

Study the example showing how to determine the number of solutions for a system of equations. Then solve problems 1–6.

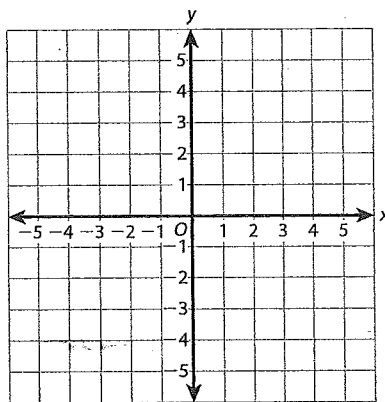
Example

You can compare the slopes and y-intercepts of a system of equations to predict how many solutions the system has.

System	Slopes	y-intercepts	Number of Solutions
$y = 2x - 1$ $y = x + 1$	2 and 1 Different	-1 and 1 Different	One solution
$y = 4x + 3$ $y = 2x + 3$	4 and 2 Different	3 and 3 Same	One solution
$y = 3x - 2$ $y = 3x + 3$	3 and 3 Same	-2 and 3 Different	No solution
$y = 2x - 3$ $y = 2x - 3$	2 and 2 Same	-3 and -3 Same	Infinitely many solutions

- 1** Look at the slopes and the number of solutions for the first two systems of equations in the example. What do the systems have in common?

- 2** Use the coordinate grid showing a graph of the third system of equations in the example. Why does the system have no solution?



Vocabulary

system of linear equations a set of two or more linear equations that share the same variables.

$$y = 3x - 2$$

$$x - y = 1$$

Solve.

Use these equations to solve problems 3–5.

Equation 1: $y = 2x + 3$ Equation 2: $y = 2x - 3$ Equation 3: $2y = 4x + 6$

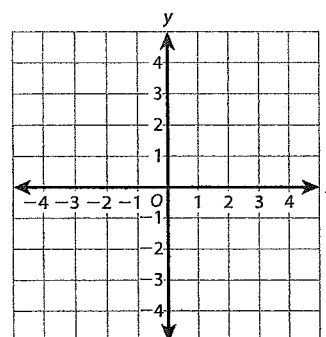
- 3 Form a system of equations with Equations 1 and 2.
Without graphing, explain how you can tell how many solutions the system has.

- 4 Form a system of equations with Equations 1 and 3.
Without graphing, explain how you can tell how many solutions the system has.

- 5 Tonya says that a system of equations formed by Equations 2 and 3 will have the same number of solutions as a system formed by Equations 1 and 2. Is she correct? Use your answers to problems 3 and 4 to help you explain your reasoning.

- 6 The system of equations shown below has no solution. Change one number in one of the equations so that the system has one solution. Graph your new system on the coordinate grid to support your answer.

$$y = 2x - 1 \quad y = 2x + 1$$



Solve the problems.

- 1 Micah paints birdhouses to sell at a fair. The table shows the amount of paint he uses. Is this a proportional relationship? If so, find the constant of proportionality and write an equation for the relationship.

Cans of Paint (p)	$\frac{1}{4}$	0.75	$1\frac{1}{2}$	2.5
Number of Birdhouses (b)	3	9	18	30

Show your work.

Solution: _____

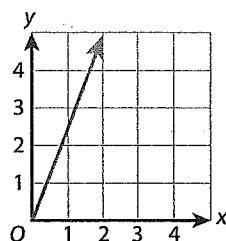
How can you simplify the ratios?



- 2 Consider the table, equation, and graph. Which of them represents a proportional relationship?

x	3	5	8
y	3.6	6	7.2

$$y = 2x + 5$$



How can you identify a proportional relationship?



- 3 Cayley says that the equations $p = 1.5q$ and $\frac{2}{3}p = q$ both represent the same proportional relationship. Mariah says that can't be true because the constants of proportionality are different. With which student do you agree? Explain.

How can you identify the equation for a proportional relationship?



Solve.

- 4 Jason runs the same distance each day. In one 7-day period he ran $40\frac{1}{4}$ miles. He knows that there is a proportional relationship between n , the number of days, and t , the total distance he runs. Tell whether each statement is *True* or *False*.

- a. The relationship can be expressed as $n = 5.25t$. ☐ True ☐ False
- b. The graph of the equation is a straight line through $(0, 0)$. ☐ True ☐ False
- c. The unit rate is 5.75. ☐ True ☐ False

How can finding the unit rate help you?



- 5 A farmer charges \$6 for 4 pounds of tomatoes. Which equation can the farmer use to find how many dollars d he should charge for p pounds of tomatoes?

- A $d = \frac{2}{3}p$ C $d = 1.5p$
 B $d = 6p$ D $d = 4p$

Rosa chose **A** as her answer. Explain her error.

What is the form of an equation for a proportional relationship?



- 6 When Chef Alice makes rice pilaf for 30 people, she uses 15 cups of chicken broth and 10 cups of rice. Dan wants to make the same recipe for 9 people. Write and use equations to find how much broth and how much rice Dan should use.

Show your work.

Finding unit rates could be helpful.



Solution: _____