

Q. The sum of two numbers is 18 and the product of these two numbers is 56. Find the numbers.

- DATA:

Two numbers when added = 18

Two numbers when multiplied = 56

These Numbers = ?

- SOLUTION:

• Let these numbers be = x, y .

• Equating them:

$$x \times y = 56 \rightarrow \textcircled{1}$$

$$\text{So, } y = \frac{56}{x} \rightarrow \textcircled{ii}$$

$$x + y = 18 \rightarrow \textcircled{2}$$

• Put (i) in (2)

$$x + y = 18$$

$$x + \frac{56}{x} = 18 \quad (\text{LCM})$$

$$\frac{x^2 + 56}{x} = 18$$

$$x^2 + 56 = 18x$$

$$x^2 - 18x + 56 = 0 \quad (\text{Quadratic Eq.})$$

• Factors Finding.

- Method: 1

2	56	
2	28	$\Rightarrow 2 \times 2 \times 2 \times 7$
2	14	
2	7	4, 14
	1	

Because of -ve sign in middle : -4, -14

• Method: 2 (Quadratic formula)

$$x^2 - 18x + 56 = 0$$

$\begin{matrix} a & b & c \end{matrix}$

$$\therefore \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \text{ Put values}$$

$$\frac{-18 \pm \sqrt{(18)^2 - 4(1)(56)}}{2(1)}$$

$$\frac{-18 \pm \sqrt{324 - 224}}{2} \Rightarrow \frac{-18 \pm \sqrt{100}}{2}$$

$$\frac{-18 + 10}{2}, \quad \frac{-18 - 10}{2}$$

$$\frac{-8}{2}, \quad \frac{-28}{2}$$

$$-4, \quad -14$$

Now,

$$x^2 - 4x - 14x + 56 = 0$$

$$x(x-4) - 14(x-4) = 0$$

$$(x-14)(x-4) = 0$$

$$\text{So, } \boxed{x = 4 \text{ or } 14}$$

Putting value of 'x' in (i)

$$y = \frac{56}{x} \Rightarrow y = \frac{56}{4} \Rightarrow \boxed{y = 14}$$

$$\text{or } x = 14$$

$$y = \frac{56}{14} = \boxed{y = 4}$$

• Concluding,

$$(x = 4, y = 14)$$

OR

$$(x = 14, y = 4)$$

• Justifying,

$$x + y = 18 \Rightarrow 4 + 14 \Rightarrow 18$$

$$x \times y = 56 \Rightarrow 4 \times 14 \Rightarrow 56 \quad (\text{LHS} = \text{RHS})$$