

Systems of Equations Word Problems

- 1) Kristin spent \$131 on shirts. Fancy shirts cost \$28 and plain shirts cost \$15. If she bought a total of 7 then how many of each kind did she buy?

$x = \text{fancy}$        $y = \text{plain}$

$$\begin{array}{r} 28x + 15y = 131 \\ -15(x + y = 7) \end{array} \rightarrow \begin{array}{r} 28x + 15y = 131 \\ -15x - 15y = -105 \\ \hline 13x = 26 \\ \hline x = 2 \end{array}$$

$2x + y = 7$   
 $-2$   
 $\hline y = 5$

$28(2) + 15y = 131$   
 $56 + 15y = 131$   
 $15y = 75$   
 $\hline y = 5$

- 2) There are 13 animals in the barn. Some are chickens and some are pigs. There are 40 legs in all. How many of each animal are there?

$x = \text{chickens}$ ,  $y = \text{pigs}$

$$\begin{array}{r} -2(x + y = 13) \\ 2x + 4y = 40 \end{array} \rightarrow \begin{array}{r} -2x - 2y = -26 \\ + (2x + 4y = 40) \\ \hline 2y = 14 \\ \hline y = 7 \end{array}$$

$x + 7 = 13$   
 $-7$   
 $\hline x = 6$

$2x + 4(7) = 40$   
 $2x + 28 = 40$   
 $-28$   
 $\hline 2x = 12$   
 $\hline x = 6$

- 3) A farmhouse shelters 10 animals. Some are pigs and some are ducks. Altogether there are 36 legs. How many of each animal are there?

$x = \text{pigs}$ ,  $y = \text{ducks}$

$$\begin{array}{r} -2(x + y = 10) \\ 4x + 2y = 36 \end{array} \rightarrow \begin{array}{r} -2x - 2y = -20 \\ + (4x + 2y = 36) \\ \hline 2x = 16 \\ \hline x = 8 \end{array}$$

$8 + y = 10$   
 $-8$   
 $\hline y = 2$

$4(8) + 2y = 36$   
 $32 + 2y = 36$   
 $-32$   
 $\hline 2y = 4$   
 $\hline y = 2$

- 4) A class of 195 students went on a field trip. They took 7 vehicles, some cars and some buses. Find the number of cars and the number of buses they took if each car holds 5 students and each bus hold 45 students.

$x = \text{cars}$ ,  $y = \text{buses}$

$$\begin{array}{r} -5(x + y = 7) \\ 5x + 45y = 195 \end{array} \rightarrow \begin{array}{r} -5x - 5y = -35 \\ + (5x + 45y = 195) \\ \hline 40y = 160 \\ \hline y = 4 \end{array}$$

$x + 4 = 7$   
 $-4$   
 $\hline x = 3$

$5x + 45(4) = 195$   
 $5x + 180 = 195$   
 $-180$   
 $\hline 5x = 15$   
 $\hline x = 3$

- 5) A farmhouse shelters 11 animals. Some are goats and some are ducks. Altogether there are 34 legs. How many of each animal are there?  $x = \text{goats}, y = \text{ducks}$

$$\begin{aligned} -2(x+y=11) &\rightarrow -2x-2y=-22 \\ 4x+2y=34 &\rightarrow 4x+2y=34 \\ \hline 2x &= 12 \\ \frac{2}{2} &\quad \frac{2}{2} \\ x &= 6 \end{aligned}$$

$$\begin{aligned} 6+y &= 11 \\ -6 &\quad -6 \\ \hline y &= 5 \end{aligned}$$

$$\begin{aligned} 4(6)+2y &= 34 \\ 24+2y &= 34 \\ -24 &\quad -24 \\ \hline 2y &= 10 \\ \frac{2}{2} &\quad \frac{10}{2} \\ y &= 5 \end{aligned}$$

- 6) All 231 students in the Math Club went on a field trip. Some students rode in vans which hold 7 students each and some students rode in buses which hold 25 students each. How many of each type of vehicle did they use if there were 15 vehicles total?  $x = \text{vans}, y = \text{buses}$

$$\begin{aligned} -7(x+y=15) &\rightarrow -7x-7y=-105 \\ 7x+25y=231 &\rightarrow 7x+25y=231 \\ \hline 18y &= 126 \\ \frac{18}{18} &\quad \frac{126}{18} \\ y &= 7 \end{aligned}$$

$$\begin{aligned} x+7 &= 15 \\ -7 &\quad -7 \\ \hline x &= 8 \end{aligned}$$

$$\begin{aligned} 7x+25(7) &= 231 \\ 7x+175 &= 231 \\ -175 &\quad -175 \\ \hline 7x &= 56 \\ \frac{7}{7} &\quad \frac{56}{7} \\ x &= 8 \end{aligned}$$

- 7) At Elisa's Printing Company LLC there are two kinds of printing presses: Model A which can print 70 books per day and Model B which can print 55 books per day. The company owns 14 total printing presses and this allows them to print 905 books per day. How many of each type of press do they have?  $x = \text{\# of Model A}, y = \text{\# of Model B}$

$$\begin{aligned} -55(x+y=14) &\rightarrow -55x-55y=-770 \\ 70x+55y=905 &\rightarrow 70x+55y=905 \\ \hline 15x &= 135 \\ \frac{15}{15} &\quad \frac{135}{15} \\ x &= 9 \end{aligned}$$

$$\begin{aligned} 9+y &= 14 \\ -9 &\quad -9 \\ \hline y &= 5 \end{aligned}$$

$$\begin{aligned} 70(9)+55y &= 905 \\ 630+55y &= 905 \\ 55y &= 275 \\ \frac{55}{55} &\quad \frac{275}{55} \\ y &= 5 \end{aligned}$$

- 8) Molly's Custom Kitchen Supplies sells handmade forks and spoons. It costs the store \$1.70 to buy the supplies to make a fork and \$1.30 to buy the supplies to make a spoon. The store sells forks for \$5.60 and spoons for \$5.40. Last April Molly's Custom Kitchen Supplies spent \$37.90 on materials for forks and spoons. They sold the finished products for a total of \$147.20. How many forks and how many spoons did they make last April?  $x = \text{forks}, y = \text{spoons}$

$$\begin{aligned} 5.60(1.70x + 1.30y = 37.90) &\rightarrow 9.52x + 7.28y = 212.24 \\ -1.70(5.60x + 5.40y = 147.20) &\rightarrow -9.52x - 9.18y = -250.24 \end{aligned}$$

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| <p>Plug in</p> $\begin{aligned} 1.70x + 1.30(20) &= 37.90 \\ 1.70x + 26 &= 37.90 \\ 1.70x &= 11.90 \\ x &= 7 \end{aligned}$ | <p>Plug in</p> $\begin{aligned} 5.60x + 5.40(20) &= 147.20 \\ 5.60x + 108 &= 147.20 \\ 5.60x &= 39.2 \\ x &= 7 \end{aligned}$ |
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$$\begin{aligned} -109y &= -38 \\ -1.9 &\quad -1.9 \\ \hline y &= 20 \end{aligned}$$