

Warm-Up

Use the **substitution method** to solve the following system of equations:

$$2x + y = 11$$

$$y = 4x + 17$$

$$(-1, 13)$$

$$2x + (4x + 17) = 11$$

$$6x + 17 = 11$$

$$6x = -6$$

$$x = -1$$

$$y = 4x + 17$$

$$y = 4(-1) + 17$$

$$y = -4 + 17$$

$$y = 13$$

Questions From Homework

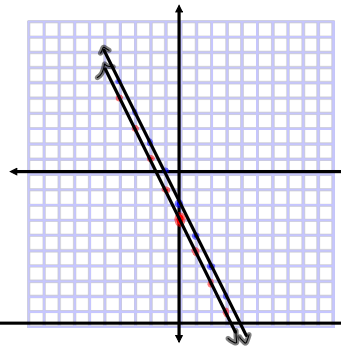
$$\begin{aligned} \textcircled{5} \quad & \begin{cases} -10 & -80x - 60y = -20 \\ -8 & -64x - 48y = -16 \end{cases} \\ & \begin{aligned} & -8x - 6y = -2 \\ \Leftrightarrow & \frac{-8x - 6y = -2}{-8x - 6y = -2} \\ & \boxed{0 = 0} \end{aligned} \end{aligned}$$

→ Infinite # of Solutions

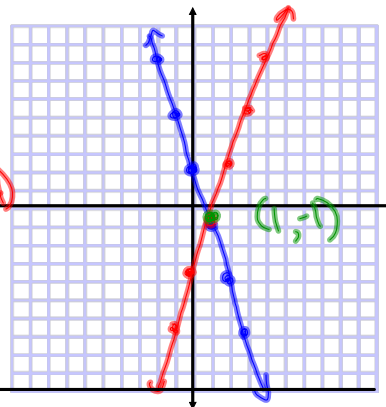
$$\begin{aligned} \textcircled{11} \quad & \begin{cases} -y = 3 + 2x \\ y = -3 - 2x \\ \boxed{y = -2x - 3} \end{cases} & \begin{cases} x + \frac{1}{2}y = -1 \\ \cdot 2 & \frac{1}{2}y = -x - 1 \\ \boxed{y = -2x - 2} \end{cases} \\ & \begin{aligned} m &= -2 \\ b &= -3 \end{aligned} & \begin{aligned} m &= -2 \\ b &= -2 \end{aligned} \end{aligned}$$

Since the lines have the same slope we know they are parallel and therefore will not intersect.

No Solution



$$\begin{aligned} \textcircled{6} \quad & \begin{cases} -y = -2 + 3x \\ y = 2 - 3x \\ \bullet \quad y = -3x + 2 \\ b = 2 \rightarrow (0, 2) \\ m = \frac{-3}{1} \end{cases} & \begin{cases} 4 = 3x - y \\ \bullet \quad y = 3x - 4 \\ b = -4 \rightarrow (0, -4) \\ m = \frac{3}{1} \end{cases} \end{aligned}$$



Comparison:

$$\begin{aligned} y &= -3x + 2 \\ y &= 3x - 4 \end{aligned}$$

$$\begin{aligned} -3x + 2 &= 3x - 4 \\ -6x &= -6 \\ \boxed{x = 1} & \end{aligned}$$

$$\begin{aligned} y &= 3(1) - 4 \\ y &= 3 - 4 \\ \boxed{y = -1} & \end{aligned}$$

Solving Word Problems

Applications

Step 1: Read the problem (multiple times!)

Step 2: Define the two variables in the problem

Step 3: Set up the equations from the problem
(# equations = # unknowns)

Step 4: Solve the system of equations

Step 5: State your conclusion

A landscaping company placed two orders with a nursery. The first order was for 13 shrubs 4 trees and totaled \$487. The second order was for 6 shrubs and 2 trees and it totaled \$232. Determine the cost of each.

Let $x =$ shrub (\$)

Let $y =$ tree (\$)

$$13x + 4y = 487$$

$$(2) \quad 6x + 2y = 232$$

$$13x + 4y = 487$$

$$\Leftrightarrow \frac{12x + 4y = 464}{}$$

$$x = 23$$

$$6(23) + 2y = 232$$

$$138 + 2y = 232$$

$$2y = 94$$

∴ A shrub costs \$23 and a tree will set you back \$47.



The admission to the fair is \$2 for children and \$4 for adults. On Saturday one thousand people attended and \$2800 was collected. How many children and how many adults attended the fair?

Let $x = \#$ of children

Let $y = \#$ of adults

$$2x + 4y = 2800$$

$$x + y = 1000$$



$$\begin{array}{r} 2x + 4y = 2800 \\ (-) \quad 2x + 2y = 2000 \\ \hline 2y = 800 \\ \boxed{y = 400} \end{array}$$

$$\begin{array}{r} x + y = 1000 \\ x + 400 = 1000 \\ \boxed{x = 600} \end{array}$$

\therefore 600 children + 400 adults attended.

A pizza costs \$10 more than a donair. If two pizzas and three donairs cost \$40, find the cost of each item.

$$\text{Let } x = \text{pizza } (\$)$$

$$\text{Let } y = \text{donair } (\$)$$

$$2x + 3y = 40$$

$$x = y + 10$$



$$2(y+10) + 3y = 40$$

$$2y + 20 + 3y = 40$$

$$5y = 20$$

$$y = 4$$

$$x = y + 10$$

$$x = 4 + 10$$

$$x = 14$$

A total of \$12,000 is invested in two funds paying 9% and 11% simple interest. If the yearly interest is \$1,180, how much of the \$12,000 is invested at each rate?

Let x = investment @ 9%

Let y = " @ 11%

$$\begin{array}{r} x + y = 12000 \\ 0.09x + 0.11y = 1180 \end{array} \quad \leftrightarrow \quad \begin{array}{r} 9x + 9y = 108000 \\ 9x + 11y = 118000 \\ \hline -2y = -10000 \\ y = \$5000 \end{array}$$

$$\begin{array}{r} x + y = 12000 \\ x + 5000 = 12000 \\ \hline x = \$7000 \end{array}$$

\therefore \$5000 is invested @ 11%
 \$7000 " " @ 9%

Homework