

DAY 7

1. Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. Find ages of both. [Ex 4.2, Q 2(iii)]

Sol :- Given **(Rohan's mother's age) = (Rohan's age) + 26**

and **After 3 years: (Rohan's mother's age) \times (Rohan's age) = 360**

Suppose Rohan's present age be x years then his mother's present age be $(x + 26)$ years

After 3 years, Rohan's age will be $(x + 3)$ years and his mother's age will be $(x + 29)$

Equation: After 3 years: (Rohan's mother's age) \times (Rohan's age) = 360

$$\Rightarrow (x + 29)(x + 3) = 360 \Rightarrow x^2 + 29x + 3x + 87 - 360 = 0$$

$$\Rightarrow x^2 + 32x - 273 = 0$$

Compare it with $ax^2 + bx + c = 0$, we get $a = 1, b = 32, c = -273$

$$D = b^2 - 4ac = (32)^2 - 4 \times 1 \times (-273) = 1024 + 1092 = 2116$$

$$\begin{aligned} \therefore x &= \frac{-b \pm \sqrt{D}}{2a} = \frac{-32 \pm \sqrt{2116}}{2 \times 1} \\ &= \frac{-32 \pm 46}{2} = \frac{-32 - 46}{2}, \frac{-32 + 46}{2} = \frac{-78}{2}, \frac{14}{2} = -39, 7 \end{aligned}$$

Since age is always positive $\therefore x = 7$

\therefore Rohan's present age is 7 years and his mother's present age is $7 + 26 = 33$ years

2. The altitude of a right angled triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

Sol :- Given **Altitude = (Base) - 7 and Hypotenuse = 13cm**

Let Base of triangle be x metre then Altitude be $(x - 7)$ cm

In Right Angled Triangle **(Hypotenuse)² = (Altitude)² + (Base)²**

$$\Rightarrow (13)^2 = (x - 7)^2 + x^2 \Rightarrow 169 = x^2 - 14x + 49 + x^2$$

$$\Rightarrow 2x^2 - 14x + 49 - 169 = 0 \Rightarrow 2x^2 - 14x - 120 = 0$$

$$\text{or } x^2 - 7x - 60 = 0 \quad \{\text{Divide both sides by 2}\}$$

$$\Rightarrow x^2 - 12x + 5x - 60 = 0 \Rightarrow x(x - 12) + 5(x - 12) = 0$$

$$\Rightarrow (x + 5)(x - 12) = 0 \Rightarrow x = -5, 12$$

But $x \neq -5$ as side can't be negative

\therefore Base of triangle is 12 cm and Altitude is $12 - 7 = 5$ cm.

3. John and Jivanthi together have 45 marbles. Both of them lost 5 marbles each and the product of the number of marbles they now have is 124. How many marbles both have in starting? [Example 1(i)]

Sol :- Suppose John has x number of marbles then Jivanthi has $(45 - x)$ marbles.

Both of them lost 5 marbles each,

so they have left with $(x - 5)$ and $(45 - x - 5) = (40 - x)$ marbles

Given: **Product of marbles both have after losing 5 each = 124**

$$\Rightarrow (x - 5)(40 - x) = 124 \quad \Rightarrow 40x - 200 + 5x - x^2 = 124$$

$$\Rightarrow x^2 - 45x + 324 = 0 \quad \Rightarrow x^2 - 36x - 9x + 324 = 0$$

$$\Rightarrow (x - 36)(x - 9) = 0 \quad \Rightarrow x = 36 \text{ or } 9$$

If John has 9 then Jivnathi has $45 - 9 = 36$ marbles.

If John has 36 then Jivnathi has $45 - 36 = 9$ marbles.

4. A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was ₹ 90, find the number of articles produced and cost of each article. [Exercise 4.2, Q6]

Sol:- Suppose number of articles be x

and **Cost of production = 3 + twice (the number of articles) = $3 + 2x$**

Given: **Total cost of production = ₹ 90**

(Cost of production) \times (number of articles) = 90

$$\Rightarrow (2x + 3)x = 90 \quad \Rightarrow 2x^2 + 3x - 90 = 0$$

$$\Rightarrow 2x^2 + 15x - 12x - 90 = 0 \quad \Rightarrow x(2x + 15) - 6(2x + 15) = 0$$

$$\Rightarrow (2x + 15)(x - 6) = 0$$

$$\Rightarrow 2x + 15 = 0 \text{ or } x - 6 = 0 \quad \Rightarrow x = \frac{-15}{2}, 6$$

But x is a quantity which can't be negative. So $x = 6$

Hence number of articles = 6 and cost of production = $2(6) + 3 = 15$ ₹

EXERCISE

1. Ex 4.1, Q 2(i)
2. Ex 4.3, Q 4,6,10,11