

For each question, set up a system of equations and solve the system using substitution or elimination.

A successful answer to this question will include:

- Evidence of you translating the information given into a mathematical representation.
- A mathematical solution using algebraic methods (guess and check is not sufficient).
- Complete communication including all work being shown and explanations as needed, using mathematical language.
- Accurate and mathematically justified solutions.
- A complete and thorough checking of your work.

1. The school's photographer took pictures at this year's prom. She charged \$3.25 for wallet-sized pictures and \$10.50 for portrait-sized pictures. If Frances bought a total of 10 pictures and paid a total of \$61.50, find how many of each type of picture Frances bought.

Let $p = \overset{\text{number}}{\text{piece of portraits}}$, $w = \overset{\text{number}}{\text{piece of wallets}}$.

Then, $3.25w + 10.50p = 61.50 \rightarrow 3.25w + 10.50p = 61.50$

And, $3.25(w + p = 10) \rightarrow \begin{array}{r} 3.25w + 3.25p = 32.50 \\ \underline{7.25p = 29} \\ \hline 7.25 \quad 7.25 \end{array}$

$w + 4 = 10$
 $\begin{array}{r} -4 \quad -4 \\ \hline w = 6 \end{array}$ Plug in $P = 4$

Check: $3.25(6) + 10.50(4) \stackrel{?}{=} 61.50$
 $19.50 + 42 = 61.50$

2. Automobile companies advertise two rates for fuel mileage. City mileage is the rate of fuel consumption for driving in stop-and-go traffic. Highway mileage is the rate for driving at higher speeds for long periods of time. Cynthia's new car gets 17 miles per gallon in the city and 25 miles per gallon on the highway. She drove 220 miles on 11 gallons of gas. How many gallons of gas did she use in the city? On the highway?

Let $c = \text{number of city gallons}$, $h = \text{number of highway gallons}$.

Then $17c + 25h = 220 \rightarrow 17c + 25h = 220$

And $17(c + h = 11) \cdot 17 \rightarrow \begin{array}{r} 17c + 17h = 187 \\ \underline{8h = 33} \\ \hline 8 \quad 8 \end{array}$

$c + 4.125 = 11$
 $\begin{array}{r} -4.125 \quad -4.125 \\ \hline c = 6.875 \end{array}$ Plug in $h = 4.125$

Check: $17(6.875) + 25(4.125) \stackrel{?}{=} 220$
 $116.875 + 103.125 = 220$

3. Mr. McQueen offers two extra credit choices. Worksheets are worth 5 points each and puzzles are worth 10 points each. Marcus has completed 26 extra credit assignments and has earned 225 extra credit points. How many of each type has he completed?

Let w = number of worksheets & p = number of puzzles

Then $5w + 10p = 225 \longrightarrow 5w + 10p = 225$

And $5(w + p = 26) \longrightarrow \underline{5w + 5p = 130}$

$$\begin{array}{r} 5p = 95 \\ \hline 5 \quad 5 \\ \hline p = 19 \end{array}$$

$w + 19 = 26 \longleftarrow$ Plug in $p = 19$

$w = 7$

Check: $5(7) + 10(19) \stackrel{?}{=} 225$
 $35 + 190 = 225$

4. Hiroshi and his brother go to a fountain every Sunday and toss in a few coins as they make a wish. Hiroshi starts with \$1.60, all dimes, while his brother starts with \$0.95, all nickles. If Hiroshi tosses in \$0.20 every Sunday, and his brother tosses in \$0.15...

a. When will they have the same number of coins?

16 dimes 19 nickles

Hiroshi: $y = 16 - 2x$

Bro: $y = 19 - 3x$

$$16 - 2x = 19 - 3x$$

$$\begin{array}{r} +3x \quad +3x \\ \hline 16 + x = 19 \\ -16 \quad -16 \\ \hline x = 3 \end{array}$$

Check: $10 \stackrel{?}{=} 19 - 3(3)$

- b. How much money will they each have left when they have the same number of coins?

Hiroshi: $y = 1.60 - 0.20x$

Bro: $y = 0.95 - 0.15x$

Plug in $x = 3$

$y = 1.60 - 0.60 = 1.00$ Hiroshi

$y = 0.95 - 0.45 = 0.50$ Bro.

- c. How much money will be in the fountain when they have the same number of coins?

$$.20 \cdot 3 + .15 \cdot 3$$

$$.60 + .45 = 1.05$$

- d. When will they each run out of money?

Hiroshi: $0 = 1.60 - 0.20x$

$$\begin{array}{r} +.20x \quad +.20x \\ \hline .20x = 1.60 \\ \hline x = 8 \end{array}$$

Bro: $0 = 0.95 - 0.15x$

$$\begin{array}{r} +0.15x \quad +0.15x \\ \hline 0.15x = 0.95 \\ \hline x = 6.3 \end{array}$$

- e. Will the brothers ever have the same amount of money?

$$1.60 - 0.20x = 0.95 - 0.15x$$

$$\begin{array}{r} +.20x \quad +.20x \\ \hline 1.60 = .95 + .05x \\ -.95 \quad -.95 \\ \hline .65 = .05x \\ \hline x = 13 \text{ days} \end{array}$$

But they run out of money before 13 days, so this answer isn't reasonable.