

What you will learn about:
Solve Mixture Problems using System of Equations

Translate to a system of equations and then solve: Jamie has seventeen total coins in her purse. She has only quarters and dimes. The change in her purse totals up to \$2.90. How many quarters does she have? How many dimes does she have?

8 quarters
9 dimes

$$\begin{aligned}
 q &= \# \text{ quarters} & q + d &= 17 & .25q + .10d &= 2.90 \\
 d &= \# \text{ dimes} & d &= 17 - q & 25q + 10d &= 290 \\
 & & & & 25q + 10(17 - q) &= 290 \\
 & & & & 25q + 170 - 10q &= 290 \\
 & & & & 15q &= 120 & q &= 8
 \end{aligned}$$

$X = \#$ 11 tickets
 $Y = \#$ 8 tickets

$$\begin{array}{r}
 147 \\
 \underline{11}
 \end{array}$$

Translate to a system of equations and then solve: The box office at a movie theater sold 147 tickets for the evening show, and receipts totaled \$1,302. How many \$11 adult and how many \$8 child tickets were sold?

$$\begin{aligned}
 X + Y &= 147 & X &= 147 - Y \\
 11X + 8Y &= 1302 \\
 11(147 - Y) + 8Y &= 1302 \\
 1617 - 11Y + 8Y &= 1302 \\
 -3Y &= -315 \\
 Y &= 105
 \end{aligned}$$

$$\begin{array}{r}
 147 \\
 -105 \\
 \hline
 42
 \end{array}$$

$$\begin{array}{r}
 1617 \\
 -1302 \\
 \hline
 315
 \end{array}$$

42 - Adult tickets
105 - Child tickets

$X =$ Adult tickets
 $Y =$ Child tickets

$$\begin{array}{r}
 16356 \\
 -12146 \\
 \hline
 4210
 \end{array}$$

Translate to a system of equations and then solve: A science center sold 1,363 tickets on a busy weekend. The receipts totaled \$12,146. How many \$12 adult tickets and how many \$7 child tickets were sold?

$$\begin{aligned}
 X + Y &= 1363 & X &= 1363 - Y \\
 12X + 7Y &= 12,146 \\
 12(1363 - Y) + 7Y &= 12,146 \\
 16,356 - 12Y + 7Y &= 12,146 \\
 -5Y &= -4210 \\
 Y &= 842
 \end{aligned}$$

$$\begin{array}{r}
 X = 1363 - 842 \\
 \hline
 X = 521
 \end{array}$$

521 - Adult
842 - Child

Translate to a system of equations and then solve: Steve has a collection of nickels and quarters, with a total value of \$7.30. The number of nickels is six less than three times the number of quarters. How many nickels and how many quarters does he have?

$n = \# \text{ of Nickels}$
 $d = \# \text{ of Dimes}$

Translate to a system of equations and then solve: Juan has a pocket full of nickels and dimes. The total value of the coins is \$8.10. Juan has a total of 99 coins in his pocket. How many nickels and how many dimes does Juan have?

$$n + d = 99$$

$$.05n + .10d = 8.10$$

$$5n + 10d = 810$$

$$n + 2d = 162$$

$$n + 2d = 162$$

$$+ \quad n + d = 99$$

$$n + 63 = 99$$

$$\underline{\hspace{1.5cm}}$$

$$d = 63$$

$$n = 36$$

$\frac{162}{5} = 32.4$
 $32.4 + 36 = 68.4$
 $99 - 68.4 = 30.6$

$x = \text{lbs of nuts}$
 $y = \text{lbs of CC}$

Translate to a system of equations and then solve: Carson wants to make 20 pounds of trail mix using nuts and chocolate chips. His budget requires that the trail mix costs him \$7.60 per pound. Nuts cost \$9.00 per pound and chocolate chips cost \$2.00 per pound. How many pounds of nuts and how many pounds of chocolate chips should he use.

$$x + y = 20$$

$$x + y = 20$$

$$9x + 2y = (7.60)(20)$$

$$9x + 2y = 152$$

$$16 + y = 20$$

$$\underline{(-) 2x + 2y = 40}$$

$$y = 4$$

$$7x = 112$$

16 lbs of nuts

$$y = 16$$

4 lbs of C.C.

$X = \text{lbs of Peanuts}$

$Y = \text{lbs of Cashews}$

3 lbs of Peanuts

2 lbs of Cashews

80 ml 25%

$X = \text{ml 25\% solution}$

$Y = \text{ml 50\% solution}$

120 ml of 50%

120 ml of 25%

$X = \text{ml of 25\% solution}$

$Y = \text{ml of 50\% solution}$

30 ml of 50%

Translate to a system of equations and then solve: Greta wants to make 5 pounds of a nut mix using peanuts and cashews. Her budget requires the mixture cost her \$6 per pound. Peanuts are \$4 per pound and cashews are \$9 per pound. How many pounds of peanuts and how many pounds of cashews should be used?

$$X + Y = 5$$

$$(X + Y = 5)^4$$

$$4X + 9Y = (6)(5)$$

$$4X + 9Y = 30$$

$$-4X + 4Y = 20$$

$$5Y = 10$$

$$Y = 2$$

Translate to a system of equations and then solve: Salley is a lab assistant at her community college. She needs to make 200 milliliters of a 40% solution of sulfuric acid for a lab experiment. The lab has only 25% and 50% solutions in the storeroom. How much should she mix of the 25% and 50% solutions to make the 40% solution?

$$X + Y = 200$$

$$.25X + .50Y = 200(.40)$$

$$.25X + .50Y = 80$$

$$25X + 50Y = 8000$$

$$X + 2Y = 320$$

$$X + 2Y = 320$$

$$(-) X + Y = 200$$

$$Y = 120$$

Translate to a system of equations and then solve: Marcus needs 150 milliliters of a 30% solution of sulfuric acid for a lab experiment but only has access to a 25% and a 50% solution. How much of the 25% and how much of the 50% solution should he mix to make the 30% solution?

$$X + Y = 150$$

$$.25X + .50Y = 150(.30)$$

$$.25X + .50Y = 45$$

$$25X + 50Y = 4500$$

$$X + 2Y = 180$$

$$X + 2Y = 180$$

$$(-) X + Y = 150$$

$$Y = 30$$

$$X = 120$$

X = Amount in 8%

Y = Amount in 3%

42,000 @ 7%

X = Amount in 7%

Y = Amount in 2%

8,000 @ 2%

Translate to a system of equations and then solve: Adrian has \$40,000 to invest and hopes to earn 7.1% interest per year. He will put some of the money into a stock fund that earns 8% per year and the rest into bonds that earns 3% per year. How much money should he put into each fund?

$$(X+Y=40,000)^3 \quad .08X+.03Y=40,000(.071)$$

$$.08X+.03Y=2840$$

$$8X+3Y=284000$$

$$8X+3Y=284,000$$

$$(-) \quad 3X+3Y=120,000$$

$$5X = 164,000$$

$$X = \$32,800$$

$$Y = \$7,200$$

Translate to a system of equations and then solve: Leon had \$50,000 to invest and hopes to earn 6.2% interest per year. He will put some of the money into a stock fund that earns 7% per year and the rest into a savings account that earns 2% per year. How much money should he put into each account?

$$(X+Y=50,000)^2 \quad .07X+.02Y=50,000(.062)$$

$$.07X+.02Y=3100$$

$$7X+2Y=31000$$

$$7X+2Y=310,000$$

$$(-) \quad 2X+2Y=100,000$$

$$5X = 210,000$$

$$X = 42,000$$

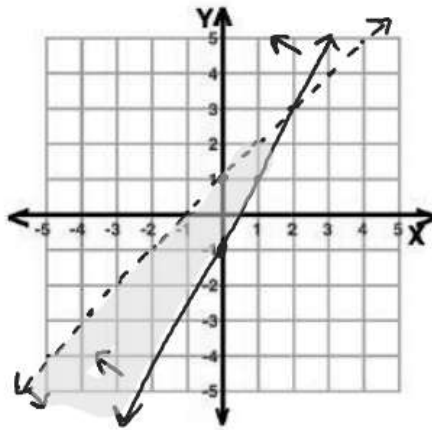
Translate to a system of equations and then solve: Rosie owes \$21,540 on her 2 student loans. The interest rate on her bank loan is 10.5% and the interest rate on the federal loan is 5.9%. The total amount of interest she paid last year was \$1,669.68. What was the principle for each loan?

What you will learn about:
Solving Systems of Linear Inequalities

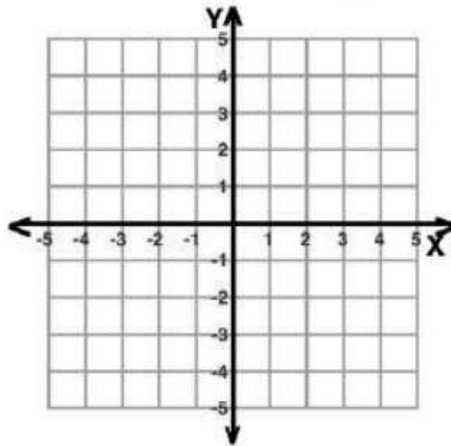
Solve the system by graphing $\begin{cases} y \geq 2x - 1 \\ y < x + 1 \end{cases}$

$$\begin{aligned} 0 &\geq 2(0) - 1 \\ 0 &\geq -1 \end{aligned}$$

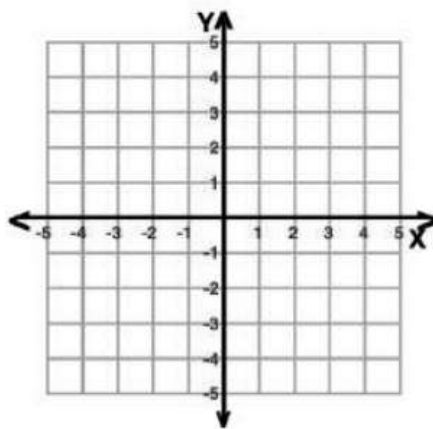
$$0 < 0 + 1$$



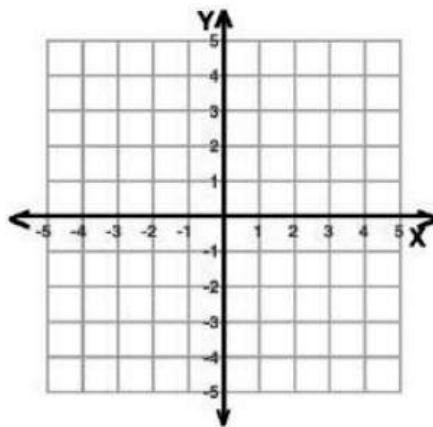
Solve the system by graphing $\begin{cases} y < -\frac{1}{2}x + 3 \\ y < 3x - 4 \end{cases}$



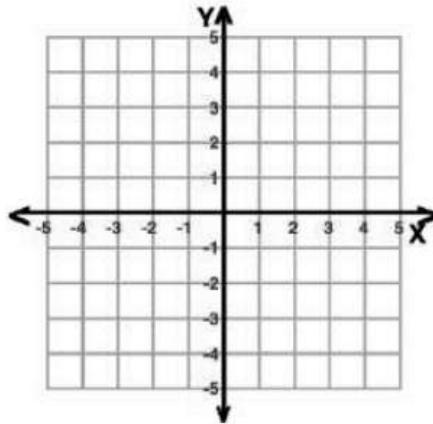
Solve the system by graphing $\begin{cases} x - y > 3 \\ y < -\frac{1}{5}x + 4 \end{cases}$



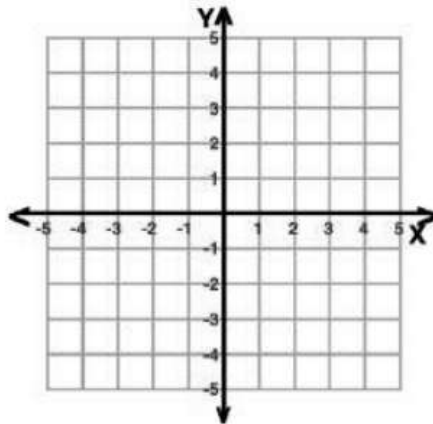
Solve the system by graphing $\begin{cases} 2x - 3y \leq 6 \\ y > -\frac{1}{4}x + 5 \end{cases}$



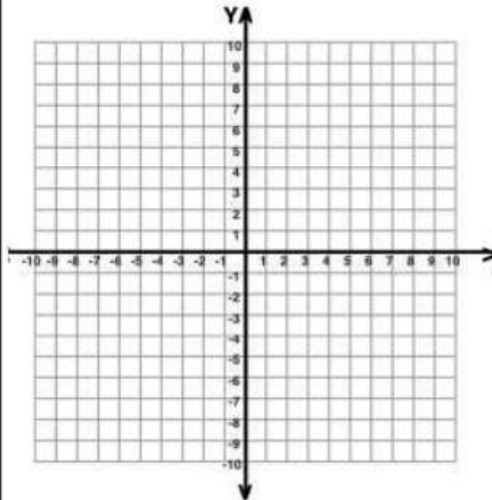
Solve the system by graphing $\begin{cases} x - 2y < 5 \\ y > -4 \end{cases}$



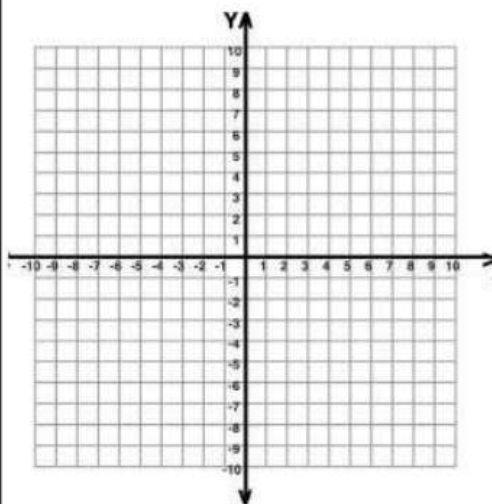
Solve the system by graphing $\begin{cases} x > -4 \\ x - 2y \leq -4 \end{cases}$



Solve the system by graphing $\begin{cases} 3x - 2y \leq 12 \\ y \geq \frac{3}{2}x + 1 \end{cases}$



Solve the system by graphing $\begin{cases} 4x + 3y \geq 12 \\ y < -\frac{4}{3}x + 1 \end{cases}$



$X = \text{Small Photos}$

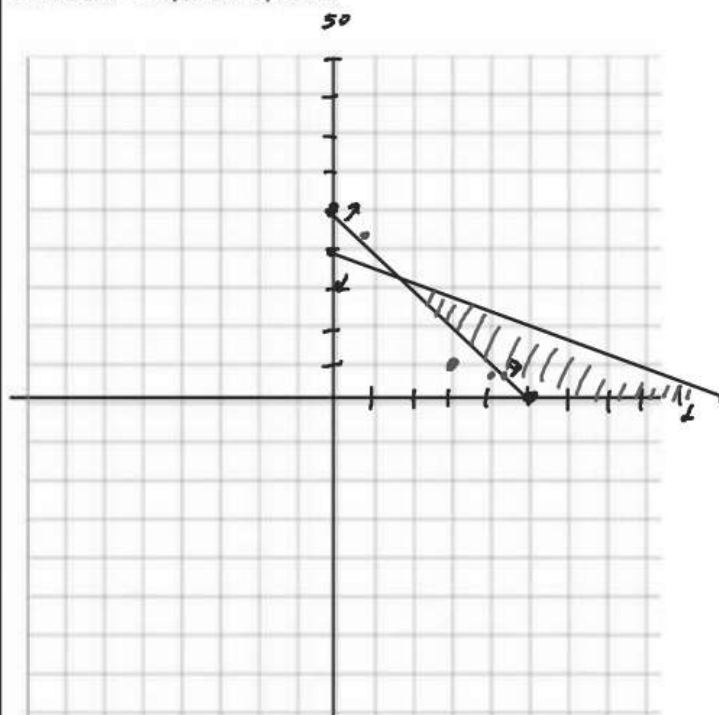
$Y = \text{Large Photos}$

$$x + y \geq 25$$

$$4x + 10y \leq 200$$

$$\left. \begin{array}{l} x \geq 0 \\ y \geq 0 \end{array} \right\} \begin{array}{l} \text{1st} \\ \text{Quadrant} \end{array}$$

Christy sell here photographs at a booth at a street fair. At the start of the day, she wants to have at least 25 photos to display at her booth. Each small photo she displays cost her \$4 and each large photo costs her \$10. She doesn't want to send more than \$200 on photos to display. Write a system of inequalities to model this situation. Graph the system.



Could she display 15 small and 5 large photos? *No*

Could she display 3 large and 22 small photos? *Yes*

$x = \# \text{ of Hamburgers}$

$y = \# \text{ of Cookies}$

Calories

$$240x + 160y \geq 800$$

$$x = 3\bar{3}$$

$$y = 5$$

$$m = -\frac{3}{2}$$

Cost

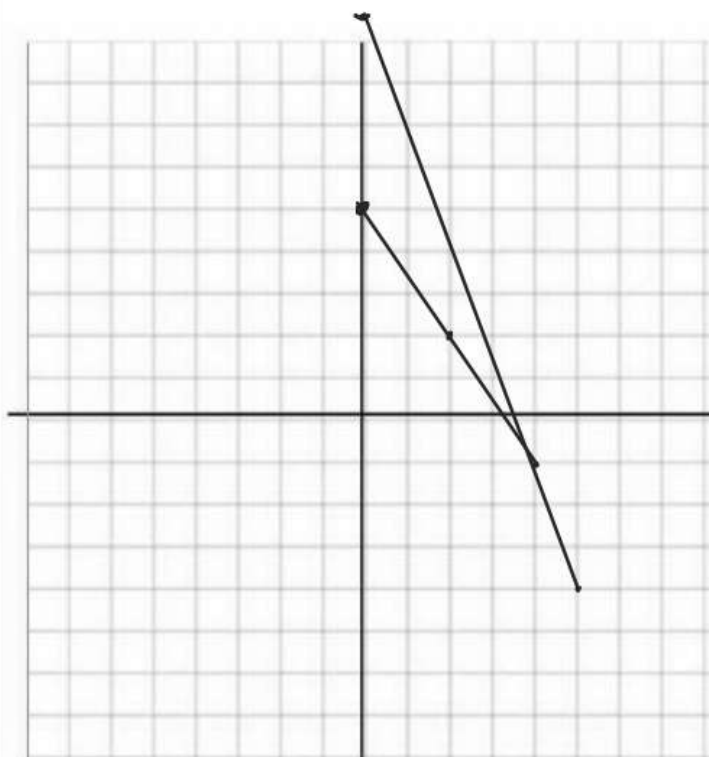
$$1.4x + .5y \leq 5$$

$$x = 3.571$$

$$y = 10$$

$$m = -\frac{2}{10}$$

Omar needs to eat at least 800 calories before going to his team practice. All he wants is hamburgers and cookies and he doesn't want to spend more than \$5. At the hamburger restaurant near his college each hamburger has 240 calories and costs \$1.40. Each cookie has 160 calories and costs \$0.50. Write a system of inequalities to model this situation. Graph the system.



Could he eat 3 hamburgers and 1 cookie?

Could he eat 2 hamburgers and 4 cookies?