Warm Up

You want to go to your sister's house this weekend. You have two options.
Option A is to take a taxi which will cost you $5 plus $1 per additional mile.
Option B is to drive by yourself. The cost of gasoline is $1.50 per mile.
Write equations to represent the total cost of Option A and B.
When will the two options cost the *same* amount?

A $y = 1x + 5$

B $y = 1.5x$

$1x + 5 = 1.5x$

$-1x \quad -1x$

$5 = .5x$

$\frac{5}{.5} = \frac{.5x}{.5}$

$x = 10$

$x = 10$

Solving Systems of Equations by Substitution

both

Step 1: Solve one of the equations for x= or y=

Step 2: Set the equations equal to one another

Step 3: Solve for x

Step 4: Substitute your solution into one of the original equations to solve for y - write the answer as (x,y)

$y = -4x$

$y = 2x + 3$

$y = x - 3$

$y = -x - 1$

$-4x = 2x + 3$

$-2x \quad -2x$

$-6x = 3$

$\frac{-6x}{-6} = \frac{3}{-6}$

$x = -.5$

$y = -4x$

$y = -4(-.5)$

$y = 2$

$(-.5, 2)$

$x - 3 = -x - 1$

$+1x \quad +1x$

$2x - 3 = -1$

$+3 \quad +3$

$\frac{2x}{2} = \frac{2}{2}$

$x = 1$

$y = x - 3$

$y = 1 - 3$

$y = -2$

$(1, -2)$

$x + 4y = 2$

$3y + x = 10$

$-x + 2y = 3$

$4x - 5y = 3$

$2x + y = 14$

$- x + 4y = 10$

$y = 4x + 4$

$2y = -3x + 14$

$x - y = 9$

$x + 2y =$

$y = -2x + 2$

$y = x + 5$

$(-1, 4)$

x, y

$y = x + 5$

$y = -1 + 5$

$y = 4$

$-2x + 2 = x + 5$

$-x \quad -x$

$-3x + 2 = 5$

$-2 \quad -2$

$-3x = 3$

$\frac{-3x}{-3} = \frac{3}{-3}$

$x = -1$

$y = x$

$y = 4x - 9$

$x = 4x - 9$

$-4x \quad -4x$

$-3x = -9$

$\frac{-3x}{-3} = \frac{-9}{-3}$

$x = 3$

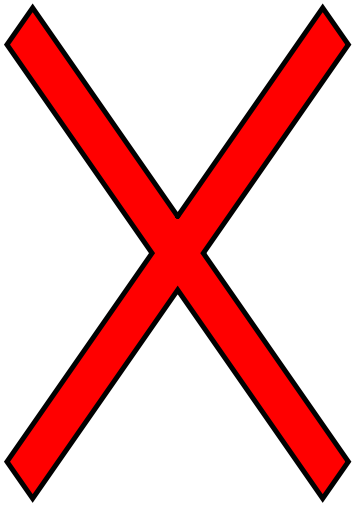
$y = x$

$y = 3$

$(3, 3)$

$6x + y = 19$

$5x - 2y = -4$

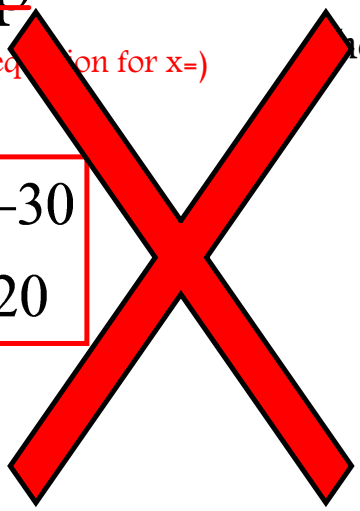


Warm Up

Solve the following system of equations using the substitution method.

(HINT: solve the 2nd equation for x=)

$$3x - 5y = -30$$
$$x - 5y = -20$$



Systems of Equations Word Problems

(solved with substitution)

Guy and Jim work at a furniture store. Guy is paid $185 per week plus 3% of his total sales in dollars, x, which can be represented by g(x)=185+0.03x. Jim is paid $275 per week plus 2.5% of his total sales in dollars, x, which can be represented by f(x)=275+0.025x. Determine the value of x, in dollars, that will make their weekly pay the same.

Solve for x

$185 + .03x = 275 + .025x$

$-.03x \quad -.03x$

$185 = 275 - .005x$

$-275 \quad -275$

$-90 = -.005x$

$\frac{-90}{-.005} = \frac{-.005x}{-.005}$

$18{,}000 = x$

A gardener is planting two types of trees:

Type A is 10 feet tall and grows at a rate of 10 inches per year.

Type B is 6 feet tall and grows at a rate of 16 inches per year.

Algebraically determine exactly how many years it will take for these trees to be the same height.

Joseph and Eli work at a store where they earn commission on their sales.

Joseph is paid $275 per week plus 9.5% of his total sales in dollars, x, which can be represented by $g(x)=275+0.095x$.

Eli is paid $613 per week plus 3% of his total sales in dollars, x, which can be represented by $f(x)=613+0.03x$.

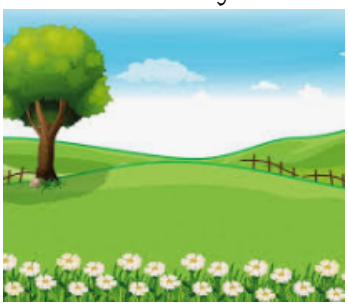
Determine the value of x, in dollars, that will make their weekly pay the same.

A local business was looking to hire a landscaper to work on their property. They narrowed their choices to two companies.

Flourish Landscaping Company charges a flat rate of $120 per hour.

Green Thumb Landscapers charges $70 per hour plus a $1600 equipment fee.

Write a system of equations representing how much each company charges.



Determine and state the number of hours that must be worked for the cost of each company to be the same.

If it is estimated to take at least 35 hours to complete the job, which company will be less expensive? Justify your answer.

A bag contains purple marbles and green marbles, 39 in total. The number of purple marbles is 9 less than 5 times the number of green marbles. How many of each type of marble are in the bag?

Currently, Tyrone has $60 and his sister has $135. Both get an allowance of $5 each week. Tyrone decides to save his entire allowance, but his sister spends all of hers each week. After how many weeks will they each have the same amount of money?

Central High School had five members on their swim team in 2010. Over the next several years, the team increased by an average of 10 members per year. The same school had 35 members in their chorus in 2010. The chorus saw an increase of 5 members per year.

Write a system of equations to model this situation, where x represents the number of years since 2010.

Determine the year in which the swim team and the chorus will have the same amount of people.