

DAY 6

In last section, we have discussed about solution of quadratic equations. In this section we shall discuss about the practical problems of life in the form of quadratic.

1. Find two numbers whose sum is 27 and product is 182.

[Ex 4.2, Q3]

Sol:- Given **Sum of two numbers = 27 i.e (1st number) + (2nd number) = 27**

and **Product of numbers = 182 i.e (1st number) \times (2nd number) = 182**

Let both numbers be x and y

First condition: $x + y = 27 \dots \dots \dots$ i)

Second condition: $xy = 182 \Rightarrow x(27 - x) = 182$

$$\Rightarrow 27x - x^2 - 182 = 0 \Rightarrow x^2 - 27x + 182 = 0$$

$$\Rightarrow x^2 - 13x - 14x + 182 = 0 \quad \{\text{Students can do this by quadratic formula}\}$$

$$\Rightarrow x(x - 13) - 14(x - 13) = 0 \Rightarrow (x - 13)(x - 14) = 0$$

$$\Rightarrow x - 13 = 0 \text{ or } x - 14 = 0 \Rightarrow x = 13 \text{ or } 14$$

Hence 13 and 14 are required numbers.

Alternate Method:- This sum also can be solved in one variable.

Suppose first number be x then second number be $27 - x$

and Product = 182 $\Rightarrow x(27 - x) = 182$

Solve as above

2. Find two consecutive positive numbers whose product is 306.

[Ex 4.1, Q1(ii)]

Sol :- Let two consecutive positive integers be x and $x + 1$

Given condition: **Product of numbers = 306**

$$\Rightarrow x(x + 1) = 306 \Rightarrow x^2 + x - 306 = 0$$

Compare it with $ax^2 + bx + c = 0$, we get $a = 1, b = 1, c = -306$

$$D = b^2 - 4ac = (1)^2 - 4 \times 1 \times (-306) = 1 + 1224 = 1225$$

$$\therefore x = \frac{-b \pm \sqrt{D}}{2a} = \frac{-1 \pm \sqrt{1225}}{2 \times 1} = \frac{-1 \pm 35}{2} = \frac{-1 - 35}{2}, \frac{-1 + 35}{2} = \frac{-36}{2}, \frac{34}{2} = -18, 17$$

Since x is positive $\therefore x = 17$

$\therefore x = 17, 18$ are required roots of given equation.

3. Find two consecutive odd positive integers whose sum of whose squares is 290.

[Example 11]

Sol :- Let two consecutive odd positive integers are x and $x + 2$

Given Condition: **Sum of squares of consecutive odd integers = 290**

$$\Rightarrow (x)^2 + (x + 2)^2 = 290 \Rightarrow x^2 + x^2 + 4x + 4 = 290$$

$$\begin{aligned}
\Rightarrow 2x^2 + 4x - 286 &= 0 & \Rightarrow x^2 + 2x - 143 &= 0 \quad \{\text{divide both sides by 2}\} \\
\Rightarrow x^2 + 13x - 11x - 143 &= 0 & \Rightarrow x(x + 13) - 11(x + 13) &= 0 \\
\Rightarrow (x + 13)(x - 11) &= 0 & \Rightarrow x + 13 = 0 \text{ or } x - 11 &= 0 \\
\Rightarrow x = 11, -13 & & \{x = -13, \text{Rejected, It is not a positive number}\} &
\end{aligned}$$

Thus 11 and 13 are required numbers.

EXERCISE

1. Find two numbers whose sum is 25 and product is 126.
2. Find two numbers whose difference is 5 and product is 204.
3. The sum of two positive integers is 21 and their product is 108. Find the numbers.
4. The product of two consecutive positive numbers is 132. Find the numbers.
5. Find two consecutive positive integers whose sum of squares is 365. [EX 4.2, Q4]
6. The sum of squares of two odd positive integers is 394. Find the numbers.
7. The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers. [Ex 4.3, Q7]

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