



DSSSB TGT

PART(A+B)



MATHS

QUADRATIC EQUATION

(द्विघात समीकरण) Part-02



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गुणांक व मूल के बीच सम्बन्ध
Relation b/w Coefficient & Roots

$$ax^2 + bx + c = 0 \quad \swarrow \begin{matrix} \alpha \\ \beta \end{matrix}$$

(Sum of zeros) $\alpha + \beta = -\frac{b}{a}$ $\left(\frac{x \text{ का Coefficient}}{x^2 \text{ का Coeff.}} \right)$

(product of zero) $\alpha\beta = \frac{c}{a}$ $\left(\frac{\text{const.}}{x^2 \text{ का Coeff.}} \right)$

विषय

DISCRIMINANT (D)

$$ax^2 + bx + c = 0$$

$$D = b^2 - 4ac$$

- # $D = 0$; Two equal roots
- $D > 0$; Two Real & distinct roots
- $D < 0$; No real roots, imaginary roots
- $D > 0$; D is a perfect square then rational roots

$$2x^2 - \sqrt{5}x + 1 = 0$$

$$ax^2 + bx + c = 0$$

$$a=2, b=-\sqrt{5}, c=1$$

$$D = b^2 - 4ac$$

$$\Rightarrow (-\sqrt{5})^2 - 4 \times 2 \times 1$$

$$5 - 8 = -3$$

$$D < 0$$

$$-3 < 0$$

1. The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ has

द्विघात समीकरण $2x^2 - \sqrt{5}x + 1 = 0$ है

(a) two distinct real roots $D > 0$

(b) two equal real roots $D = 0$

(c) no real roots $D < 0$

~~(d) more than 2 real roots~~

$$D = b^2 - 4ac$$

$$(-3\sqrt{2})^2 - 4 \times 2 \times \frac{9}{4}$$

$$18 - 18 = 0$$

$$(3)^2 - 4 \times 1 \times 2\sqrt{2}$$

$$(9 - 8\sqrt{2}) < 0$$

$$D = 0$$

2. Which of the following equations has two distinct roots?

निम्नलिखित में से किस समीकरण के दो अलग-अलग मूल हैं?

(a) $2x^2 - 3\sqrt{2}x + \frac{9}{4} = 0$

(b) $x^2 + x - 5 = 0 \rightarrow 1^2 - 4 \times (-5) \times 1 = 1 + 20 = 21$

(c) $x^2 + 3x + 2\sqrt{2} = 0$

(d) $5x^2 - 3x + 1 = 0$

$$(-3)^2 - 4 \times 5 \times 1$$

$$9 - 20 = -11 < 0$$

$$D > 0$$

$$21 > 0$$

$$\sqrt{2} = 1.414 \dots$$

3. Which of the following equations has no real roots?

निम्नलिखित में से किस समीकरण का कोई वास्तविक मूल नहीं है?

$$D < 0$$

$$(-4)^2 - 4 \times 1 \times 3\sqrt{2}$$

$$16 - 12\sqrt{2}$$

$$16 - 12 \times 1.4$$

$$16 - 16.8$$

$$-0.8 < 0$$

$$(a) x^2 - 4x + 3\sqrt{2} = 0$$

$$(b) x^2 + 4x - 3\sqrt{2} = 0$$

$$(c) x^2 - 4x - 3\sqrt{2} = 0$$

$$(d) 3x^2 + 4\sqrt{3}x + 4 = 0$$

$$(-4)^2 - 4 \times 1 \times (-3 \times \sqrt{2})$$

$$16 + 12\sqrt{2} > 0$$

$$(-4)^2 - 4 \times 1 \times (-3\sqrt{2})$$

$$16 + 12\sqrt{2} > 0$$

$$(4\sqrt{3})^2 - 4 \times 3 \times 4$$

$$48 - 48 = 0$$

4. The equation $(x^2 + 1)^2 - x^2 = 0$ has.

समीकरण $(x^2 + 1)^2 - x^2 = 0$ है।

(a) four real roots

(b) two real roots

(c) no real roots

(d) one real root

2

$$x^4 + 1 + 2x^2 - x^2 = 0$$

$$x^4 + x^2 + 1 = 0$$

$$(x^2)^2 + (x^2) + 1$$

Let $x^2 = y$

$$y^2 + y + 1 = 0$$

$$D = b^2 - 4ac = 1^2 - 4 \times 1 \times 1$$

$$1 - 4 = -3$$

5. If $x = 0.2$ is a root of the equation $x^2 -$

$0.4k = 0$, then $k =$

यदि $x=0.2$ समीकरण $x^2 - 0.4k = 0$ का मूल है, तो $k =$ $p(0.2) = 0$

(a) 1

(b) 10

(c) 0.1

(d) 100

$$(0.2)^2 - 0.4k = 0$$

$$0.04 - 0.4k = 0$$

$$+0.4k = +0.04$$

$$k = \frac{0.04}{0.40} \Rightarrow \frac{4}{40} = \frac{1}{10}$$

6. If $-\frac{1}{2}$ is a root of the equation $x^2 - kx - \frac{5}{4} = 0$, then the value of k is.

यदि $-\frac{1}{2}$ समीकरण $x^2 - kx - \frac{5}{4} = 0$ का मूल है, तो k का मान है।

(a) -2

(b) 2

(c) $\frac{1}{4}$

(d) $\frac{1}{2}$

$$p\left(-\frac{1}{2}\right) = 0$$

$$k = \frac{4}{2}$$

$$x^2 - kx - \frac{5}{4} = 0$$

$$\left(-\frac{1}{2}\right)^2 - k\left(-\frac{1}{2}\right) - \frac{5}{4} = 0$$

$$\frac{1}{4} + \frac{2k}{2 \times 2} - \frac{5}{4} = 0$$

$$1 + 2k - 5 = 0$$

$$2k - 4 = 0$$

$$2k = 4$$

$$x=3$$

7. Which of the following equations has 3 as a root?

निम्नलिखित में से किस समीकरण का मूल 3 है?

$$9 - 12 + 3 = 0$$

(a) $x^2 - 4x + 3 = 0$

(b) $x^2 + 4x + 3 = 0$

(c) $x^2 + 5x + 6 = 0$

(d) $x^2 + 7x + 12 = 0$

$$3 + 12 + 3$$

$$9 + 15 + 6$$

$$p(3) = 0$$

9. The **discriminant** of the quadratic equation $(x + 2)^2 = 0$ is.

द्विघात समीकरण $(x + 2)^2 = 0$ का विभेदक है।

(a) -2

(b) 2

(c) 4

(d) 0

$$(x+2)^2 = 0$$

$$x^2 + 4 + 4x = 0$$

$$x^2 + 4x + 4 = 0$$

$$a=1, \quad b=4, \quad c=4$$

$$b^2 - 4ac = ?$$

$$16 - 4 \times 1 \times 4$$

$$0$$

$$16x^2 + 24x + 9 = 0$$

$$(4x)^2 + 2 \times 4x \times 3 + 3^2 = 0$$

$$(4x+3)^2 = 0$$

$$(4x+3)(4x+3) = 0$$

$$x = -\frac{3}{4}$$

10. The values of k for which the quadratic equation $16x^2 + 4kx + 9 = 0$ has real and equal roots are.

K का वह मान जिसके लिए द्विघात समीकरण $16x^2 + 4kx + 9 = 0$ के मूल वास्तविक और समान हैं, हैं। $\rightarrow$

(a) $6, -\frac{1}{6}$

(b) $36, -36$

(c) $6, -6$

(d) $\frac{3}{4}, -\frac{3}{4}$

$$16x^2 + 4kx + 9 = 0$$

$$a=16; b=4k; c=9$$

for real & equal roots
 $b^2 - 4ac = 0$

$$b^2 - 4ac = 0$$

$$(4k)^2 - 4 \times 16 \times 9 = 0$$

$$16k^2 - 576 = 0$$

$$16k^2 = 576 \quad 36$$

$$k = \sqrt{36} \Rightarrow \pm 6$$

11. If one root of the equation $x^2 + ax + 3 = 0$ is 1, then its other root is.

यदि समीकरण $x^2 + ax + 3 = 0$ का एक मूल 1 है, तो इसका दूसरा मूल है।

product of $(\alpha\beta) = \frac{c}{a}$
Roots

$$\alpha\beta = \frac{3}{1}$$

$$\alpha\beta = 3$$

$$1 \times \beta = 3$$

$$\boxed{\beta = 3}$$

(a) 3

(b) -3

(c) 2

(d) -2

