**Question 1.**
If the equation $x^2 + 4x + k = 0$ has real and distinct roots, then
(a) $k < 4$
(b) $k > 4$
(c) $k \geq 4$
(d) $k \leq 4$
**Solution:**
**(a)** In the equation $x^2 + 4x + k = 0$
$a = 1, b = 4, c = k$
$D = b^2 - 4ac = (4)^2 - 4 \times 1 \times k = 16 - 4k$
Roots are real and distinct
$D > 0$
$\Rightarrow 16 - 4k > 0$
$\Rightarrow 16 > 4k$
$\Rightarrow 4 > k$
$\Rightarrow k < 4$

**Question 2.**
If the equation $x^2 - ax + 1 = 0$ has two distinct roots, then
(a) $|a| = 2$
(b) $|a| < 2$
(c) $|a| > 2$
(d) None of these
**Solution:**
**(c)** In the equation $x^2 - ax + 1 = 0$
$a = 1, b = -a, c = 1$
$D = b^2 - 4ac = (-a)^2 - 4 \times 1 \times 1 = a^2 - 4$
Roots are distinct
$D > 0$
$\Rightarrow a^2 - 4 > 0$
$\Rightarrow a^2 > 4$
$\Rightarrow a^2 > (2)^2$
$\Rightarrow |a| > 2$

**Question 3.**
If the equation $9x^2 + 6kx + 4 = 0$, has equal roots, then the roots are both equal to
(a) ± 23
(b) ± 32
(c) 0
(d) ± 3
**Solution:**
**(a)**

In the equation
$9x^2 + 6kx + 4 = 0$
$a = 9, b = 6k, c = 4$ then
$D = b^2 - 4ac$
$= (6k)^2 - 4 \times 9 \times 4$
$= 36k^2 - 144$
$\because$ Roots are equal
$\therefore D = 0$
$\Rightarrow 36k^2 - 144 = 0 \Rightarrow 36k^2 = 144$
$$\Rightarrow k^2 = \frac{144}{36} = 4 = (\pm 2)^2$$
$\therefore k = \pm 2$
$$\therefore \text{Roots are} = \frac{-b}{2a} = \frac{\pm 2 \times 6}{2 \times 9} = \pm \frac{2}{3}$$

**Question 4.**
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) $\frac{b^2}{4a}$

**Solution:**

**(d)** In the equation $ax^2 + bx + c = 0$

$D = b^2 – 4ac$

Roots are equal

$D = 0 \Rightarrow b^2 – 4ac = 0$

$\Rightarrow 4ac = b^2$

$\Rightarrow c = \frac{b^2}{4a}$

## Question 5.

If the equation $ax^2 + 2x + a = 0$ has two distinct roots, if

(a) $a = \pm1$

(b) $a = 0$

(c) $a = 0, 1$

(d) $a = -1, 0$

**Solution:**

**(a)** In the equation $ax^2 + 2x + a = 0$

$D = b^2 – 4ac = (2)^2 – 4 \times a \times a = 4 – 4a^2$

Roots are real and equal

$D = 0$

$\Rightarrow 4 – 4a^2 = 0$

$\Rightarrow 4 = 4a^2$

$\Rightarrow 1 = a^2$

$\Rightarrow a^2 = 1$

$\Rightarrow a^2 = (\pm1)^2$

$\Rightarrow a = \pm1$

## Question 6.

The positive value of k for which the equation $x^2 + kx + 64 = 0$ and $x^2 – 8x + k = 0$ will both have real roots, is

(a) 4

(b) 8

(c) 12

(d) 16

**Solution:**

**(d)** In the equation $x^2 + kx + 64 = 0$

$a = 1, b = k, c = 64$

$D = b^2 - 4ac = k^2 - 4 \times 1 \times 64$

$= k^2 - 256$

$\because$ The roots are real

$\therefore D \geq 0 \Rightarrow k^2 - 256 \geq 0$

$\Rightarrow k^2 \geq 256 \Rightarrow k^2 \geq (\pm16)^2$

$\Rightarrow k \geq 16$ ....(*i*)

Only positive value is taken

Now in second equation

$x^2 - 8x + k = 0$

$D = (-8)^2 - 4 \times 1 \times k = 64 - 4k$

$\because$ Roots are real

$\therefore D \geq 0 \Rightarrow 64 - 4k \geq 0 \Rightarrow 64 \geq 4k$

$16 \geq k$ ....(*ii*)

From (*i*) and

$16 \geq k \geq 16 \Rightarrow k = 16$

**Question 7.**

The value of $\sqrt{6+\sqrt{6+\sqrt{6+\dots}}}$ is

(a) 4 (b) 3

(c) –2 (d) 3.5

**Solution:**

**(b)**

Let $x = \sqrt{6+\sqrt{6+\sqrt{6+\dots}}}$

$x = \sqrt{6+x} \Rightarrow x^2 = 6 + x$

$\Rightarrow x^2 - x - 6 = 0$

$\Rightarrow x^2 - 3x + 2x - 6 = 0$

$\Rightarrow x(x-3) + 2(x-3) = 0$

$\Rightarrow (x-3)(x+2) = 0$

Either $x - 3 = 0$, then $x = 3$

or $x + 2 = 0$, then $x = -2$

Now if $x = 3$, then

$3 = \sqrt{6+\sqrt{6+\sqrt{6+\dots}}}$

$= \sqrt{6+3} = \sqrt{9} = 3$

If $x = -2$, then

$x = \sqrt{6+x}$

$\Rightarrow -2 = \sqrt{6-2} = -2 = \sqrt{4} = 2$

Which is not possible

x = 3 is correct

**Question 8.**

If 2 is a root of the equation $x^2 + bx + 12 = 0$ and the equation $x^2 + bx + q = 0$ has equal roots, then q =

(a) 8

(b) – 8

(c) 16

(d) -16

**Solution:**

**(c)**

$x^2 + bx + 12 = 0$

$\because$ 2 is its root, then it will satisfy it

$\therefore (2)^2 + b \times 2 \times 12 \Rightarrow 4 + 2b + 12 = 0$

$\Rightarrow 2b + 16 = 0 \Rightarrow b = \frac{-16}{2} = -8$

Now equation

$x^2 + bx + q = 0$, has equal roots, then

$D = 0 \Rightarrow b^2 - 4q = 0$

$\Rightarrow (-8)^2 - 4q = 0 \Rightarrow 64 = 4q$

$\Rightarrow q = 16$

**Question 9.**

If the equation $(a^2 + b^2) x^2 - 2(ac + bd) x + c^2 + d^2 = 0$ has equal roots, then

(a) ab = cd

(b) ad = bc
(c) ad = √bc
(d) ab = √cd

**Solution:**

**(b)**

In the equation

$(a^2 + b^2) x^2 - 2 (ac + bd) x + (c^2 + d^2) = 0$

$D = B^2 - 4AC$

$= [-2(ac + bd)]^2 - 4 (a^2 + b^2) (c^2 + d^2)$

$= 4 [a^2c^2 + b^2d^2 + 2abcd] - 4 [a^2c^2 + a^2d^2 + b^2c^2 + b^2d^2]$

$= 4a^2c^2 + 4b^2d^2 + 8abcd - 4a^2c^2 - 4a^2d^2 - 4b^2c^2 - 4b^2d^2$

$= 8abcd - 4a^2d^2 - 4b^2c^2$

$= -4 [a^2d^2 + b^2c^2 - 2abcd]$

$= -4 (ad - bc)^2$

$\because$ Roots are equal

$\therefore D = 0 \Rightarrow -4 (ad - bc)^2 = 0$

$\Rightarrow ad - bc = 0 \Rightarrow ad = bc$

## Question 10.

If the roots of the equation $(a^2 + b^2) x^2 – 2b (a + c) x + (b^2 + c^2) = 0$ are equal, then ;
(a) 2b = a + c
(b) $b^2$ = ac
(c) b = 2aca+c
(d) b = ac

**Solution:**

**(b)**

In the equation

$(a^2 + b^2) x^2 - 2b (a + c) x + (b^2 + c^2) = 0$

$D = B^2 - 4AC$

$= [-2b(a + c)]^2 - 4 (a^2 + b^2) (b^2 + c^2)$

$= 4b^2 (a^2 + c^2 + 2ac) - 4 [a^2b^2 + a^2c^2 + b^4 + b^2c^2]$

$= 4a^2 b^2 + 4b^2c^2 + 8ab^2c - 4a^2b^2 - 4a^2c^2 - 4b^4 - 4b^2c^2$

$= 8ab^2c - 4a^2c^2 - 4b^4$

$= -4 [a^2c^2 + b^4 - 2ab^2c] = -4 [ac - b^2]^2$

$\because$ Roots are equal

$\therefore -4 (ac - b)^2 = 0$

$\Rightarrow ac - b^2 = 0 \Rightarrow ac = b^2$

$\Rightarrow b^2 = ac$

## Question 11.

If the equation $x^2 – bx + 1 = 0$ does not possess real roots, then
(a) -3 < b < 3
(b) -2 < b < 2
(c) b > 2
(d) b < -2

**Solution:**

**(b)**

In the equation

$x^2 - bx + 1 = 0$

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

$= b^2 - 4$

$\because$ The roots are not real

$\therefore D < 0 \Rightarrow b^2 - 4 < 0$

$\Rightarrow b^2 < 4 \Rightarrow b^2 < (\pm 2)^2$

$\therefore b < 2$ and $b > -2$ or $-2 < b$

$\therefore -2 < b < 2$

**Question 12.**

If x = 1 is a common root of the equations $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$, then ab =

(a) 3
(b) 3.5
(c) 6
(d) -3

**Solution:**

**(a)** In the equation

$ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$

Substituting the value of x = 1, then in $ax^2 + ax + 3 = 0$

$a(1)^2 + a(1) + 3 = 0 \Rightarrow a + a + 3 = 0$

$\Rightarrow 2a + 3 = 0 \Rightarrow 2a = -3 \Rightarrow a = \frac{-3}{2}$

and in $x^2 + x + b = 0$

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

$\therefore ab = \frac{-3}{2} \times (-2) = 3$

**Question 13.**

If p and q are the roots of the equation $x^2 - px + q + 0$, then

(a) p = 1, q = -2
(b) p = 0, q = 1
(c) p = -2, q = 0
(d) p = -2, q = 1

**Solution:**

**(a)**

∵ $p$ and $q$ are the roots of the equation

$x^2 - px + q = 0,$

Sum of roots $= -(-p) = p$

and product of roots $= q$

(a) If $p = 1, q = -2$, then equation will be

$x^2 - (s)\,x + p = 0 \Rightarrow x^2 - (1 - 2)x + 1 \times (-2) = 0$

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

(b) If $p = 0, q = 1$, then equation will be

$x^2 - (0 + 1)\,x + 0 \times 1 = 0$

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

(c) If $p = -2, q = 0$, then equation will be

$x^2 - (-2 + 0)\,x + (-2 \times 0)$

$\Rightarrow x^2 + 2x + 0 = 0$

(d) $p = -2, q = 1$, then equation will be

$x^2 - (-2 + 1)\,x + (-2 \times 1) = 0$

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

We see that only (a) is correct

When $p = 1, q = -2$

## Question 14.

If a and b can take values 1, 2, 3, 4. Then the number of the equations of the form $ax^2 + bx + 1 = 0$ having real roots is

(a) 10

(b) 7

(c) 6

(d) 12

**Solution:**

**(b)**

$ax^2 + bx + 1 = 0$

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

Roots are real

$D \geq 0$

$\Rightarrow b^2 - 4a \geq 0$

$\Rightarrow b^2 \geq 4a$

Here value of b can be 2, 3 or 4

If b = 2, then a can be 1,

If b = 3, then a can be 1, 2

If b = 4, then a can be 1, 2, 3, 4

No. of equation can be 7

## Question 15.

The number of quadratic equations having real roots and which do not change by squaring their roots is

(a) 4

(b) 3

(c) 2

(d) 1

**Solution:**

**(c)** There can be two such quad, equations whose roots can be 1 and 0

The square of 1 and 0 remains same

No. of quad equation are 2

## Question 16.

If $(a^2 + b^2)\,x^2 + 2(ab + bd)\,x + c^2 + d^2 = 0$ has no real roots, then

(a) ad = bc

(b) ab = cd

(c) ac = bd

(d) ad ≠ bc

**Solution:**

**(d)**

$(a^2 + b^2)\, x^2 + 2\,(ab + bd)\, x + c^2 + d^2 = 0$

Here $A = a^2 + b^2$, $B = 2\,(ab + bd)$, $C = c^2 + d^2$

$D = B^2 - 4AC = [2\,(ac + bd)]^2 - 4\,(a^2 + b^2)(c^2 + d^2)$

$= 4\,[a^2c^2 + b^2d^2 + 2abcd] - 4\,[a^2c^2 + a^2d^2 + b^2c^2 + b^2d^2]$

$= 4a^2c^2 + 4b^2d^2 + 8abcd - 4a^2c^2 - 4a^2d^2 - 4b^2c^2 - 4b^2d^2$

$= -4a^2d^2 - 4b^2c^2 + 8abcd$

$= -4\,(a^2d^2 + b^2c^2 - 2abcd)$

$= -4\,(ad - bc)^2$

$\because$ Roots are not real

$\therefore D < 0$

$\therefore -4\,(ad - bc)^2 < 0 \Rightarrow (ad - bc)^2 < 0$

$\Rightarrow ad - bc < 0$ or $ad \neq bc$

**Question 17.**

If the sum of the roots of the equation $x^2 - x = \lambda\,(2x - 1)$ is zero, then $\lambda$ =

(a) -2

(b) 2

(c) – 12

(d) 12

**Solution:**

**(c)**

$x^2 - x = \lambda\,(2x - 1)$

$\Rightarrow x^2 - x = 2\lambda x - \lambda$

$\Rightarrow x^2 - x - 2\lambda x + \lambda = 0$

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

$$\text{Sum of roots} = \frac{-b}{a} = \frac{1+2\lambda}{1}$$

$$\frac{1+2\lambda}{1} = 0 \Rightarrow 2\lambda = -1$$

$$\lambda = -\frac{1}{2}$$

**Question 18.**

If x = 1 is a common root of $ax^2 + ax + 2 = 0$ and $x^2 + x + b = 0$ then, ab =

(a) 1

(b) 2

(c) 4

(d) 3

**Solution:**

(b)

$ax^2 + ax + 2 = 0$ ....(*i*)

$x^2 + x + b = 0$ ....(*ii*)

$x = 1$ is common root of equations (*i*) and (*ii*)

Then in (*i*) $a(1)^2 + a \times 1 + 2 = 0$

$\Rightarrow a + a + 2 = 0 \Rightarrow 2a + 2 = 0$

$\Rightarrow 2a = -2 \Rightarrow a = \frac{-2}{2} = -1$

$\therefore a = -1$

Then in (*ii*)

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

$\Rightarrow 2 + b = 0 \Rightarrow b = -2$

$\therefore ab = (-1) \times (-2) = 2$

**Question 19.**

The value of c for which the equation $ax^2 + 2bx + c = 0$ has equal roots is

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

(c) $\frac{a^2}{b}$ (d) $\frac{a^2}{4b}$

**Solution:**

(a)

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

$D = b^2 - 4ac$

$= (2b)^2 - 4 \times a \times c$

$= 4b^2 - 4ac$

$\because$ Roots are equal

$\therefore D = 0$

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

$\Rightarrow 4ac = 4b^2$

$\Rightarrow c = \frac{4b^2}{4a} = \frac{b^2}{a}$

**Question 20.**

If $x^2 + k(4x + k - 1) + 2 = 0$ has equal roots, then k =

(a) $-\frac{2}{3}, 1$ (b) $\frac{2}{3}, -1$

(c) $\frac{3}{2}, \frac{1}{3}$ (d) $\frac{3}{2}, -\frac{1}{3}$

**Solution:**

(b)

$x^2 + k(4x + k - 1) + 2 = 0$

$\Rightarrow x^2 + 4kx + k^2 - k + 2 = 0$

$\Rightarrow$ Here $a = 1, b = 4k, c = k^2 - k + 2$

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

$= (4k)^2 - 4 \times 1(k^2 - k + 2)$

$= 16k^2 - 4k^2 + 4k - 8$

$= 12k^2 + 4k - 8$

$\because$ Roots are equal

$\therefore D = 0$

$\therefore 12k^2 + 4k - 8 = 0$

$\Rightarrow 3k^2 + k - 2 = 0$ (Dividing by 4)

Here $a = 3, b = 1, c = -2$

$$\because k = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a} = \frac{-1 \pm \sqrt{1+24}}{2 \times 3}$$

$$= \frac{-1 \pm \sqrt{25}}{6} = \frac{-1 \pm 5}{6}$$

$$\therefore k = \frac{-1+5}{6} = \frac{4}{6} = \frac{2}{3}$$

$$\text{and } k = \frac{-1-5}{6} = \frac{-6}{6} = -1$$

$$\therefore k = \frac{2}{3}, -1$$

## Question 21.

If the sum and product of the roots of the equation $kx^2 + 6x + 4k = 0$ are equal, then k =

(a) $-\frac{3}{2}$ (b) $\frac{3}{2}$

(c) $\frac{2}{3}$ (d) $-\frac{2}{3}$

**Solution:**

**(b)**

$kx^2 + 6x + 4k = 0$

Here $a = k, b = 6, c = 4k$

$D = b^2 - 4ac = (6)^2 - 4 \times k \times 4k$

$= 36 - 16k^2$

$\because$ Roots are equal

$\therefore D = 0 \Rightarrow 36 - 16k^2 = 0$

$\Rightarrow 16k^2 = 36$

$$k^2 = \frac{36}{16} = \left(\frac{6}{4}\right)^2$$

$$k = \frac{6}{4} = \frac{3}{2}$$

## Question 22.

If sin α and cos α are the roots of the equations $ax^2 + bx + c = 0$, then $b^2$ =

(a) $a^2 - 2ac$

(b) $a^2 + 2ac$

(b) $a^2 - ac$

(d) $a^2 + ac$

**Solution:**

**(b)**

$\sin\alpha$ and $\cos\alpha$ are the roots of the equations $ax^2 + bx + c = 0$

$\therefore$ Sum of roots $= \frac{-b}{a}$ and

product of roots $= \frac{c}{a}$

$\therefore \sin\alpha + \cos\alpha = \frac{-b}{a}$ and $\sin\alpha\cos\alpha = \frac{c}{a}$

$(\sin\alpha + \cos\alpha)^2 = \left(\frac{-b}{a}\right)^2$

$\Rightarrow \sin^2\alpha + \cos^2\alpha + 2\sin\alpha\cos\alpha = \frac{b^2}{a^2}$

$\Rightarrow 1 + 2 \times \frac{c}{a} = \frac{b^2}{a^2}$

$\Rightarrow 1 + \frac{2c}{a} = \frac{b^2}{a^2} \Rightarrow b^2 = a^2 + 2ac$

$\therefore b^2 = a^2 + 2ac$

**Question 23.**

If 2 is a root of the equation $x^2 + ax + 12 = 0$ and the quadratic equation $x^2 + ax + q = 0$ has equal roots, then q =

(a) 12

(b) 8

(c) 20

(d) 16

**Solution:**

**(d)**

2 is a root of equation $x^2 + ax + 12 = 0$

$\therefore (2)^2 + a \times 2 + 12 = 0 \Rightarrow 4 + 2a + 12 = 0$

$\Rightarrow 2a = -(12 + 4) \Rightarrow 2a = -16$

$\Rightarrow a = \frac{-16}{2} = -8$

and in quadratic equation roots are equal $x^2 + ax + q = 0$

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

$\Rightarrow a^2 - 4q = 0 \Rightarrow (-8)^2 - 4q = 0$

$\Rightarrow 64 - 4q = 0 \Rightarrow 4q = 64$

$\Rightarrow q = \frac{64}{4} = 16$

$\therefore q = 16$

**Question 24.**

If the sum of the roots of the equation $x^2 - (k + 6)x + 2(2k - 1) = 0$ is equal to half of their product, then k =

(a) 6

(b) 7
(c) 1
(d) 5

**Solution:**

**(b)** In the quadratic equation
$x^2 – (k + 6) x + 2 (2k – 1) = 0$
Here a = 1, b = – (k + 6), c = 2 (2k – 1)

$$\therefore \text{ Sum of roots } = \frac{-b}{a} = \frac{[(-k+6)]}{1} = k + 6$$

$$\text{and product of roots } = \frac{c}{a} = \frac{2(2k-1)}{1}$$

$$= 4k - 2$$

$$\text{But sum of roots } = \frac{1}{2} \text{ product of roots}$$

$$\therefore k + 6 = \frac{4k-2}{2}$$

$$\Rightarrow k + 6 = 2k - 1$$

$$\Rightarrow 2k - k = 6 + 1 \Rightarrow k = 7$$

$$\therefore k = 7$$

**Question 25.**

If a and b are roots of the equation $x^2 + ax + b = 0$, then a + b =
(a) 1
(b) 2
(c) -2
(d) -1

**Solution:**

**(d)** a and b are the roots of the equation $x^2 + ax + b = 0$
Sum of roots = – a and product of roots = b
Now a + b = – a
and ab = b => a = 1 ….(i)
2a + b = 0
=> 2 x 1 + b = 0
=> b = -2
Now a + b = 1 – 2 = -1

**Question 26.**

A quadratic equation whose one root is 2 and the sum of whose roots is zero, is
(a) $x^2 + 4 = 0$
(b) $x^2 – 4 = 0$
(c) $4x^2 – 1 = 0$
(d) $x^2 – 2 = 0$

**Solution:**

**(b)** Sum of roots of a quad, equation = 0
One root = 2
Second root = 0 – 2 = – 2
and product of roots = 2 x (-2) = – 4
Equation will be
$x^2$ + (sum of roots) x + product of roots = 0
$x^2 + 0x + (-4) = 0$
=> $x^2 – 4 = 0$

**Question 27.**

If one root of the equation $ax^2 + bx + c = 0$ is three times the other, then $b^2 : ac$ =

(a) 3 : 1
(b) 3 : 16
(c) 16 : 3
(d) 16 : 1

**Solution:**

**(c)**

Quad. equation is $ax^2 + bx + c = 0$

Let first root = $\alpha$, then

Second root = $3\alpha$

$\therefore$ Sum of root = $\alpha + 3\alpha = \frac{-b}{a} \Rightarrow 4\alpha = \frac{-b}{a}$

$\Rightarrow \alpha = \frac{-b}{4a}$ ....(*i*)

and produt of roots = $\alpha \times 3\alpha = \frac{c}{a}$

$\Rightarrow 3\alpha^2 = \frac{c}{a} \Rightarrow \alpha^2 = \frac{c}{3a}$

$\Rightarrow \left(\frac{-b}{4a}\right)^2 = \frac{c}{3a}$ [From (*i*)]

$\Rightarrow \frac{b^2}{16a^2} = \frac{c}{3a}$

$\Rightarrow \frac{b^2}{16a} = \frac{c}{3}$ (Dividing by *a*)

$\frac{b^2}{ac} = \frac{16}{3} \Rightarrow b^2 : ac = 16 : 3$

**Question 28.**

If one root of the equation $2x^2 + kx + 4 = 0$ is 2, then the other root is
(a) 6
(b) -6
(c) -1
(d) 1

**Solution:**

**(d)** The given quadratic equation $2x^2 + kx + 4 = 0$
One root is 2
Product of roots = $\frac{c}{a} = \frac{4}{2} = 2$
Second root = $\frac{2}{2} = 1$

**Question 29.**

If one root of the equation $x^2 + ax + 3 = 0$ is 1, then its other root is
(a) 3
(b) -3
(c) 2
(d) -2

**Solution:**

**(a)** The quad, equation is $x^2 + ax + 3 = 0$
One root =1
and product of roots = $\frac{c}{a} = \frac{3}{1} = 3$
Second root = $\frac{3}{1} = 3$

**Question 30.**

If one root of the equation $4x^2 – 2x + (\lambda – 4) = 0$ be the reciprocal of the other, then $\lambda$ =
(a) 8
(b) -8
(c) 4
(d) -4

**Solution:**

**(a)**

The quad. equation is $4x^2 - 2x + (\lambda - 4) = 0$

Let first root $= a$

Then second root $= \dfrac{1}{a}$

Product of roots $= \dfrac{c}{a} - \dfrac{\lambda - 4}{4}$

$\Rightarrow a \times \dfrac{1}{a} = \dfrac{\lambda - 4}{4}$

$\Rightarrow \dfrac{\lambda - 4}{4} = 1 \Rightarrow \lambda - 4 = 4$

$\Rightarrow \lambda = 4 + 4 = 8$

**Question 31.**

If y = 1 is a common root of the equations $ay^2 + ay + 3 = 0$ and $y^2 + y + b = 0$, then ab equals

(a) 3

(b) – 12

(c) 6

(d) -3 **[CBSE 2012]**

**Solution:**

**(a)**

$y = 1$

$ax^2 + ay + 3 = 0$

$\therefore a \times (1)^2 + a.1 + 3 = 0$

$a + a + 3 = 0 \Rightarrow 2a = -3$

$\Rightarrow a = \dfrac{-3}{2}$

and $y^2 + y + b = 0$

$(1)^2 + (1) + b = 0 \Rightarrow 1 + 1 + b = 0$

$\Rightarrow 2 + b = 0$

$\therefore b = -2$

$ab = \dfrac{-3}{2} \times (-2) = 3$

**Question 32.**

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

(a) 6, – 16

(b) 36, -36

(c) 6, -6

(d) 34 , – 34 **[CBSE 2014]**

**Solution:**

**(c)** $16x^2 + 4kx + 9 = 0$

Here a = 16, b = 4k, c = 9

Now $D = b^2 - 4ac = (4k)^2 - 4 \times 16 \times 9 = 16k^2 - 576$

Roots are real and equal

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

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

$\Rightarrow k^2 - 36 = 0$

=> $k^2 = 36 = (\pm 6)^2$
$k = \pm 6$
$k = 6, -6$

1. Which of the following is not a quadratic equation
(a) $x^2 + 3x - 5 = 0$
(b) $x^2 + x3 + 2 = 0$
(c) $3 + x + x^2 = 0$
(d) $x^2 - 9 = 0$

**Answer/Explanation**
Answer: b
Explaination:Reason: Since it has degree 3.

---

2. The quadratic equation has degree
(a) 0
(b) 1
(c) 2
(d) 3

**Answer/Explanation**
Answer: c
Explaination:Reason: A quadratic equation has degree 2.

---

3. The cubic equation has degree
(a) 1
(b) 2
(c) 3
(d) 4

**Answer/Explanation**
Answer: c
Explaination:Reason: A cubic equation has degree 3.

---

4. A bi-quadratic equation has degree
(a) 1
(b) 2
(c) 3
(d) 4

**Answer/Explanation**
Answer: d
Explaination:Reason: A bi-quadratic equation has degree 4.

---

5. The polynomial equation x (x + 1) + 8 = (x + 2) {x – 2) is
(a) linear equation
(b) quadratic equation
(c) cubic equation
(d) bi-quadratic equation

**Answer/Explanation**
Answer: a
Explaination:Reason: We have $x(x + 1) + 8 = (x + 2) (x - 2)$
$\Rightarrow x^2 + x + 8 = x^2 - 4$

⇒ $x^2 + x + 8 - x^2 + 4 = 0$
⇒ $x + 12 = 0$, which is a linear equation.

---

6. The equation $(x – 2)^2 + 1 = 2x – 3$ is a
(a) linear equation
(b) quadratic equation
(c) cubic equation
(d) bi-quadratic equation

**Answer/Explanation**
Answer: b
Explaination:Reason: We have $(x – 2)^2 + 1 = 2x – 3$
⇒ $x^2 + 4 – 2 \times x \times 2 + 1 = 2x – 3$
⇒ $x^2 – 4x + 5 – 2x + 3 = 0$
∴ $x^2 – 6x + 8 = 0$, which is a quadratic equation.

---

7. The roots of the quadratic equation $6x^2 – x – 2 = 0$ are
(a) $\frac{2}{3}, \frac{1}{2}$
(b) $-\frac{2}{3}, \frac{1}{2}$
(c) $\frac{2}{3}, -\frac{1}{2}$
(d) $-\frac{2}{3}, -\frac{1}{2}$

**Answer/Explanation**
Answer: c
Explaination:Reason: We have 6×2 – x – 2 = 0
⇒ $6x^2 + 3x - 4x - 2 = 0$
⇒ $3x(2x + 1) - 2(2x + 1) = 0$
⇒ $(2x + 1)(3x – 2) = 0$
⇒ $2x + 1 = 0$ or $3x – 2 = 0$
∴ x =−12, x = 23

---

8. The quadratic equation whose roots are 1 and
(a) $2x^2 + x – 1 = 0$
(b) $2x^2 – x – 1 = 0$
(c) $2x^2 + x + 1 = 0$
(d) $2x^2 – x + 1 = 0$

**Answer/Explanation**
Answer: b
Explaination:Reason: Required quadratic equation is
$$x^2 - \left(1 - \frac{1}{2}\right)x + \left(1 \times \frac{-1}{2}\right) = 0 \quad \Rightarrow x^2 - \left(\frac{1}{2}x\right)$$
$$\therefore\ 2x^2 - x - 1 = 0$$

---

9. The quadratic equation whose one rational root is $3 + \sqrt{2}$ is
(a) $x^2 – 7x + 5 = 0$
(b) $x^2 + 7x + 6 = 0$
(c) $x^2 – 7x + 6 = 0$
(d) $x^2 – 6x + 7 = 0$

**Answer/Explanation**

---

10. The equation $2x^2 + kx + 3 = 0$ has two equal roots, then the value of k is

(a) ±√6
(b) ± 4
(c) ±3√2
(d) ±2√6

**Answer/Explanation**
Answer: d
Explaination:Reason: Here a = 2, b = k, c = 3
Since the equation has two equal roots
∴ $b^2 – 4AC = 0$
⇒ $(k)^2 – 4 \times 2 \times 3 = 0$
⇒ $k^2 = 24$
⇒ k = ± √24
∴ k= ± ±4×6−−−−√ = ± 2√6

---

11. The roots of the quadratic equation x+1x=3, x ≠ 0 are.

(a) $3+\sqrt{5}, 3-\sqrt{5}$ (b) $2+\sqrt{5}, 2-\sqrt{5}$

(c) $\frac{3+\sqrt{5}}{2}, \frac{3-\sqrt{5}}{2}$ (d) $\frac{3+\sqrt{3}}{2}, \frac{3-\sqrt{3}}{2}$

**Answer/Explanation**
Answer: c
Explaination:Reason: We have x+1x=3
⇒ x2+1x=3
⇒ $x^2 + 1 = 3x$
On comparing with $ax^2 + bx + c = 0$
∴ a = 1, b = – 3, c = 1
⇒ $D = b^2 – 4ac = (-3)^2 – 4 \times (1) \times (1) = 9 – 4 = 5$

---

12. The roots of the quadratic equation $2x^2 – 2\sqrt{2}x + 1 = 0$ are

(a) $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$ (b) $\sqrt{2}, \sqrt{2}$

(c) $\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}$ (d) $\sqrt{2}, \frac{1}{\sqrt{2}}$

**Answer/Explanation**
Answer: c
Explaination:Reason: Here a = 2, b = -2√2 , c = 1
∴ $D = b^2 – 4ac = (-2\sqrt{2})^2 – 4 \times 2 \times 1 = 8 – 8 = 0$

$$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{-(-2\sqrt{2}) \pm 0}{2 \times 2} = \frac{2\sqrt{2}}{4} = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$$

$$\therefore\ x = \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$$

---

13. The sum of the roots of the quadratic equation 3×2 – 9x + 5 = 0 is
(a) 3
(b) 6
(c) -3
(d) 2

**Answer/Explanation**
Answer: c
Explaination:Reason: Here a = 3, b = -9, c = 5
∴ Sum of the roots =−ba=−(−9)3=3

---

14. If the roots of ax2 + bx + c = 0 are in the ratio m : n, then
(a) $mna^2 = (m + n) c^2$
(b) $mnb^2 = (m + n) ac$
(c) $mn b^2 = (m + n)^2 ac$
(d) $mnb^2 = (m – n)^2 ac$

**Answer/Explanation**
Answer: c
Explaination:
(c); **Reason:** We have $\frac{\alpha}{\beta}=\frac{m}{n}$ $\Rightarrow \frac{\alpha}{m}=\frac{\beta}{n} \Rightarrow \frac{\alpha+\beta}{m+n}=\sqrt{\frac{\alpha\beta}{mn}}$ by Ratio proportio
$\therefore mn(\alpha+\beta)^2 = \alpha\beta(m+n)^2$ $\Rightarrow mn\left(\frac{-b}{a}\right)^2 = (m+n)^2\frac{c}{a}$ $\therefore mn\, b^2 = ($

---

15. If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, the value of q is
(a) $\frac{49}{4}$ (b) $\frac{4}{49}$
(c) 4 (d) 49

**Answer/Explanation**
Answer: a
Explaination:Reason: Since 4 is a root of $x^2 + px + 12 = 0$
$\therefore (4)^2 + p(4) + 12 = 0$
$\Rightarrow p = -7$
Also the roots of $x^2 + px + q = 0$ are equal, we have $p^2 – 4 \times 1 \times q = 0$
$\Rightarrow (-7)^2 -4q = 0$
Undefined control sequence \therefore

---

16. a and p are the roots of $4x^2 + 3x + 7 = 0$, then the value of 1α+1β is
(a) $\frac{-3}{4}$ (b) $\frac{-3}{7}$
(c) $\frac{3}{7}$ (d) $\frac{7}{4}$

**Answer/Explanation**
Answer: b
Explaination:
(b); **Reason:** Here $\alpha+\beta = \frac{-3}{4}$ and $\alpha\beta = \frac{7}{4}$ $\therefore \frac{1}{\alpha}+\frac{1}{\beta}=\frac{\beta+\alpha}{\alpha\beta}$

---

17. If a, p are the roots of the equation (x – a) (x – b) + c = 0, then the roots of the equation (x – a) (x – P) = c are
(a) a, b
(b) a, c
(c) b, c
(d) none of these

**Answer/Explanation**
Answer: a
Explaination:Reason: By given condition, (x – a) (x – b) + c = (x – α) (x – β)

⇒ (x – α) (x – β) – c = (x – a) (x – b)
This shows that roots of (x – α) (x – β) – c are a and b

---

18. Mohan and Sohan solve an equation. In solving Mohan commits a mistake in constant term and finds the roots 8 and 2. Sohan commits a mistake in the coefficient of x. The correct roots are
(a) 9,1
(b) -9,1
(c) 9, -1
(d) -9, -1

**Answer/Explanation**
Answer: a
Explaination:Reason: Correct sum = 8 + 2 = 10 from Mohan
Correct product = -9 x -1 = 9 from Sohan
∴ $x^2$ – (10)x + 9 = 0
⇒ $x^2$ – 10x + 9 = 0
⇒ $x^2$ – 9x – x + 9
⇒ x(x – 9) – 1(x – 9) = 0
⇒ (x-9) (x-l) = 0 .
⇒ Correct roots are 9 and 1.

---

19. If a and p are the roots of the equation $2x^2$ – 3x – 6 = 0. The equation whose roots are 1α and 1β is
(a) $6x^2$ – 3x + 2 = 0
(b) $6x^2$ + 3x – 2 = 0
(c) $6x^2$ – 3x – 2 = 0
(d) $x^2$ + 3x-2 = 0
**Answer/Explanation**
Answer: b
Explaination:
(*b*); ***Reason:*** Here $a = 2, b = -3, c = -6$

$\alpha + \beta = \frac{-b}{a} = \frac{3}{2}$ and $\alpha\beta = \frac{c}{a} = \frac{-6}{2} = -3$ $\therefore s = \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\beta+\alpha}{\alpha\beta} = \frac{\frac{3}{2}}{-3} = \frac{-1}{2}$

$p = \frac{1}{\alpha}, \frac{1}{\beta} = \frac{1}{\alpha\beta} = \frac{1}{-3}$

The equation is $x^2 - (s)\,x + p = 0$ $\Rightarrow x^2 - \left(-\frac{1}{2}\right)x + \left(-\frac{1}{3}\right)$ $\therefore 6x^2$ -

---

20. If the roots of px2 + qx + 2 = 0 are reciprocal of each other, then
(a) P = 0
(b) p = -2
(c) p = ±2
(d) p = 2

**Answer/Explanation**
Answer: d
Explaination:Reason: here α = 1β
∴ αβ = 1
⇒ 2p = 1
∴ p = 2

---

21. If one root of the quadratic equation $2x^2$ + kx – 6 = 0 is 2, the value of k is
(a) 1
(b) -1
(c) 2
(d) -2

### Answer/Explanation

Answer: b

Explaination:Reason: Scice x = 2 is a root of the equation $2x^2 + kx - 6 = 0$

∴ $2(2)^2 + k(2) - 6 = 0$

⇒ $8 + 2k - 6 = 0$

⇒ $2k = -2$

∴ $k = -1$

---

22. The roots of the quadratic equation

$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x},\ a + b \neq 0 \text{ is}$$

(a) a, b

(b) -a, b

(c) a, -b

(d) -a, -b

### Answer/Explanation

Answer: d

Explaination:

(*d*); **Reason:** We have $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$

⇒ $\frac{x-a-b-x}{x(a+b+x)} = \frac{a+b}{ab}$

⇒ $ax + bx + x^2 = -ab$

⇒ $x(x + a) + b(x + a) = 0$

∴ $x = -a, x = -b$

⇒ $\frac{1}{a+b+x} - \frac{1}{x} =$

⇒ $\frac{-(a+b)}{x(a+b+x)} =$

⇒ $x^2 + ax + bx$

⇒ $(x + a)(x +$

---

23. The roots of the equation $7x^2 + x - 1 = 0$ are

(a) real and distinct

(b) real and equal

(c) not real

(d) none of these

### Answer/Explanation

Answer: a

Explaination:Reason: Here a = 2, b = 1, c = -1

∴ $D = b^2 - 4ac = (1)^2 - 4 \times 2 \times (-1) = 1 + 8 = 9 > 0$

∴ Roots of the given equation are real and distinct.

---

24. The equation $12x^2 + 4kx + 3 = 0$ has real and equal roots, if

(a) k = ±3

(b) k = ±9

(c) k = 4

(d) k = ±2

### Answer/Explanation

Answer: a

Explaination:Reason: Here a = 12, b = 4k, c = 3

Since the given equation has real and equal roots

∴ $b^2 - 4ac = 0$

⇒ $(4k)^2 - 4 \times 12 \times 3 = 0$

⇒ $16k^2 - 144 = 0$

⇒ $k^2 = 9$

⇒ $k = \pm 3$

25. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$, then
(a) $p = 3$
(b) $p = 5$
(c) $p = 7$
(d) $p = 1$

**Answer/Explanation**

Answer: c
Explaination:Reason: Since – 5 is a root of the equation $2x^2 + px - 15 = 0$
$\therefore 2(-5)^2 + p(-5) - 15 = 0$
$\Rightarrow 50 - 5p - 15 = 0$
$\Rightarrow 5p = 35$
$\Rightarrow p = 7$

---

26. If the roots of the equations $ax^2 + 2bx + c = 0$ and $bx^2 - 2\sqrt{ac}\,x + b = 0$ are simultaneously real, then
(a) b = ac
(b) b2 = ac
(c) a2 = be
(d) c2 = ab

**Answer/Explanation**

Answer: b
Explaination:Reason: Given equations have real roots, then
$D_1 \geq 0$ and $D_2 \geq 0$
$(2b)^2 - 4ac > 0$ and $(-2\sqrt{ac})^2 - 4b.b \geq 0$
$4b^2 - 4ac \geq 0$ and $4ac - 4b2 > 0$
$b^2 \geq ac$ and $ac \geq b^2$
$\Rightarrow b^2 = ac$

---

27. The roots of the equation $(b - c) x^2 + (c - a) x + (a - b) = 0$ are equal, then
(a) $2a = b + c$
(b) $2c = a + b$
(c) $b = a + c$
(d) $2b = a + c$

**Answer/Explanation**

Answer: d
Explaination:Reason: Since roots are equal
$\therefore D = 0 \Rightarrow b^2 - 4ac = 0$
$\Rightarrow (c - a)^2 - 4(b - c)(a - b) = 0$
$\Rightarrow c^2 - b^2 - 2ac - 4(ab - b^2 + bc) = 0 \Rightarrow c + a - 2b = 0 \Rightarrow c + a = 2b$
$\Rightarrow c^2 + a^2 - 2ca - 4ab + 4b^2 + 4ac - 4bc = 0$
$\Rightarrow c^2 + a^2 + 4b^2 + 2ca - 4ab - 4bc = 0$
$\Rightarrow (c + a - 2b)^2 = 0$
$\Rightarrow c + a - 2b = 0$
$\Rightarrow c + a = 2b$

---

28. A chess board contains 64 equal squares and the area of each square is 6.25 $cm^2$. A border round the board is 2 cm wide. The length of the side of the chess board is
(a) 8 cm
(b) 12 cm
(c) 24 cm
(d) 36 cm

**Answer**
Answer: c

---

29. One year ago, a man was 8 times as old as his son. Now his age is equal to the square of his son’s age. Their present ages are
(a) 7 years, 49 years
(b) 5 years, 25 years
(c) 1 years, 50 years
(d) 6 years, 49 years

**Answer**
Answer: a

---

30. The sum of the squares of two consecutive natural numbers is 313. The numbers are
(a) 12, 13
(b) 13,14
(c) 11,12
(d) 14,15

**Answer**
Answer: a

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