Ncert Solutions Class 10 Quadratic Equations

Exercise 4.3

5. Is it possible to design a rectangular park of perimeter 80 m and area 400 m^2? If so, find its length and breadth.

Solution:

Let length of rectangular park = x m

and breadth of rectangular park = y m

perimeter of rectangular park = 2(x + y) m

and area of rectangular park = xy m

ATQ :- $2(x + y) = 80 \Rightarrow x + y = 40 \ldots$ (i)

and $xy = 400 \ldots$ (ii)

from (i), $y = 40 - x$

from (ii), $x(40 - x) = 400 \Rightarrow 40x - x^2 = 400$

$\Rightarrow x^2 - 40x + 400 = 0$

Comparing with standard form $ax^2 + bx + c = 0$,

we get : $a = 1, b = -40, c = 400$

Now, $b^2 - 4ac = (-40)^2 - 4 \times (1) \times (400) = 1600 - 1600 = 0$

$\therefore$ given quadratic equation has real and unequal roots.

$\therefore \quad x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-(-40) \pm \sqrt{0}}{2(1)} = \frac{40 \pm 0}{2}$

$\Rightarrow \quad x = \frac{40 \pm 0}{2} = \frac{40+0}{2}, \frac{40-0}{2} = 20, 20$

$\therefore$ length of rectangular park = x = 20 m

& breadth of rectangular park = y = 40 – x = 20 m

$\therefore$ it is possible to design rectangular park if it is a square.