Q. 90% and 97% pure acid solutions are mixed to obtain 21 litres of 95% pure acid solution. Find the amount of each type of acid to be mixed to from the mixture.

Solution:- Let $x$ litres of 90% Pure acid solution and $y$ litres of 97% Pure acid solution be taken.

Then. $x$ litres of 90% + $y$ litres of 97% = 95% of mixtures

$$\frac{90x}{100} + \frac{97y}{100} = \frac{95}{100}(x+y)$$

$$\Rightarrow \frac{90x+97y}{100} = \frac{95x+95y}{100}$$

$$\Rightarrow 90x + 97y = 95x + 95y$$

$$\Rightarrow 90x - 95x + 97y - 95y = 0$$

$$\Rightarrow -5x + 2y = 0 \quad \text{——— (i)} \times 1$$

Again $x + y = 21$ ——— (ii) × 5

eqn (i) × 1 and (ii) × 5 and (i) + (ii)

$$-5x + 2y = 0$$

$$5x + 5y = 105$$

$$7y = 105$$

$$\therefore y = \frac{105}{7} = 15$$

Putting the value of $y$ in eqn (ii)

$$x + y = 21$$

$$\Rightarrow x + 15 = 21$$

$$\therefore x = 6$$

Hence 6 litres of 90% Pure acid and 15 litres of 97% pure acid. Ans.

Q. In a $\triangle ABC$, $\angle A = x^\circ$, $\angle B = (3x-2)^\circ$ and $\angle C = y^\circ$. Also $\angle C - \angle B = 9^\circ$. Determine the three angles.

Solution :- We know that sum of all interior angles in a triangle is $180^\circ$

In $\triangle ABC$,

$$\angle A + \angle B + \angle C = 180^\circ$$

$$\Rightarrow x^\circ + 3x - 2 + y = 180^\circ$$

$$\Rightarrow 4x + y = 182 \quad \text{——} (i)$$

Given in question

$$\angle C - \angle B = 9^\circ$$

$$\Rightarrow y - (3x-2) = 9$$

$$\Rightarrow y - 3x + 2 = 9$$

$$\therefore -3x + y = 7 \quad \text{——} (ii)$$

eqn (i) − (ii)

$$\begin{array}{r} 4x + y = 182 \\ -3x + y = 7 \\ \hline 7x = 175 \end{array}$$

$$x = \frac{175}{7} = 25^\circ$$

Putting the value of $x$ in eqn (i)

$$\Rightarrow 4x + y = 182$$

$$\Rightarrow 4 \times 25 + y = 182$$

$$\Rightarrow y = 182 - 100$$

$$y = 82^\circ$$

Hence $\angle A = x^\circ = 25^\circ$, $\angle B = 3x - 2 = 3 \times 25 - 2 = 73^\circ$

and $\angle C = y = 82^\circ$ Ans

Do your self

Q In $\triangle ABC$, $\angle A = x^\circ$, $\angle B = y^\circ$ and $\angle C = y + 20^\circ$. If $4x - y = 10^\circ$ show that triangle is a right angled triangle.

Q. In $\triangle ABC$, $\angle C = 3\angle B = 2(\angle A + \angle B)$ Find the three angles.