Qudratic Equation

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10^{th} Maths - Chapter 4

This is Problem-2 from Exercise 4.2

1. John and Jivanti together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124. We would like to find out how many marbles they have to start with.

Solution:
Given Data:
Let, the number of marbles John has = x.
Therefore, number of marbles Jivanti has = 45 – x
After losing 5 marbles each,
Number of marbles John has = x – 5
Number of marbles Jivanti has = 45 – x – 5 = 40 – x
Given,
product of their marbles = 124.
$\big(x–5\big)\big((40–x)\big) = 124$

$x^2 - 45x + 324 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{1}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{2}$$

$$x = \frac{45 \pm \sqrt{-45^2 - 4 \times 1 \times 324}}{2 \times 1} \tag{3}$$

$$x = \frac{45 + \sqrt{2025 - 1296}}{2} \tag{4}$$

$$x = \frac{45 + \sqrt{729}}{2} \tag{5}$$

$$\tag{6}$$

1st condition

$$x = \frac{45 + 27}{2} \tag{7}$$

$$x = \frac{72}{2} \tag{8}$$

$$x = 36 \tag{9}$$

$$\tag{10}$$

2nd condition

$$x = \frac{45 - 27}{2} \tag{11}$$

$$x = \frac{18}{2} \tag{12}$$

$$x = 9 \tag{13}$$

Hence there roots are x=36 and x=9