Foundation

# UDAAN 2025

## Maths

## Quadratic Equations

DHA : 03

**Q1** If $ax^2+bx+c=0$ has equal roots, then c =

(A) $\frac{-b}{2a}$ (B) $\frac{b}{2a}$

(C) $\frac{-b^2}{4a}$ (D) $\frac{b^2}{4a}$

**Q2** Find the values(s) of k for which the quadratic equation $x^2+2\sqrt{2}kx+18=0$ has equal roots.

(A) $k=\pm 3$ (B) $k=\pm 4$

(C) $k=\pm 7$ (D) $k=\pm 5$

**Q3** If the roots of the equation $px^2+2qx+r=0$ and $qx^2-2\sqrt{pr}x+q=0$ be real, then

(A) $q^2=p^2r$ (B) $q^2=pr$

(C) $p^2=qr$ (D) $r^2=pq$

**Q4** Find the roots of the quadratic equation $2x^2-\sqrt{5x}-2=0$ using the quadratic formula.

**Q5** Find the roots of the quadratic Equations by using quadratic formula $x^2-4x-1=0$

**Q6** Find the roots of the quadratic equations by using Quadratic Formula $\sqrt{3}x^2-2\sqrt{2}x-2\sqrt{3}=0.$

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# Answer Key

**Q1** (D)

**Q2** (A)

**Q3** (B)

**Q4** $\frac{\sqrt{5}-\sqrt{21}}{4}, \frac{\sqrt{5}+\sqrt{21}}{4}$

**Q5** $\alpha = \frac{-b+\sqrt{D}}{2a} = \frac{-(-4)+\sqrt{20}}{2\times 1} = \frac{4+2\sqrt{5}}{2}$

$= \frac{2(2+\sqrt{5})}{2} = \left(2+\sqrt{5}\right)$

$\beta = \frac{-b-\sqrt{D}}{2a} = \frac{-(-4)-\sqrt{20}}{2} = \frac{4-2\sqrt{5}}{2}$

$= \frac{2(2-\sqrt{5})}{2} = \left(2-\sqrt{5}\right)$

**Q6** Hence, $\sqrt{6}\, and - \frac{\sqrt{6}}{3}$ are the root of the given equation.

# Hints & Solutions

**Q1 Text Solution:**

$\textit{For the equation to have equal roots, the}$
$\textit{discriminant must be equal to zero}$

$D = 0$

$b^2 - 4ac = 0$

$b^2 = 4ac$

$c = {}^{b^2}/{}_{4a}$

**Video Solution:**

**Q2 Text Solution:**

For the equation to have equal roots, the discriminant must be equal to zero.

D=0

$b^2 - 4ac = 0$

$\left(2\sqrt{2}k\right)^2 - 4 \times 1x18 = 0$

$8k^2 - 72 = 0$

$k^2 = 9$

$k = \pm 3$

**Video Solution:**

**Q3 Text Solution:**

The equation $px^2 + 2qx + r = 0$ has **real** roots, therefore the denominator is greater than equal to zero. Hence,

$D \geq 0$

$b^2 - 4ac \geq 0$

$4q^2 - 4pr \geq 0$

$q^2 \geq pr \qquad eq\ 1$

The equation $qx^2 - 2\sqrt{pr}\ x + q = 0$ has **real** roots, therefore the denominator is greater than equal to zero. Hence,

$D \geq 0$

$b^2 - 4ac \geq 0$

$\left(2\sqrt{pr}\right)^2 - 4 \times q \times q \geq 0$

$-4q^2 + 4pr \geq 0$

$q^2 \ \leq pr \qquad eq\ 2$

$\textit{from equation } 1 \textit{ and } 2$

$q^2 = pr$

**Video Solution:**

**Q4 Text Solution:**

$b^2$ – 4ac = 5 – 4 × 2 × (–2) = 21

Therefore the roots are $\frac{\sqrt{5}\pm\sqrt{21}}{4}, i.e., \frac{\sqrt{5}+\sqrt{21}}{4}\ and \frac{\sqrt{5}-\sqrt{21}}{4}$

**Video Solution:**

**Q5 Text Solution:**

Given:

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

On comparing it with $ax^2 + bx + c = 0$, we get

a = 1, b = –4 and c = –1

Discriminant D is given by:

$D = \left(b^2 - 4ac\right)$

$= (-4)^2 - 4 \times 1 \times \left(-1\right)$

$= 16 + 4$
=20

$\alpha = \frac{-b+\sqrt{D}}{2a} = \frac{-(-4)+\sqrt{20}}{2\times 1} = \frac{4+2\sqrt{5}}{2}$
$= \frac{2(2+\sqrt{5})}{2} = \left(2+\sqrt{5}\right)$
$\beta = \frac{-b-\sqrt{D}}{2a} = \frac{-(-4)-\sqrt{20}}{2} = \frac{4-2\sqrt{5}}{2}$
$= \frac{2(2-\sqrt{5})}{2} = \left(2-\sqrt{5}\right)$

**Video Solution:**

**Q6** **Text Solution:**

The given equation is
$\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0.$
Comparing it with $ax^2 + bx + c = 0$, we get
$a = \sqrt{3}, b = -2\sqrt{2}\, and\, c = -2\sqrt{3}$
$\therefore$ Discriminant,
$D = b^2 - 4ac = \left(-2\sqrt{2}\right)^2 - 4 \times \sqrt{3}$
$\times \left(-2\sqrt{3}\right) = 8 + 24 = 32 > 0$

Now, $\sqrt{D} = \sqrt{32} = 4\sqrt{2}$
$\therefore \alpha = \frac{-b+\sqrt{D}}{2a} = \frac{-(-2\sqrt{2})+4\sqrt{2}}{2\times\sqrt{3}} = \frac{6\sqrt{2}}{2\sqrt{3}} = \sqrt{6}$
$\beta = \frac{-b-\sqrt{D}}{2a} = \frac{-(-2\sqrt{2})-4\sqrt{2}}{2\times\sqrt{3}} = \frac{-2\sqrt{2}}{2\sqrt{3}} =$
$-\frac{\sqrt{6}}{3}$
Hence, $\sqrt{6}\, and -\frac{\sqrt{6}}{3}$ are the roots of the given equation.

**Video Solution:**