

### Exercise - 3.14

Solve by any one of the methods:-

- ① The sum of a two digit number and the number formed by interchanging the digit is 110. If 10 is subtracted from the first number, the new number is 4 more than 5 times the sum of the digits of the first number. Find the first number.

⇒ Let the ten digit and unit digit number are  $x$  and  $y$ .

$$\begin{aligned}\text{Then, The number} &= 10x + y \\ &= 10x + y\end{aligned}$$

Given by condition,

$$10x + y + 10y + x = 110$$

$$11x + 11y = 110$$

$$x + y = 10 \quad \dots (i)$$

and

$$10x + y - 10 = 5(x + y) + 4$$

$$10x + y - 10 = 5x + 5y + 4$$

$$5x - 4y = 14 \quad \dots (ii)$$

Now

$$(i) \times 4 \rightarrow 4x + 4y = 40$$

$$(ii) \times 1 \rightarrow 5x - 4y = 14$$

$$\hline 9x = 54$$

$$x = 6$$

~~from~~ putting  $x = 6$  in (i), we get

$$x + y = 10$$

$$6 + y = 10$$

$$y = 10 - 6$$

$$y = 4$$

Thus, the value of  $x = 6$  and  $y = 4$ .

$$\begin{aligned}\text{Therefore, the number} &= 10x + y \\ &= 10 \times 6 + 4 \\ &= 64\end{aligned}$$

- ② The sum of the numerator and denominator of a fraction is 12. If the denominator is increased by 3, the fraction becomes  $\frac{1}{2}$ . Find the fraction.

⇒ Let the fraction numerator and denominator are  $x$  and  $y$ .

Then, the fraction =  $\frac{x}{y}$ .

Given by condition,

$$x + y = 12 \quad \dots (i)$$

$$\text{and } \frac{x}{y+3} = \frac{1}{2}$$

$$2x = y + 3$$

$$2x - y = 3 \quad \dots (ii)$$

$$(i) \times 1 \longrightarrow x + y = 12$$

$$(ii) \times 1 \longrightarrow 2x - y = 3$$

$$\hline 3x = 15$$

$$x = 5$$

Putting  $x = 5$  in (i), we get

$$x + y = 12$$

$$5 + y = 12$$

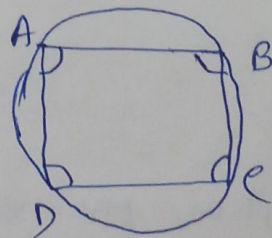
$$y = 12 - 5 = 7.$$

Therefore the fraction is  $\frac{5}{7}$ .

- ③ ABCD is a cyclic quadrilateral such that  $\angle A = (4y + 20)^\circ$ ,  $\angle B = (3y - 5)^\circ$ ,  $\angle C = (4x)^\circ$  and  $\angle D = (7x + 5)^\circ$ . Find the four angles.

⇒ Given ABCD is a cyclic quadrilateral.

then  $\angle A + \angle C = 180^\circ$  and  $\angle B + \angle D = 180^\circ$



Now,

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

$$(4y + 20)^\circ + (4x)^\circ = 180^\circ$$

$$4x + 4y = 180 - 20 = 160$$

$$x + y = 40 \quad \dots (i)$$

$$\text{and } \angle B + \angle D = 180^\circ$$

$$(3y - 5)^\circ + (7x + 5)^\circ = 180^\circ$$

$$3y - 5 + 7x + 5 = 180^\circ$$

$$7x + 3y = 180^\circ \quad \dots (ii)$$

$$(i) \times 3 \longrightarrow 3x + 3y = 120$$

$$(ii) \times 1 \longrightarrow 7x + 3y = 180^\circ$$

$$\begin{array}{r} (-) \quad (-) \quad (-) \\ \hline -4x = -60 \end{array}$$

$$x = \frac{60}{4}$$

$$x = 15^\circ$$

putting  $x = 15$  in (i), we get

$$x + y = 40$$

$$15 + y = 40$$

$$y = 40 - 15 = 25$$

$$y = 25^\circ$$

$$\text{Therefore, } \angle A = (4y + 20)^\circ = (4 \times 25 + 20)^\circ = 120^\circ$$

$$\angle B = (3y - 5)^\circ = (3 \times 25 - 5)^\circ = 70^\circ$$

$$\angle C = (4x)^\circ = (4 \times 15)^\circ = 60^\circ$$

$$\angle D = (7x + 5)^\circ = (7 \times 15 + 5)^\circ = 110^\circ$$

④ on selling a T.V. at 5% gain and a fridge at 10% gain, a shopkeeper gains ₹ 2000. But if he sells the T.V. at 10% gain and the fridge at 5% loss, he gains RS. 1500 on the transaction. Find the actual price of the T.V. and the fridge.

⇒ Let the T.V. and fridge actual price are  $x$  and  $y$ .

Given by ~~condition~~ condition,

$$\frac{5}{100}x + \frac{10}{100}y = 2000$$

$$\text{and } \frac{10}{100}x - \frac{5}{100}y = 1500$$

$$5x + 10y = 2000 \times 100$$

$$10x + 5y = 1500 \times 100$$

$$2x + 2y = 2000 \times 20$$

$$22x + 19y = 300 \times 100$$

$$21x + 22y = 40000 \text{ --- (i)}$$

$$22x + 19y = 30000 \text{ --- (ii)}$$

$$x + 2y = 40000 \text{ --- (i)}$$

$$2x + y = 30000 \text{ --- (ii)}$$

$$(i) \times 1 \longrightarrow x + 2y = 40000$$

$$(ii) \times 2 \longrightarrow 4x - 2y = 60000$$

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$$5x = 10,000$$

$$x = 20000$$

Putting  $x = 20000$  in (i), we get

$$x + 2y = 40000$$

$$20000 + 2y = 40000$$

$$2y = 20000$$

$$y = 10000$$

Thus, the T.V and fridge actual prices are 20,000 and ~~10,000~~ 10,000

(5) ~~Two~~ Two numbers are in the ratio 5:6, if 8 is subtracted from each of the numbers, the ratio becomes 4:5. Find the numbers.

⇒ Let the two numbers are  $5x$  and  $6x$  given by condition,

$$\frac{5x - 8}{6x - 8} = \frac{4}{5}$$

$$25x - 40 = 24x - 32$$

$$25x - 24x = -32 + 40$$

$$x = 8$$

Therefore, the numbers are 40 and 48

⑥ 4 Indians and 4 Chinese can do a piece of work in 3 days. While 2 Indians and 5 Chinese can finish it in 4 days. How long would it take for 1 Indian to do it? How long would it take for 1 Chinese to do it?

⇒ Let 1 Indian and 1 Chinese time taken by are  $x$  and  $y$ .

Then, one day 1 Indian time taken =  $\frac{1}{x}$   
and one day 1 Chinese time taken =  $\frac{1}{y}$ .

Given by condition,

$$\frac{4}{x} + \frac{4}{y} = \frac{1}{3} \quad \text{and} \quad \frac{2}{x} + \frac{5}{y} = \frac{1}{4}$$

$$\frac{2}{x} + \frac{2}{y} = \frac{1}{6} \quad \dots (i) \quad \frac{2}{x} + \frac{5}{y} = \frac{1}{4} \quad \dots (ii)$$

$$(i) \times 1 \rightarrow \frac{2}{x} + \frac{2}{y} = \frac{1}{6}$$

$$(ii) \times 1 \rightarrow \frac{2}{x} + \frac{5}{y} = \frac{1}{4}$$

$$\frac{2-5}{y} = \frac{2-3}{12}$$

$$\frac{-3}{y} = \frac{-1}{12}$$

$$y = 36$$