

You can model the problem I n the Solve It with two linear equations. *Two or more linear equations form a* **system of linear equations**. Any ordered pair that makes all of the equations in a system true is a **solution of a system of linear equations**.

You can use systems of linear equations to model problems. Systems of equations can be solved in more than one way. One method is to graph each equation and find the intersection point, if one exists.

PROBLEM 1: SOLVING A SYSTEM OF EQUATIONS BY GRAPHING

Find the solution of the system by graphing. Check your solutions.





PROBLEM 2: WRITING A SYSTEM OF EQUATIONS

5. Scientists studied the weights of two alligators over a period of 12 months. The initial weight and growth rate of each alligator are shown below. After how many months did the alligators weight the same amount?



6. One satellite radio service charges \$10 per month plus an activation fee of \$20. A second service charges \$11 per month plus an activation fee of \$15. In what month was the cost of the service the same?



7. At a local fitness center, members pay a \$20 membership fee and \$3 for each aerobics class. Nonmembers pay \$5 for each aerobics class. For what number of aerobics classes will the cost for members and nonmembers be the same?



A system of equations that has at least one solution is <u>consistent</u>. A consistent system can be either independent or dependent.

A consistent system that is <u>independent</u> has exactly one solution. For example, the systems in problems 1 through 7 are consistent and independent. A consistent system that is <u>dependent</u> has infinitely many solutions.

A system of equations that has no solution is *inconsistent*.

PROBLEM 3: SYSTEMS WITH INFINITELY MAY SOLUTIONS OR NO SOLUTION



10. Before graphing the equations, how can you determine whether a system of equations has exactly one solution, infinitely many solutions, or no solution?

One solution : diff. slopes Solutions : same slope & same y-intercept ho solution : same slope & diff. y-intercepts

Concept Summary Systems of Linear Equations

One solution

ve note



The lines intersect at one point. The lines have different slopes. The equations are consistent and independent.

Infinitely many solutions



The lines are the same. The lines have the same slope and *y*-intercept. The equations are consistent and dependent.

No solution



The lines are parallel. The lines have the same slope and different *y*-intercepts. The equations are inconsistent.



Period _____



1.
$$y = 2x + 7$$

 $y = x + 6$
 $y = -x + 4$
2. $y = -\frac{1}{5}x$

Solve by graphing. Check you solution.



Without graphing, decide whether each system has one solution, no solution, or infinitely many solutions. 3r - 5v = 0

9.
$$y = 2x$$

 $y = 2x - 5$
10. $y = -3x + 1$
 $y = 3x + 7$
11. $y = \frac{3}{5}x$

12. Suppose you have \$20 in you bank account. You start saving \$5 each week. Your friend has \$5 in his bank account and is saving \$10 each week. Assume that neither you nor your friend makes any withdrawals.

- a.) After how many weeks will you and your friend have the same amount of money in your accounts?
- b.) How much money will each of you have?



13. Two hikers are walking along a marked trail. The first hiker starts at a point 6 miles from the beginning of the trail and walks at a speed of 3 mi/h. At the same time, the second hiker starts 1 mile from the beginning and walks at a speed of 5 mi/h. Write a system of linear equations and graph them to find when the second hiker will pass the first hiker.



14. y = -5x + wy = -5x + v

a)For what values of w and v does the system have no solution? b)For what values of w and v does the system have infinitely many solutions? c)For what values of w and v does the system have exactly one solution? 15. y = gx + 3y = hx + 7

a) If $g \ge h$, the system has no solution: always, sometimes, or never? b) If $g \le h$, the system has infinitely many solutions: always, sometimes, or never?

16. The slope of the line joining point P to the origin is $\frac{2}{9}$. The slope of the line joining point P to (-4,3) is 1. Find the coordinates of point P.

17. Which value of b will make the graphs of y = 2x+3 and y = 2.5x+b intersect at (2,7)?

a) 2 b) 3 c) 5 d) 7

- 18. The advertisements at the right are for two jobs you are considering.
 - a. Write a system of equations that relates the amount of sales x to the money y earned in a week at each job.
 - b. How much would you need to sell in a week at each job to earn the same amount of money at both?
 - c. After talking with salespeople, you estimate weekly sales of about \$600 at either job. At which job would you earn more money?





BELL RINGER (use on of your graphs from #1-4)
Solve the system by graphing. Check your solution.

$$m=4, b=-2$$

$$\begin{cases}
y=4X-2 \\
2X+3y=24 \\
y=2X+3y=24 \\
y=2x=22 \\
y=2x=22$$