, 2\frac{1}{2})$  or  $(0.5, 2.5)$

8.  $10x + 3y = 19$   
 $y = 2x + 5$

$(\frac{1}{4}, 5\frac{1}{2})$  or  $(0.25, 5.5)$

Write and solve a system of equations that represents each situation. Use a bar diagram if needed. Interpret the solution. (Examples 3 and 4)

9. Elaine bought a total of 15 shirts and pairs of pants. She bought 7 more shirts than pants. How many of each did she buy?


Sample answer:  $s + p = 15$ ;  $p + 7 = s$ ; (4, 11); She bought 11 shirts and 4 pairs of pants.

$$\begin{array}{l} 3x = 1/3 \\ 1/3 \\ + = 1 \end{array}$$



10. Together, Preston and Horatio have 49 video games. Horatio has 11 more games than Preston. How many games does each person have?

**Sample answer:  $p + h = 49$ ;  $h = p + 11$ ; (19, 30); Preston has 19 games and Horatio has 30 games.**

11  The cost of 8 muffins and 2 quarts of milk is \$18. The cost of 3 muffins and 1 quart of milk is \$7.50. How much does 1 muffin and 1 quart of milk cost?

**Sample answer:  $8x + 2y = 18$ ;  $3x + y = 7.50$ ; (1.5, 3); A muffin costs \$1.50 and 1 quart of milk costs \$3.**



12. **CCSS Multiple Representations** The table shows the rates at which Ajay and Tory are biking along the same trail.

Person	Rate (m/min)
Ajay	200
Tory	250

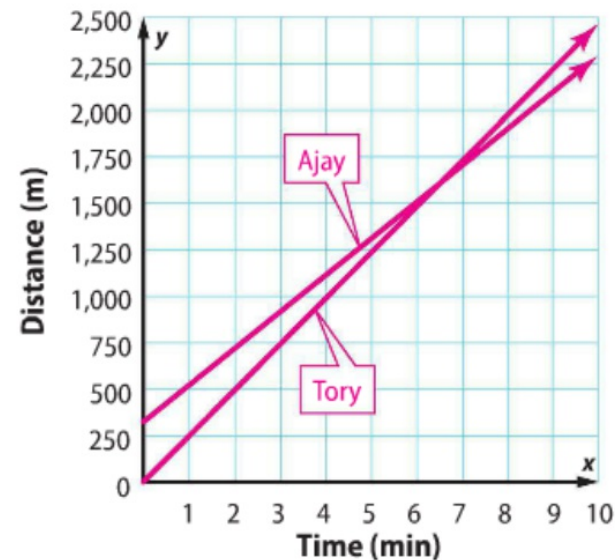
- a. **Algebra** Suppose Ajay began the trail 325 meters ahead of Tory. Write a system of equations to represent the distance  $y$  each person will travel after any number of minutes  $x$ . **Ajay:  $y = 200x + 325$ ; Tory:  $y = 250x$**
- b. **Words** Which person was farther along the trail after 5 minutes?

**Ajay**

- c. **Graphs** Graph the system. Use the graph to determine when Tory will catch up to Ajay.

**Tory catches up with Ajay after biking between 6 and 7 minutes and traveling about 1,600 meters.**

- d. **Algebra** Solve the system of equations algebraically. Interpret your solution. How does your solution compare to your estimate in part c? **(6.5, 1,625); Tory catches up with Ajay after biking 6.5 minutes and traveling 1,625 meters. Sample answer: The solution to part c was an estimate which is close to the exact solution found in part d.**



13. **CCSS Persevere with Problems** What is the solution to the system  $5x + y = 2$  and  $y = -5x + 8$ ? Explain.  $\emptyset$ ; Sample answer: Adding  $5x$  to each side of  $y = -5x + 8$  results in the equation  $5x + y = 8$ . Since  $5x + y$  cannot equal both  $8$  and  $2$ , there are no values for  $x$  and  $y$  that make this system of equations true.
14. **CCSS Identify Structure** Describe when it is better to use substitution to solve a system of equations rather than graphing. Sample answer: When the equations are complex and cannot be easily graphed, or when the solution involves numbers that are not integers.
15. **CCSS Which One Doesn't Belong?** Circle the system of equations that does not belong with the other three. Explain your reasoning.

$$\begin{aligned} y &= 3x - 5 \\ y &= -2x \end{aligned}$$

$$\begin{aligned} y &= 5x - 7 \\ y &= 2(2x - 3) \end{aligned}$$

$$\begin{aligned} y &= x + 3 \\ y &= -2x - 3 \end{aligned}$$

$$\begin{aligned} y &= -2x \\ y &= -2(3x - 2) \end{aligned}$$

Sample answer: The solution of  $y = x + 3$  and  $y = -2x - 3$  is  $(-2, 1)$ . The solution of the other three systems is  $(1, -2)$ .