

## // Exercise - 3.12 //

① solve by the method elimination.

(i)  $2x - y = 3$  ;  $3x + y = 7$  (ii)  $x - y = 5$  ;  $3x + 2y = 25$

(iii)  $\frac{x}{10} + \frac{y}{5} = 14$  ;  $\frac{x}{8} + \frac{y}{6} = 15$

(iv)  $3(2x + y) = 7xy$  ;  $2(x + 3y) = 11xy$

(v)  $\frac{4}{x} + 5y = 7$  ;  $\frac{3}{x} + 4y = 5$

(vi)  $13x + 11y = 70$  ;  $11x + 13y = 74$

⇒ (i)  $2x - y = 3$  --- (i)

$3x + y = 7$  --- (ii)

Now, (i)  $\times 1 \longrightarrow 2x - y = 3$

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

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$5x = 10$

$x = 2$

Putting  $x = 2$ , in (i), we get.

$2x - y = 3$

~~$4 - y = 3$~~

$4 - y = 3$

$y = 4 - 3 = 1$

Thus, the value of  $x = 2$  and  $y = 1$ .

(ii)  $x - y = 5$  --- (i)

$3x + 2y = 25$  --- (ii)

Now, (i)  $\times 2 \longrightarrow 2x - 2y = 10$

(ii)  $\times 1 \longrightarrow 3x + 2y = 25$

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$5x = 35$

$x = 7$

Putting  $x = 7$  in (i), we get

$x - y = 5$

$7 - y = 5$

$y = 7 - 5 = 2$

Thus, the value of  $x = 7$  and  $y = 2$

$$(iii) \frac{x}{10} + \frac{y}{5} = 14$$

$$\frac{x+2y}{10} = 14$$

$$x+2y = 140 \dots (i)$$

$$\frac{x}{8} + \frac{y}{6} = 15$$

$$\frac{3x+4y}{24} = 15$$

$$3x+4y = 360 \dots (ii)$$

$$(i) \times 3 \longrightarrow 3x+6y = 420$$

$$(ii) \times 1 \longrightarrow \frac{3x+4y = 360}{\phantom{3x+4y = 360}}$$

$$2y = 60$$

$$y = 30$$

Putting  $y = 30$  in (i), we get

$$x+2y = 140$$

$$x+60 = 140$$

$$x = 140 - 60 = 80$$

Thus, the value of  $x = 80$  and  $y = 30$ .

$$(iv) 3(2x+y) = 7xy$$

$$3(x+3y) = 11xy$$

$$6x+3y = 7xy \dots (i)$$

$$3x+9y = 11xy \dots (ii)$$

$$(i) \times 1 \longrightarrow 6x+3y = 7xy$$

$$(ii) \times 2 \longrightarrow \frac{6x+18y = 22xy}{\phantom{6x+18y = 22xy}}$$

$$-15y = -15xy$$

$$x = 1$$

Putting  $x = 1$  in (i), we get

$$6x+3y = 7xy$$

$$6+3y = 7y$$

$$6 = 7y - 3y = 4y$$

$$y = \frac{6}{4} = \frac{3}{2}$$

Therefore, The value of  $x = 1$  and  $y = \frac{3}{2}$ .

$$(v) \frac{4}{x} + 5y = 7 \dots (i)$$

$$\frac{3}{x} + 4y = 5 \dots (ii)$$

$$(i) \times 4 \longrightarrow \frac{16}{x} + 20y = 28$$

$$(ii) \times 5 \longrightarrow \frac{15}{x} + 20y = 25$$

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$$\frac{1}{x} = 3$$

$$x = \frac{1}{3}$$

Putting  $x = \frac{1}{3}$  in (i), we get

$$\frac{4}{x} + 5y = 7$$

$$\frac{4}{\frac{1}{3}} + 5y = 7$$

$$12 + 5y = 7$$

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

$$y = -1$$

Therefore, the value of  $x = \frac{1}{3}$  and  $y = -1$ .

$$(vi) 13x + 11y = 70 \dots (i)$$

$$11x + 13y = 74 \dots (ii)$$

$$(i) \times 13 \longrightarrow 169x + 143y = 910$$

$$(ii) \times 11 \longrightarrow \frac{121x + 143y = 814}{48x = 96}$$

$$x = 2$$

Putting  $x = 2$  in (i), we get,

$$13x + 11y = 70$$

$$13 \times 2 + 11y = 70$$

$$26 + 11y = 70$$

$$11y = 70 - 26 = 44$$

$$y = 4$$

Thus the value of  $x = 2$  and  $y = 4$

② The monthly income of A and B are in the ratio 3:4 and their monthly expenditures are in the ratio 5:7. If each saves ₹ 5000 per month, find the monthly income of each.

⇒ Let A and B monthly income are  $3x$  and  $4x$ .

Let A and B monthly expenditures are  $5y$  and  $7y$ .

now, given condition,

$$3x - 5y = 5000 \quad \text{--- (i)}$$

$$4x - 7y = 5000 \quad \text{--- (ii)}$$

Now, (i)  $\times 4 \rightarrow 12x - 20y = 20000$

(ii)  $\times 3 \rightarrow 12x - 21y = 15000$

$$\begin{array}{r} (-) \quad (+) \quad (-) \\ \hline y = 5000 \end{array}$$

putting  $y = 5000$  in (i), we get

$$3x - 5y = 5000$$

$$3x - 5 \times 5000 = 5000$$

$$3x = 5000 + 25000$$

$$3x = 30000$$

$$x = 10000$$

Thus, the A and B monthly income are 30000 and 40000.

③ Five years ago, a man was seven times as old as his son, while five years hence, the man will be four times as old as his son. Find their present age.

⇒ Let the man's present age is  $x$   
and the son's present age is  $y$