

Aptitude Shortcuts and Mind Tricks to Solve Quadratic Equations

QUADRATIC EQUATION

1). Structure of a quadratic equation = $X^2 \pm (\text{Sum of Root}) X \pm (\text{Product of root}) = 0$

DIRECTIONS

In each question below one or more equations are given on the basis of which we are supposed to find out the relationship between x and y

Give answer (1) if $X > Y$

Give answer (2) if $X \geq Y$

Give answer (3) if $X < Y$

Give answer (4) if $X \leq Y$

Give answer (5) if $X = Y$ or the relationship cannot be determined

QUESTION

(i) $X^2 - 11X + 28 = 0$

(ii) $Y^2 - 15Y + 56 = 0$

GIVEN

In equation (i)

Sum of Root (SR) = 11

Product of Root (PR) = 28

Similarly in eq. (ii)

$$SR = 15$$

$$PR = 56$$

SOLUTION

NORMAL METHOD

$$(i). X^2 - 11X + 28 = 0$$

Now $SR = -11$ can be written as $(-7-4 = -11)$

$$\text{So } X^2 - 7X - 4X + 28 = 0$$

Consider the first 2 terms and take the common term outside i.e., X here

$$X(X - 7) - 4X + 28 = 0$$

Similarly consider the last 3 terms and take the common term outside i.e., -4 here

$$X(X - 7) - 4(X - 7) = 0$$

$$(X - 7)(X - 4) = 0$$

Therefore $X = 7, 4$

$$(ii). Y^2 - 15Y + 56 = 0$$

Now $SR = -15$ can be written as $(-7-8 = -15)$

$$\text{So } Y^2 - 7Y - 8Y + 56 = 0$$

Consider the first 2 terms and take the common term outside i.e., Y here

$$Y(Y - 7) - 8Y + 56 = 0$$

Similarly consider the last 3 terms and take the common term outside i.e., -8 here

$$Y(Y - 7) - 8(Y - 7) = 0$$

$$(Y - 7)(Y - 8) = 0$$

Therefore $Y = 7, 8$

We have calculated the values of X and Y, now we have to compare the values with each other to deduce the relation between them

Take $X = 7$, compare it with both the values of $Y = 7, 8$

We get, $X = 7$ is equal to $Y = 7$ i.e., $X=Y$

$X = 7$ is smaller than $Y = 8$ i.e., $X<Y$

Similarly Take $X = 4$, compare it with both the values of $Y = 7, 8$

We get, $X = 4$ is smaller than $Y = 7$ i.e., $X<Y$

$X = 4$ is smaller than $Y = 8$ i.e., $X<Y$

So the relation between X and Y is given by both $X = Y$ and $X<Y$ i.e., $X\leq Y$

Therefore **Answer is (4)** if $X\leq Y$

ALTERNATE METHOD

If the given **SR** is **-ve** then consider it as **+ve**

If the given **SR** is **+ve** then consider it as **-ve**

$$(i) \quad X^2 - 11X + 28 = 0$$

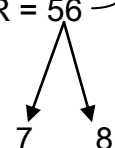
$$\begin{array}{l} \text{SR} = +11 \\ \text{PR} = 28 \end{array} \left. \vphantom{\begin{array}{l} \text{SR} = +11 \\ \text{PR} = 28 \end{array}} \right\} X = 7, 4$$

Split the PR into its divisible numbers such that when the numbers are added or subtracted we get the SR

Here $7 \times 4 = 28$ (PR)

And $7 + 4 = 11$ (SR)

(ii) $Y^2 - 15Y + 56 = 0$

$$\begin{array}{l} \text{SR} = +15 \\ \text{PR} = 56 \end{array} \left\{ \begin{array}{l} Y = 7, 8 \end{array} \right.$$


Here $7 \times 8 = 56$ (PR)

And $7 + 8 = 15$ (SR)

Therefore from both the equations $X = 7, 4$ and $Y = 7, 8$

Take $X = 7$, compare it with both the values of $Y = 7, 8$

We get, $X = 7$ is equal to $Y = 7$ i.e., $X=Y$

$X = 7$ is smaller than $Y = 8$ i.e., $X<Y$

Similarly Take $X = 4$, compare it with both the values of $Y = 7, 8$

We get, $X = 4$ is smaller than $Y = 7$ i.e., $X<Y$

$X = 4$ is smaller than $Y = 8$ i.e., $X<Y$

So the relation between X and Y is given by both $X = Y$ and $X<Y$ i.e., $X \leq Y$