

Grade 9

Analytic Geometry - Solving Systems of Linear Equations by Graphing

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Play **Solving Systems of Equations by Graphing** first.

Click on http://www.quia.com/cz/10498.html?AP_rand=133531484 to play.

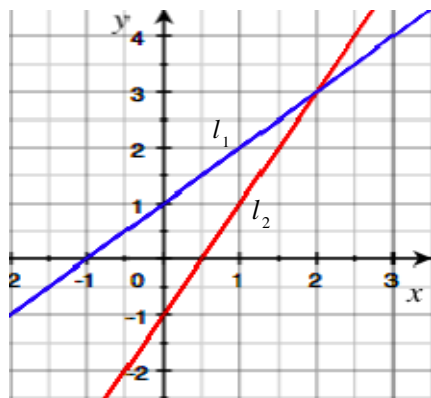
You can go to www.wiredmath.ca for the links.

Linear Systems

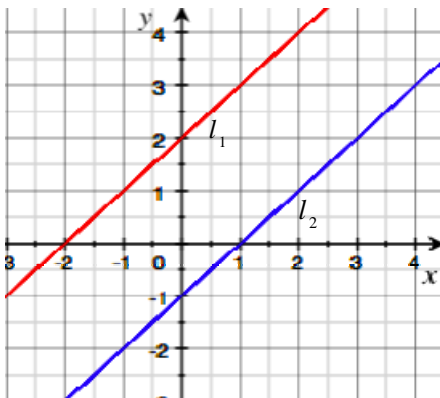
- A linear system may have **exactly one solution**. This is true when the two lines intersect at a single point. Such a system is said to be *consistent*.
- A linear system may have **no solution**. This is true when the two lines are parallel. Such a system is said to be *inconsistent*.
- A linear system may have **infinitely many solutions**. This is true when the two lines are coincident. Such a system is said to be *dependent*.

1. a. Analyze each graph to determine whether the system has one solution, no solution, or infinitely many solutions.

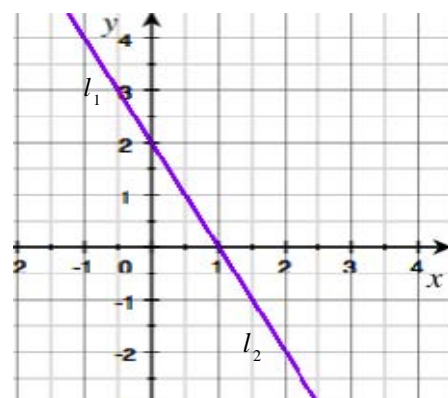
i. _____



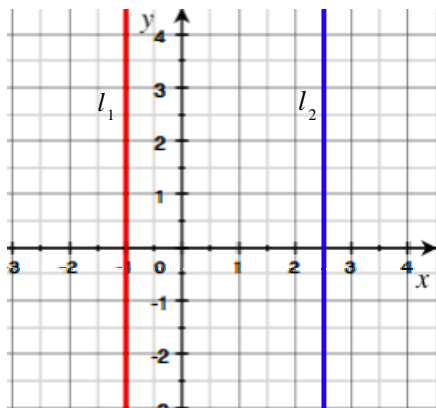
ii. _____



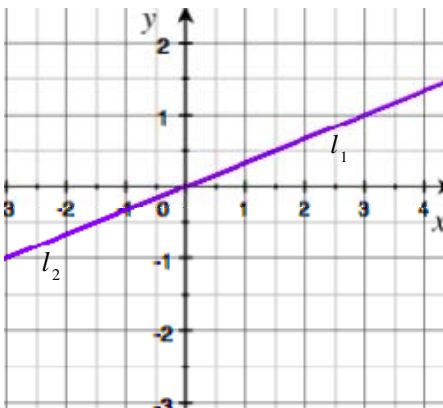
iii. _____



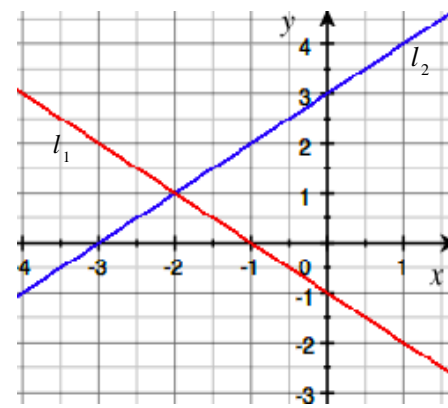
iv. _____



v. _____



vi. _____

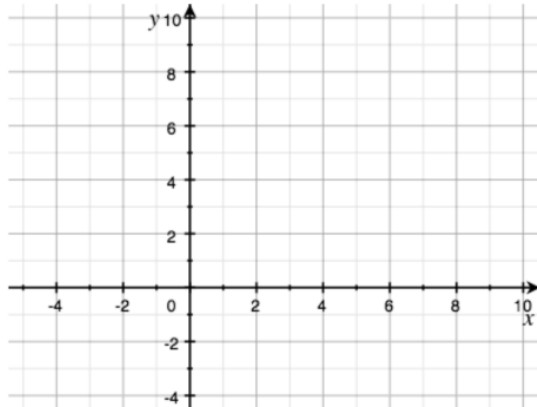


b. What does this mean about the slopes and the y -intercepts of the two lines, l_1 and l_2 ?

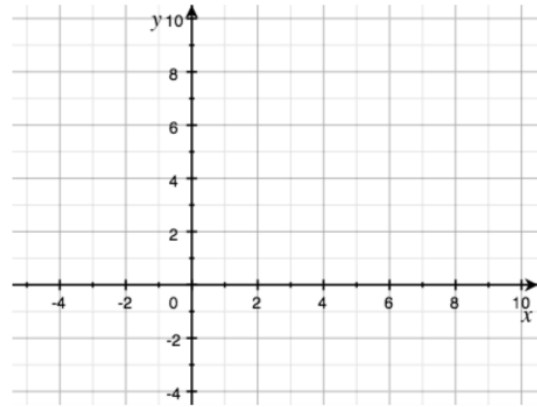
- i. _____
- ii. _____
- iii. _____
- iv. _____
- v. _____
- vi. _____

2. Graph the following equations on the grids supplied. Determine the point of intersection from the graphs.

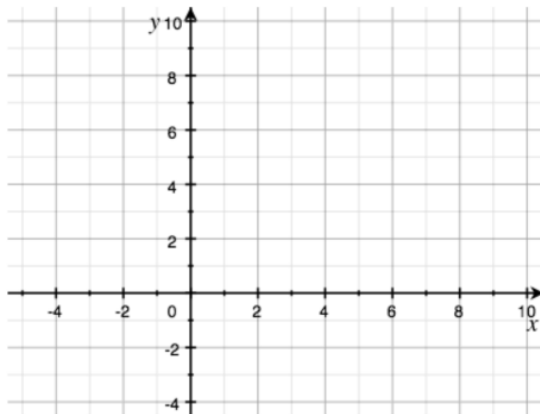
a. $2y = 3x + 2$ and $6x - 4y = -4$



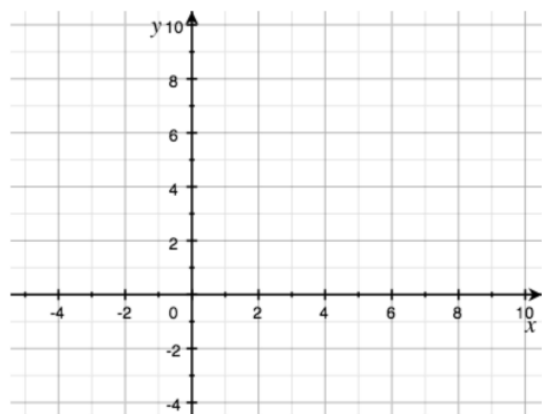
b. $y = 3x - 1$ and $x + y = 3$



c. $y - 2x = 1$ and $8x - 4y = -16$



d. $y = -x + 2$ and $x - y = -2$



3. Determine whether the given linear system has infinitely many solutions, no solution, or one solution.

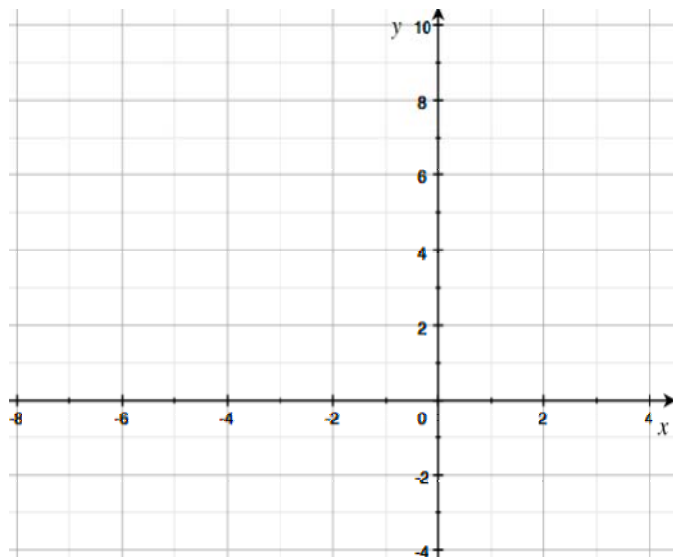
- | | | | | |
|-----------------|-----------------|------------------|------------------|-------------------|
| a. $x + 2y = 6$ | b. $4x - y = 9$ | c. $6x - 4y = 8$ | d. $x - 8y = 24$ | e. $7x - 2y = 20$ |
| $x + 2y = 2$ | $3x + y = 5$ | $9x - 6y = 12$ | $2x - 16y = 30$ | $5x + y = 12$ |

4. a. Solve the following system graphically and check your solution.

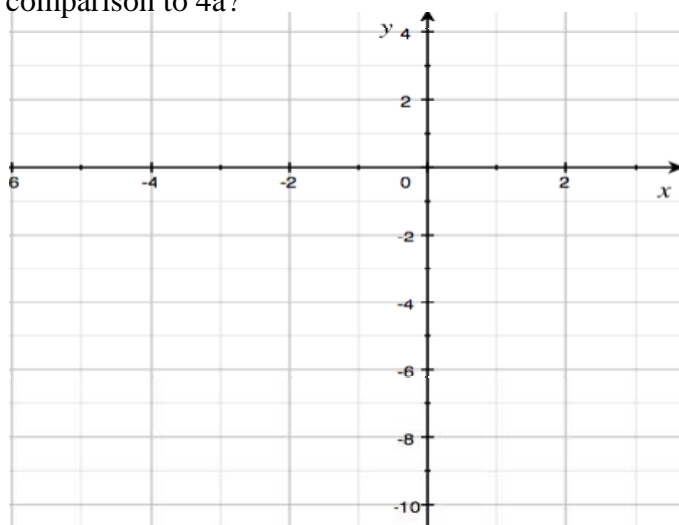
$$3x - y = -5 \quad \mathbf{1}$$

$$x + 2y = -4 \quad \mathbf{2}$$

- b. Multiply equation **1** by 3, and equation **2** by 2. What is the solution of this system? What can you conclude about multiplying equations of a linear system by a constant?



- c. Consider adding equations **1** and **2**, graph this equation on the grid below. Consider subtracting equations **1** and **2**, graph this equation on the grid below. What do you notice about the point of the intersection of these two lines in comparison to 4a?



5. Give an example of another linear system, which has the same point of intersection as each of the following systems.

a. $2x + 7y = 9$

$6x - y = 5$

b. $5x - y = 17$

$x + 4y = -5$

c. $x - 3y = -11$

$4x + 9y = 2$

d. $3x - y = -7$

$x + 4y = 2$

6. A ship is travelling on a course given by $3x - 2y = -3$, while a submarine is travelling on a course given by $x - y = -1$. Determine the coordinates of the point at which their paths cross.

Don't forget to try this math drill now! Go to www.wiredmath.ca for the links.



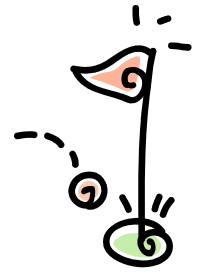
TRY THIS!

Quiz: Solving Systems of Linear Equations by Graphing

http://www.quia.com/quiz/284838.html?AP_rand=449247250

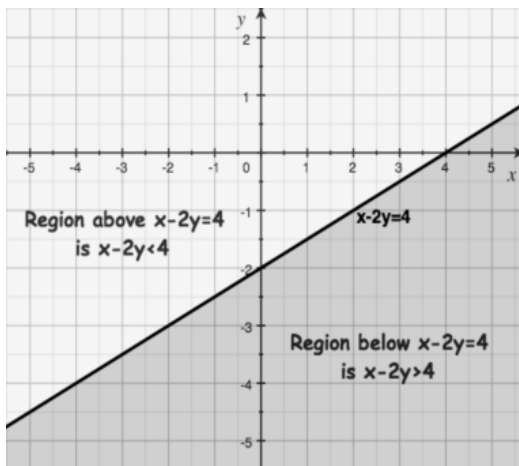
CHALLENGE YOURSELF!

7. Sales personnel at Smitty's golf equipment shop are given a choice of two methods for monthly income:
Plan 1: A monthly salary of \$250.00 plus a 2% commission on all sales or,
Plan 2: No monthly salary, but a 7% commission on all sales.
Make a graph to represent each plan. Which plan is better for the employee? Explain.
8. A triangle is formed by three intersecting lines $y = 1$, $x - 2y = -4$ and $2x + y = 7$. Find the area of the triangle.



EXTENSION

Did You Know?



Linear programming is a tool for solving problems that frequently arise in business and industry. It uses graphs of linear equations to solve practical problems.

Terminology

- The quantity $ax + by$, which is to be maximized or minimized, is called the **objective function**.
- The set of points satisfying the system of linear inequalities, which represent the constraints imposed on the variables x and y is called the **feasible set**.
- The points of intersection of the bounding lines of the feasible set are called **extreme points**.

9. Students attending an athletic banquet have a choice of two dinners, chicken or pork. Suppose it is known that at least twice as many students will choose a chicken dinner over a pork dinner. It costs \$12 to prepare a chicken dinner and \$9 to prepare a pork dinner. There are 240 invitations issued and at least 150 students will attend the athletic banquet. What are the minimum and maximum possible costs of the banquet?
10. Sporty's firm manufactures hard and soft baseballs. Each hard ball requires 1 minute on the stitching machine and 3 minutes on the ball-covering machine. Each soft ball requires 2 minutes on the stitching machine and 2 minutes on the ball-covering machine. The stitching machine is only available for 100 minutes each day, while the ball-covering machine is available for 180 minutes each day. The profit on a hard ball is \$2 and on a soft ball it is \$3. Find how many hard balls and soft balls should be manufactured each day to maximize the profit.

