

2.7 Word Problems--> Day 2

1. A gum ball machine contains only quarters and dimes. There are 28 coins whose total value is \$5.35. How many quarters are there?



Let q be # of quarters

Let d " " " dimes

$$q + d = 28 \quad (1)$$

$$0.25q + 0.10d = 5.35 \quad (2)$$

Substitution!

$$(1) \quad d = 28 - q$$

Sub into (2)

$$0.25q + 0.10(28 - q) = 5.35$$

$$0.25q + 2.8 - 0.10q = 5.35$$

$$0.15q = 2.55$$

$$q = 17$$

∴ There are 17 quarters.



2. Moira invested \$800. Part of the money was in a term deposit that paid 6% per annum, the rest was in an account earning 4% per annum. After one year she had earned \$42 interest. How much did she invest at each rate?

Let x be the amount invested @ 6%

Let y " " " " " 4%

$$x + y = 800 \quad (1)$$

$$0.06x + 0.04y = 42 \quad (2)$$

$$(1) \quad x + y = 800$$

$$x = 800 - y$$

Sub into (2)

$$0.06(800 - y) + 0.04y = 42$$

$$48 - 0.06y + 0.04y = 42$$

$$6 = 0.02y$$

$$300 = y$$

Sub back into (1)

$$x + 300 = 800$$

$$x = 500$$

Remember!
 $6\% = 0.06$
 $\frac{6}{100} = 0.06$

∴ She invested

\$500 @ 6%

\$300 @ 4%

3. Sheldon is asked to make 200 mL of 48% alcohol solution to pass his chemistry course! He is given a 40% and 60% alcohol solutions and asked to mix them in order to get the right solution. Help poor Sheldon... How many milliliters of each must he use?



Let x be the amount of 40%
 Let y " " " " 60%

$$\textcircled{1} \quad x + y = 200$$

$$\textcircled{2} \quad 0.40x + 0.60y = 0.48(200)$$

$$= 96$$

Elimination!

$$\begin{array}{rcl} \textcircled{1} \times 4 & 4x + 4y = 800 & \\ \textcircled{2} \times 10 & - \quad 4x + 6y = 960 & \\ \hline & \quad \quad -2y = -160 & \\ & \quad \quad y = 80 & \end{array}$$

Sub into $\textcircled{1}$
 $x + 80 = 200$
 $x = 120$

$\therefore$ He needs
 120 mL of 40%
 80 mL of 60%

4. How many kg of 30% salt solution by mass and 40% salt solution by mass should be mixed to form 400 kg of 37% salt solution by mass?

Let x be amount of 30%
 Let y " " " " 40%



$$\begin{array}{rcl} \textcircled{1} & x + y = 400 & \\ \textcircled{2} & 0.30x + 0.40y = 0.37(400) & \\ & = 148 & \end{array}$$

$$\begin{array}{rcl} \textcircled{1} \times 0.3 & 0.3x + 0.3y = 120 & \\ \textcircled{2} & - \quad 0.3x + 0.4y = 148 & \\ \hline & \quad \quad -0.1y = -28 & \\ & \quad \quad y = 280 & \end{array}$$

Sub into $\textcircled{1}$
 $x + 280 = 400$
 $x = 120$

$\therefore$ 120 kg of 30%
 280 kg of 40%

Homework:

Set 1: p.18 #12,16 p.46 #3,12,15

Set 2: p.18 #12,16 p.46 #12,15,16