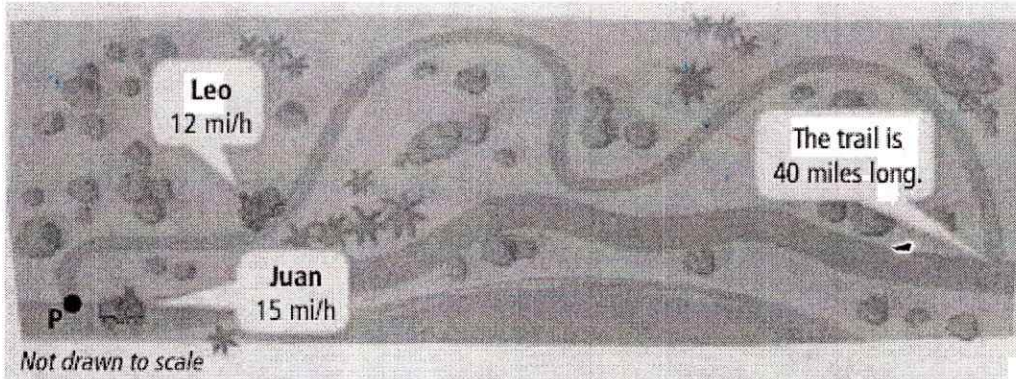


# Topic 4.1 - Solving Systems of Equations by Graphing

## Explore & Reason



A. Write an equation for Leo's distance from the starting point after riding for  $x$  hours. Write an equation for Juan's distance from the starting point if he starts  $h$  hours after Leo.

B. Suppose  $h=1$ . How can you use graphs of the two equations to determine who finishes the trail first?

C. How much of a head start must Leo have to finish the trail at the same time as Juan?

### EXAMPLE 1

What is the solution of the system of equations?

$y = -2x - 4$   $m = -2$   $\downarrow 2 \rightarrow 1$   $b = -4$   $(0, -4)$

$y = 0.5x + 6$   $m = 0.5$  or  $\frac{1}{2}$   $\uparrow 1 \rightarrow 2$   $(0, 6)$

Step 1: Graph equations

Step 2: Find intersection point

$(-4, 4)$

Step 3: Check answer

$4 = -2(-4) - 4$

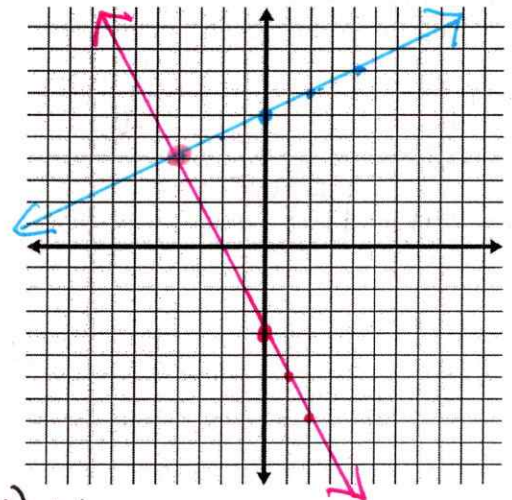
$4 = 8 - 4$

$4 = 4 \checkmark$

and  $4 = 0.5(-4) + 6$

$4 = -2 + 6$

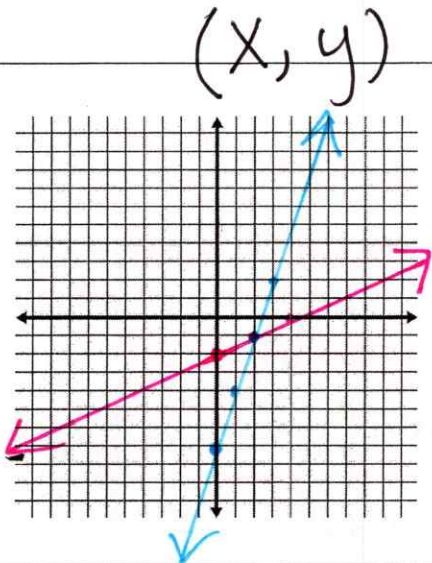
$4 = 4 \checkmark$



Try it...

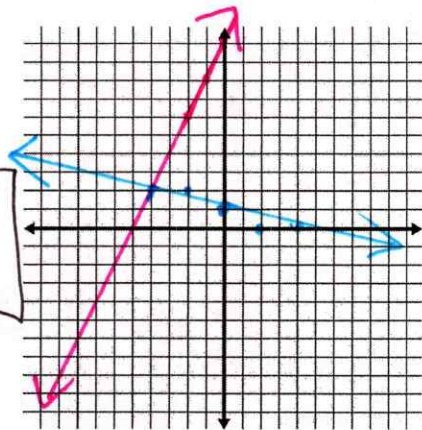
a)  $y = \frac{1}{2}x - 2$   
 $y = 3x - 7$

$(2, -1)$



b)  $y = 2x + 10$   
 $y = -\frac{1}{4}x + 1$

$(-4, 2)$

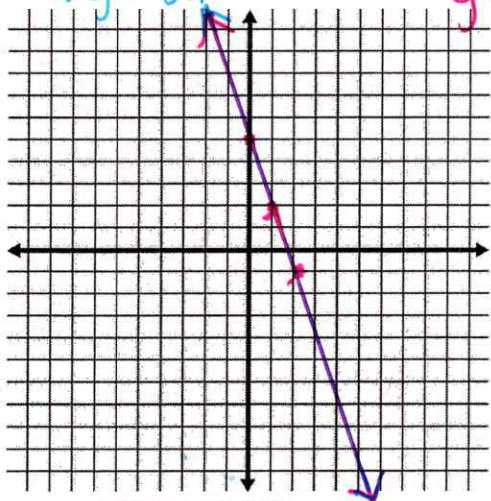


**EXAMPLE 2**

What is the solution of the system of equations? Use a graph to explain your answer.

a)  $15x + 5y = 25$   
 $y = 5 - 3x$   
 $\rightarrow y = -3x + 5$

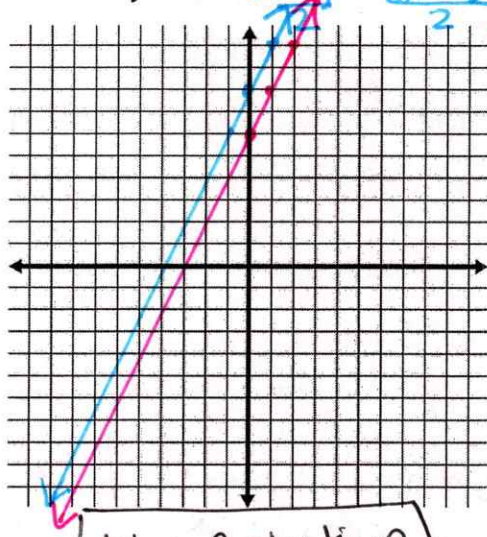
$5y = -15x + 25$   
 $\frac{5y}{5} = \frac{-15x + 25}{5}$   
 $y = -3x + 5$



infinite

b)  $y - 2x = 6$   
 $-4x + 2y = 8$

$\rightarrow y = 2x + 6$   
 $\rightarrow 2y = 4x + 8$   
 $y = 2x + 4$

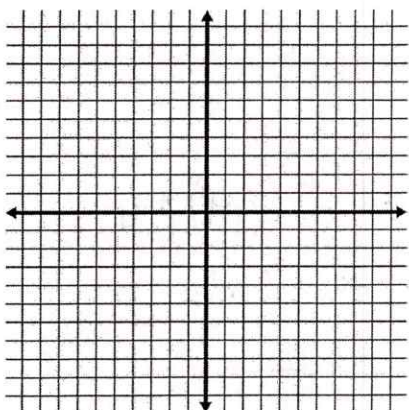


parallel lines

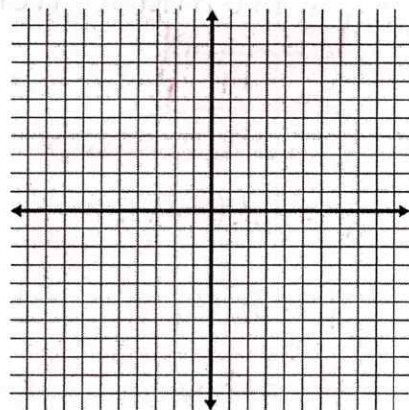
No solution

Try it...

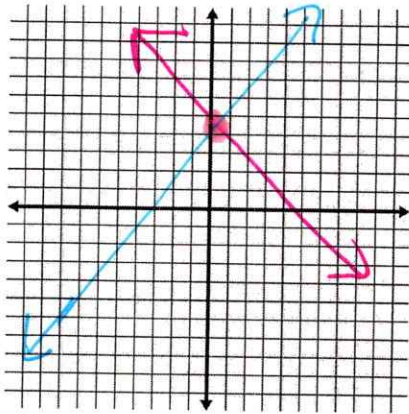
a)  $y = \frac{1}{2}x + 7$   
 $4x - 8y = 12$



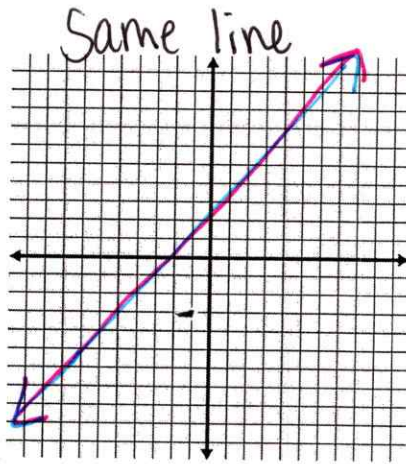
b)  $3x + 2y = 9$   
 $\frac{2}{3}y = 3 - x$



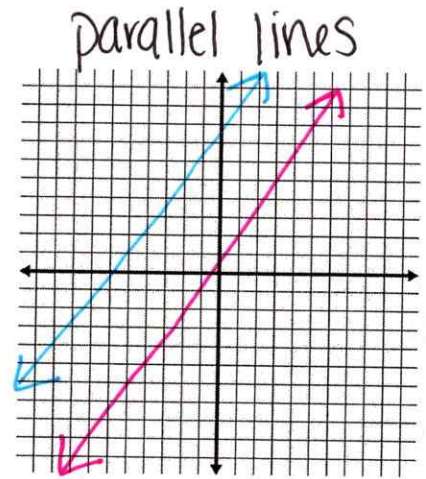
Types of Solutions:



one  $(x,y)$



infinite



No solution

EXAMPLE 3

KK and Caleb want to make the high school basketball gym, so they are going to join a gym over the summer. KK decided to go to Planet Fitness, which costs \$30 to join, and \$5 per visit. Caleb decided to go to Club4Fitness, which just charges \$8 per visit. After how many visits have KK and Caleb spent the same amount of money, and how much money did they spend?

Step 1: Define variables and write equations

$x$ : # of visits       $y$ : total cost

Planet fitness:  $y = 5x + 30$

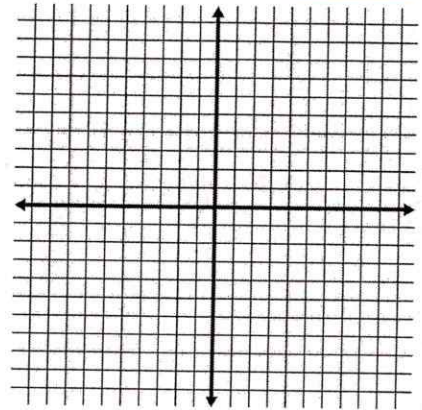
Club4fitness:  $y = 8x$

Step 2:

Graph

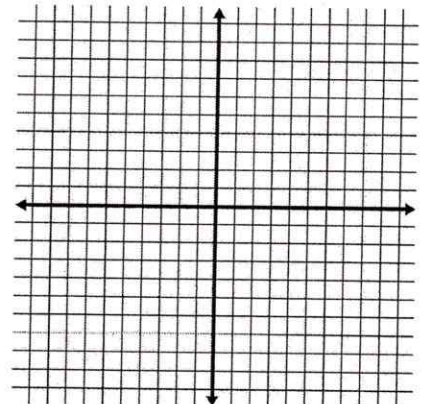
Step 3: Write answer in context

After \_\_\_\_\_ visits both gyms  
cost \$ \_\_\_\_\_.



Beth and Jane's birthdays are coming up and their parents are about to get their very own phone plans. Beth gets Verizon that charges \$15 per month plus 10 cents per text she sends. Jane gets AT&T charges \$20 per month but only charges 5 cents per text she sends. After how many texts will Beth and Jane spend the same amount of money, and how much money did they spend?

HW: Pg 148 #13-16, 19, 28  
due tomorrow





Similar Triangles  
 Triangle ABC  
 Triangle DEF

Corresponding sides are proportional  
 $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

Corresponding angles are equal  
 $\angle A = \angle D$   
 $\angle B = \angle E$   
 $\angle C = \angle F$

Example:  
 Triangle ABC is similar to Triangle DEF  
 Find the length of side EF