QUADRATIC EQUATIONS

MCQs & A and R WORK SHEET

Test / Exam Name: Quadratic Equations **Standard: 10th** **Subject: Mathematics**

Student Name: ..... **Section:** ..... **Roll No.:** .....

Questions: 45 **Time: 01:30 hh:mm** **Negative Marks: 0** **Marks: 45**

Instructions

1. MULTIPLE CHOICE QUESTIONS.

Q1. If $ax^2 + bx + c = 0$ has equal roots, then c is equal to: **1 Mark**

A $-\frac{b^2}{2a}$ **B** $-\frac{b^2}{4a}$ **C** $\frac{b^2}{4a}$ **D** $\frac{b^2}{4a}$

Ans: D $\frac{b^2}{4a}$

Solution:

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

$b^2 - 4ac = 0$

? $4ac = b^2$

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

Q2. The roots of the quadratic equation $x^2 - 0.04 = 0$ are: **1 Mark**

A ± 0.2 **B** ± 00.2 **C** 0.4 **D** 2

Ans: A ± 0.2

Solution:

$x^2 - 0.04 = 0$

$\Rightarrow x^2 = 0.04$

$\Rightarrow x = \sqrt{0.04}$

$\Rightarrow x = \pm 0.2$

Q3. Choose the correct answer from the given four options in the following questions: **1 Mark**

Which of the following equations has the sum of its roots as 3?

A $2x^2 - 3x + 6 = 0.$ **B** $-x^2 + 3x - 3 = 0.$ **C** $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + 1 = 0.$ **D** $3x^2 - 3x + 3 = 0$

Ans: B $-x^2 + 3x - 3 = 0.$

Solution:

1. Given that, $2x^2 - 3x + 6 = 0$

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

a = 2, b = -3 and c = 6

$\therefore$ Sum of the roots $= \frac{-b}{a} = \frac{-(-3)}{2} = \frac{3}{2}$

So, sum of the roots of the quadratic equation $2x^2 - 3x + 6 = 0$ is not 3; so it is not the answer.

2. Given that, $-x^2 + 3x - 3 = 0$

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

a = -1, b = 3 and c = -3

$\therefore$ Sum of the roots $= \frac{-b}{a} = \frac{-(3)}{-1} = 3$

So, sum of the roots of the quadratic equation $-x^2 + 3x - 3 = 0$ is 3, so it is the answer.

3. Given that, $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + 1 = 0$

$\Rightarrow 2x^2 - 3x + \sqrt{2} = 0$

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

a = 2, b = -3 and $c = \sqrt{2}$

$\therefore$ Sum of the roots $= \frac{-b}{a} = \frac{-(-3)}{2} = \frac{3}{2}$

So, sum of the roots of the quadratic equation $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + 1 = 0$ is not 3, so it is not the answer,

4. Given that, $3x^2 - 3x + 3 = 0$

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

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

a = 1, b = -1 and c = 1

$\therefore$ Sum of the roots $= \frac{-b}{a} = \frac{-(-1)}{1} = 1$

So, sum of the roots of the quadratic equation $3x^2 - 3x + 3 = 0$ is not 3, so it is not the answer.

Q4. The discriminant of the equation $(2a + b)x = x^2 + 2ab$ is ..... **1 Mark**

A $(2a + b^2)$ **B** $(2a - b)^2$ **C** $(2a + b)^2$ **D** $(2a - b^2)$

Ans: B $(2a - b)^2$

Solution:

$(2a + b)\ x = x^2 + 2ab$

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

$D = b^2 - 4ac$

$D = [-(2a + b)]^2 - 4 \times 1 \times 2ab$

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

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

$D = (2a - b)^2$

Q5. $x^2 - 6ax = -6a^2$ discriminant of the given equation is ..... **1 Mark**

A $4a^2$ **B** $12a^2$ **C** $2a^2$ **D** $6a^2$

Ans: B $12a^2$

Solution:

$x^2 - 6ax + 6a^2 = 0$

$D = b^2 - 4ac$

$D = (-6a)^2 - 4 \times 1 \times 6a^2$

$D = 36a^2 - 24a^2$

$D = 12a^2$

Q6. If the equation $x^2 - ax + 1 = 0$ has two distinct roots, then: **1 Mark**

A $|a| = 2$ **B** $|a| < 2$ **C** $|a| > 2$ **D** None of these.

Ans: C $|a| > 2$

Solution:

The given quadric equation is $x^2 - ax + 1 = 0$, and roots are dostinct.

Then fond the value of a.

Here, $a = 1$, $b = a$ and $c = 1$

As we know that $D = b^2 - 4ac$

Putting the value of $a = 1$, $b = a$ and $c = 1$

$= (a)^2 - 4 \times 1 \times 1$

$= a^2 - 4$

The given equation will have real and distinct roots, if $D > 0$

$a^2 - 4 > 0$

$a^2 > 4$

$a > \sqrt{4}$

$a > \pm 2$

Therefore, the value of $|a| > 2$

Thus, the correct answer is (c)

Q7. $(x - 1)\ (2x - 1) = 0$ discriminant of the given equation is: **1 Mark**

A 0 **B** 2 **C** 1 **D** 3

Ans: C 1

Solution:

$(x - 1)\ (2x - 1) = 0$

$2x^2 - 3x + 1 = 0$

$D = b^2 - 4ac$

$D = (-3)^2 - 4 \times 2 \times 1$

$D = 9 - 8$

$D = 1$

Q8. If $x = 2$ is a root of the quadratic equation $3x^2 - px - 2 = 0$, then the value of p is: **1 Mark**

A 1 **B** 5 **C** 3 **D** 0

Ans: B 5

Solution:

Given: $p(x) = 3x^2 - px - 2 = 0$

$\therefore p(2) = 3(2)^2 - p(2) - 2 = 0$

? $12 - 2p - 2 = 0$

? $-2p = -10$

? $p = 5$

Q9. Which of the following is a quadratic equation? **1 Mark**

A $(x^2 + 1) = (2 - x)^2 + 3$ **B** $x^3 - x^2 = (x - 1)^3$ **C** $2x^2 + 3 = (5 + x)(2x - 3)$ **D** None of these.

Ans: B $x^3 - x^2 = (x - 1)^3$

Solution:

1. $(x^2 + 1) = (2 - x)^2 + 3$

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

? $4x - 3$,

This is not an equation of degree 2.

2. $x^3 - x^2 = (x - 1)^2$

? $x^3 - x^2 = x^3 - 3x^2 + 3x - 1$

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

This is a quadratic equation.

3. $2x^2 + 3 = (5 + x)(2x - 3)$

? $2x^3 + 3 = 10x - 15 + 2x^2 - 3x$

? $2x^3 - 2x^2 - 7x + 18 = 0$

This is an equation of degree 3.

Q10. The quadratic equation whose roots are $7 + \sqrt{3}$ and $7 - \sqrt{3}$ is: **1 Mark**

A $x^2 - 14x + 46 = 0$ **B** $x^2 - 14x - 46 = 0$ **C** $x^2 + 14x + 46 = 0$ **D** $x^2 + 14x - 46 = 0$

Ans: A $x^2 - 14x + 46 = 0$

Solution:

Given: $\alpha = 7 + \sqrt{3}$ and $\beta = 7 - \sqrt{3}$

$\therefore x^2 - (\alpha + \beta)\, x + \alpha\beta = 0$

$\Rightarrow x^2 - (7 + \sqrt{3} + 7 - \sqrt{3})\, x + (7 + \sqrt{3})(7 - \sqrt{3}) = 0$

$\Rightarrow x^2 - 14x + (49 - 3) = 0$

$\Rightarrow x^2 - 14x + 46 = 0$

Q11. The roots of the equation $x^2 + x - p(p + 1) = 0$, where p is a constant, are: **1 Mark**

A p, p + 1 **B** -p, p + 1 **C** p, - (p + 1) **D** −p, - (p + 1)

Ans: C p, - (p + 1)

Solution:

$x^2 + x - p(p + 1) = 0$

$x^2 + (p + 1)x - px - p(p + 1) = 0$

$x(x + p + 1) - p(x + p + 1) = 0$

$(x + p + 1)\,(x - p) = 0$

$x = -p - 1, p$

Q12. The roots of the quadratic equation $2x^2 - x - 6 = 0$ are: **1 Mark**

A $-2, \frac{3}{2}$ **B** $2, \frac{-3}{2}$ **C** $-2, \frac{-3}{2}$ **D** $2, \frac{3}{2}$

Ans: B $2, \frac{-3}{2}$

Solution:

Given that, $2x^2 - x - 6 = 0$

? $2x^2 - (4x - 3x) - 6 = 0$

? $2x^2 - 4x + 3x - 6 = 0$

? $2x(x - 2) + 3(x - 2) = 0$

? $(x - 2)(2x + 3) = 0$

$\Rightarrow x = 2, \frac{-3}{2}$

Q13. A quadratic equation whose one root is 3 is: **1 Mark**

A $x^2 - 5x - 6 = 0$ **B** $x^2 - 6x - 6 = 0$ **C** $x^2 - 5x + 6 = 0$ **D** $x^2 + 6x - 5 = 0$

Ans: C $x^2 - 5x + 6 = 0$

Solution:

since 3 is the root of the equation, $x = 3$ must satisfy the equation.

Applying $x = 3$ in the equation $x^2 - 5x + 6 = 0$

gives, $(3)^2 - 5(3) + 6 = 0$

? $9 - 15 + 6 = 0$

? $15 - 15 = 0$

? $0 = 0$

? L.H.S. = R.H.S.

$x^2 - 5x + 6 = 0$????? is a required equation which has 3 as root.

Q14. $4x^2 - 20x + 25 = 0$ have: **1 Mark**

A Real roots **B** No Real roots **C** Real and Equal roots **D** Real and Distinct roots

Ans: C Real and Equal roots

Solution:

$D = b^2 - 4ac$

$D = (-20)^2 - 4 \times 4 \times 25$

$D = 400 - 400$

$D = 0$. Real and equal roots.

Q15. The roots of the equation $x^2 - 3x - m(m + 3) = 0$, where m is a constant, are: **1 Mark**

A m, m + 3 **B** -m, m + 3 **C** m, -(m + 3) **D** -m, -(m: 3)

Ans: B -m, m + 3

Solution:

The given quadratic equation is $x^2 - 3x - m(m + 3) = 0$, where m is a constant.

$x^2 - 3x - m(m + 3) = 0$

$\therefore x^2 - [(m + 3) - m]x - m(m+ 3) = 0$

? $x^2 - (m + 3)x + mx - m(m + 3) = 0$

? $x [x - (m +3)] + m[x - (m + 3)] = 0$

? $[x - (m +3)] (x + m) = 0$

? $x - (m +3) = 0$ or $x + m = 0$

? $x = m + 3$ or $x = -m$

Thus, the roots of the given quadratic equation are m + 3 and m.

Q16. Let $b = a + c$. Then the equation $ax^2 + bx + c = 0$ has equal roots if: **1 Mark**

A a = -c **B** a = 2c **C** a = c **D** a = -2c

Ans: C a = c

Solution:

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

$b^2 - 4ac = 0$

? $(a + c)^2 - 4ac = 0$ [Given: $b = a + c$]

? $a^2 + c^2 + 2ac - 4ac = 0$

? $a^2 + c^2 - 2ac = 0$

? $(a - c)^2 = 0$

? $a - c = 0$

? $a = c$

Q17. A quadratic equation $ax^2 + bx + c = 0$ has real and distinct roots, if: **1 Mark**

A None of these **B** $b^2 - 4ac < 0$ **C** $b^2 - 4ac = 0$ **D** $b^2 - 4ac > 0$

Ans: D $b^2 - 4ac > 0$

Solution:

A quadratic equation $ax^2 + bx + c = 0$ has real and distinct roots, if $b^2 - 4ac > 0$.

Q18. $\sqrt{2}x^2 - 3x - 5 = 0$ have: **1 Mark**

A Real and Equal roots **B** Real roots **C** Real and Distinct roots **D** No Real roots

Ans: C Real and Distinct roots

Solution:

$D = (-3)^2 - 4 \times \sqrt{2} \times (-5)$

$D = 9 + 20\sqrt{2}$

$D > 0$. Real and distinct roots.

Q19. If one root the equation $2x^2 + kx + 4 = 0$ is 2, then the other root is: **1 Mark**

A 6 **B** -6 **C** -1 **D** 1

Ans: D 1

Solution:

Let α and β be the roots of quadratic equation $2x^2 + kx + 4 = 0$ in such a way that a = 2

Here, a = 2, b = k and c = 4

Then, according to question sum of the roots

$\alpha + \beta = \frac{-b}{a}$

$2 + \beta = \frac{-k}{2}$

$\beta = \frac{-k}{2} - 2$

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

And the product of the roots

$\alpha \cdot \beta = \frac{c}{a}$

$\alpha \cdot \beta = \frac{4}{2}$

$\alpha \cdot \beta = 2$

Putting the value $\beta = \frac{-k-4}{2}$ in above

$2 \times \frac{(-k-4)}{2} = 2$

$(-k-4) = 2$

$k = -4 - 2$

$k = -6$

Putting the value of k in $\beta = \frac{-k-4}{2}$

$\beta = \frac{-(-6)-4}{2}$

$\beta = \frac{6-4}{2}$

$\beta = \frac{2}{2}$

$\beta = 1$

Therefore, value of other root be $\beta = 1$

Thus, the correct answer is (d)

Q20. If the equation x^2 - kx + 1 = 0 has no real roots, then: **1 Mark**

A k < -2 **B** k > 2 **C** -2 < k < 2 **D** None of these.

Ans: C -2 < k < 2

Solution:

Since the equation x^2 + 5kx + 16 = 0 has no real roots,

? D < 0

? b^2 - 4ac > 0

? $(-k)^2$ - 4 × 1 × 1 < 0

? k^2 - 4 < 0

? k^2 < 4

$\Rightarrow k < \sqrt{4}$ or $k > -\sqrt{4}$

? k < 2 or k > -2

? -2 < k < 2

Q21. If $(a^2 + b^2)x^2 + 2(ab + bd)x + c^2 + d^2 = 0$ has no real roots, then: **1 Mark**

A ab = bc **B** ab = cd **C** ac = bd **D** ad ≠ bc

Ans: D ad ≠ bc

Solution:

The given quadric equation is $(a^2 + b^2)x^2 + 2(ab + bd)x + c^2 + d^2 = 0$, and roots are equal.

Here, $a = (a^2 + b^2)$, $b = 2(ab + bd)$ and, $c = c^2 + d^2$

As we know that $D = b^2 - 4ac$

Putting the value of $a = (a^2 + b^2)$, $b = 2(ab + bd)$ and, $c = c^2 + d^2$

$= \{2(ab + bd)\}^2 - 4 \times (a^2 + b^2) \times (c^2 + d^2)$

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

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

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

$= 4(a^2b^2 + 2ab^2d - a^2c^2 - a^2d^2 - b^2c^2)$

The given equation will have no real roots, if D < 0

$4(a^2b^2 + 2ab^2d - a^2c^2 - a^2d^2 - b^2c^2) < 0$

$a^2b^2 + 2ab^2d - a^2c^2 - a^2d^2 - b^2c^2 < 0$

ad ≠ bc

Thus, the correct answer is (d)

Q22. The two numbers whose sum is 27 and their product is 182 are: **1 Mark**

A 14 and 15 **B** 12 and 13 **C** 13 and 14 **D** 12 and 15

Ans: C 13 and 14

Solution:

Let the one number be x. As the sum of numbers is 27, then the other number will be (27 - x)

According to question.

x(27 - x) = 182

? 27x - x^2 = 182

? x^2 - 27x + 182 = 0

? x^2 - 14x - 13x + 182 = 0

? x(x - 14) -13(x - 14) = 0

? (x - 13) (x - 14) = 0

? x - 13 = 0 and x - 14 = 0

x = 13 and x = 14

Now, the other number = 27 - 13 = 14 and 27 - 14 = 13

∴ The required two numbers are 13 and 14.

Q23. The values of k for which the quadratic equation $2x^2$ - kx + k = 0 has equal roots is: **1 Mark**

A 8 only **B** 0 only **C** 4 **D** 0, 8

Ans: D 0, 8

Solution:

If a quadratic equation $ax^2 + bx + c = 0$, a ? 0 has two equal roots, then its discriminant value will be equal to zero i.e.

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

Given, $2x^2$ - kx + k = 0

For equal roots,

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

? $(-k)^2 - 4(2)^{(k)} = 0$

? k^2 - 8k = 0

? k(k - 8) = 0

∴ k = 0, 8

Q24. If sin α and cos α are the roots of the equations $ax^2 + bx + c = 0$, then b^2 = **1 Mark**

A a^2 - 2ac **B** a^2 + 2ac **C** a^2 - ac **D** a2 + ac

Ans: B a^2 + 2ac

2. a^2 + 2ac

Solution

The given quadric equation is $ax^2 + bx + c = 0$, and sin α and cos β are roots of given equation.

And, a = a, b = b and c = c

Then, as we know that sum of the roots

$\sin\alpha + \cos\beta = \frac{-b}{a}$ ... (i)

And the product of the roots

$\sin\alpha \cdot \cos\beta = \frac{c}{a}$ .... (ii)

Squaring both sides of equation (i) we get

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

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

Putting the value of $\sin\alpha + \cos\beta = 1$ we get

$1 + 2\sin\alpha\cos\beta = \frac{b^2}{a^2}$

$a^2(1 + 2\sin\alpha\cos\beta) = b^2$

Putting the value of $\sin\alpha \cdot \cos\beta = \frac{c}{a}$ we get

$a^2\left(1 + 2\frac{c}{a}\right) = b^2$

$a^2\left(\frac{a+2c}{a}\right) = b^2$

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

Threfore, the value of $b^2 = a^2 + 2ac$

Thus, the correct answer is (b)

Q25. The value of $\sqrt{6 + \sqrt{6 + \sqrt{6+}}}\ldots$ is: **1 Mark**

A 4 **B** 3 **C** -2 **D** 3.5

Ans: B 3

Solution:

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

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

? $x^2 = 6 + x$

? x^2 - x - 6 = 0

? x^2 - 3x + 2x - 6 = 0

? x(x - 3) + 2(x - 3) = 0

? (x - 3)(x + 2) = 0

Either x - 3 = 0, then x = 3

Or x + 2 = 0, then x = -2

Now if x = 3, then

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

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

$= 3$

If x = -2, then

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

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

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

$\Rightarrow -2 \neq 2$

Which is not possible x = 3 is correct.

Q26. If the sum of the roots of the equation $x^2 - x = \lambda(2x-1)$ is zero, then $\lambda =$ **1 Mark**

A -2 **B** 2 **C** $-\frac{1}{2}$ **D** $\frac{1}{2}$

Ans: C $-\frac{1}{2}$

Solution:

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

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

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

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

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

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

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

$\Rightarrow 2\lambda = -1$

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

Q27. If one root of the equation $4x^2 - 2x + (\lambda - 4) = 0$ be the reciprocal of the other, then $\lambda =$ **1 Mark**

A 8 **B** -8 **C** 4 **D** -4

Ans: A 8

Solution:

Let α and β be the roots of quadratic equation$4x^2 - 2x + (\lambda - 4) = 0$ in such a way

Then, $\alpha = \frac{1}{\beta}$

Here, $a = 4, b = -2$ and $c = (\lambda - 4)$

Then, according to question sum of the roots

$\alpha + \beta = \frac{-b}{a}$

$\frac{1}{\beta} + \beta = \frac{-(-2)}{4}$

$\frac{1+\beta^2}{\beta} = \frac{1}{2}$

$2 + 2\beta^2 = \beta$

$2\beta^2 - \beta + 2 = 0$

And the product of the roots

$\alpha \cdot \beta = \frac{c}{a}$

$\frac{1}{\beta} \times \beta = \frac{\lambda-4}{4}$

$1 = \frac{\lambda-4}{4}$

$\lambda - 4 = 4$

$\lambda = 4 + 4$

$\lambda = 8$

Therefore, value of $\lambda = 8$

Thus, the correct answer is (a)

Q28. If the sum of a number and its reciprocal is $2\frac{1}{2}$ then the number are: **1 Mark**

A None of these **B** 2 and$\frac{1}{2}$ **C** 1 and$\frac{3}{2}$ **D** 3 and$\frac{1}{3}$

Ans: B 2 and$\frac{1}{2}$

Solution:

Let the one number be x then its reciprocal will be $\frac{1}{x}$ According to question,

$\Rightarrow \frac{x^2+1}{x} = \frac{5}{2}$

? $2x^2 + 2 = 5x$

? $2x^2 - 5x + 2 = 0$

using factorisation method

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

? 2x(x - 2) -1(x - 2) = 0
? (x - 2) (2x - 1) = 0
? x - 2 = 0 and 2x - 1 = 0
? x = 2 and x = $\frac{1}{2}$
∴ The number are 2 and $\frac{1}{2}$

Q29. The perimeter of a rectangle is 82m and its area is 400m^2. The breadth of the rectangle is: **1 Mark**

A 25m **B** 20m **C** 16m **D** 9m

Ans: C 16m

Solution:

Perimeter of a rectangle = 82m
Let the breadth of the rectangle be x m.
Then, length of the rectangle = $\frac{\text{Perimeter}}{2} - \text{Breadth}$
= $\frac{82}{2} - x = (41 - x)$m
Now Area = 400m^2
? Length × Breadth = 400
? x(41 - x) = 400
? 41x - x^2 = 400
? x^2 - 41x + 400 = 0
? x^2 - 25x - 16x + 400 = 0
? x(x - 25) - 16(x - 25) = 0
? (x - 25)(x - 16) = 0
? x - 25 = 0 or x - 16 = 0
? x = 25 or x = 16
Hence, the length is 25m and the breadth is 16m.

Q30. In a cricket match, Kumble took three wickets less than twice the number of wickets taken by Srinath. The product of the number of wickets taken by these two is 20, then the number of wickets taken by Kumble is: **1 Mark**

A 2 **B** 4 **C** 10 **D** 5

Ans: D 5

Solution:

Let the number of wickets taken by Srinath be x
then, the number of wickets taken by Kumble will be 2x - 3
According to question, x(2x - 3) = 20
? $2x^2$ - 3x - 20 = 0
? $2x^2$ - 8x + 5x - 20 = 0
? 2x(x - 4) + 5(x - 4) = 0
? (x - 4) (2x + 5) = 0
? x - 4 = 0 and 2x + 5 = 0

Q31. Rohan's mother is 26 years older than him. The product of their ages 3 years from now will be 360, then Rohan's present age is: **1 Mark**

A 10 years **B** 6 years **C** 7 years **D** 8 years

Ans: C 7 years

Solution:

Let Rohan's present age be x years.
Then Rohan's mother age will be (x + 26) years.
And after 3 years their ages will be (x + 3) and (x + 29) years.
According to question,
(x + 3) (x + 29) = 360
? x^2 + 29x + 3x + 87 = 360
? x^2 + 32x - 273 = 0
? x^2 + 39x + 7x - 273 = 0
? x(x + 39) -7(x + 39) = 0
? (x - 7) (x + 39) = 0
? (x - 7) = 0 and x + 39 = 0
? x = 7 and x = -39 [x = -39 is not possible]
∴ Rohan's present is 7 years.

Q32. The hypotenuse of a right triangle is 6m more than twice the shortest side. The third side is 2m less than the hypotenuse. The representation of the above situation in the form of a quadratic equation is: **1 Mark**

A $(2x + 6)_2 = x^2 - (2x + 4)^2$ **B** None of these **C** $(2x + 6)^2 + x^2 = (2x + 4)^2$ **D** $(2x + 6)^2 = x^2 + (2x + 4)^2$

Ans: D $(2x + 6)^2 = x^2 + (2x + 4)^2$

Solution:

Let the shortest side of a right angled triangle be x meters.

Then according to question, its hypotenuse will be (2x + 6) meters and,

The third side will be (2x + 6 - 2) = (2x + 4) meters.

Now, using Pythagoras theorem, $(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$

? $(2x + 6)^2 = x^2 + (2x + 4)^2$

Q33. A train travels 360km at a uniform speed. If the speed had been 5km/ hr more, it would have taken 1 hour less for the same journey, then the actual speed of the train is: **1 Mark**

A 48km/ hr **B** 40km/ hr **C** 36km/ hr **D** 45km/ hr

Ans: B 40km/ hr

Solution:

Let the actual speed of the train be x km/ hr

Time taken to cover 360km at this speed $= \frac{360}{x}$hr

Time taken to cover 360km at the increased speed $= \frac{360}{x+5}$hr

According to condition, $\frac{360}{x} - \frac{360}{x+5} = 1$

$\Rightarrow 360\left[\frac{1}{x} - \frac{1}{x+5}\right] = 1$

$\Rightarrow 360\left[\frac{x+5-x}{x(x+5)}\right] = 1$

$\Rightarrow 360\left[\frac{5}{x(x+5)}\right] = 1$

? $x^2 + 5x - 1800 = 0$

? $x^2 + 45x - 40x - 1800$

? $x(x + 45) - 40(x + 45) = 0$

? $(x - 40)(x - 45) = 0$

? $x - 40 = 0$ and $x + 45 = 0$

? x = 40km/ hr and x = -45km/ hr [But x = -45 is not possible]

∴ The actual speed of the train is 40km/ hr

Q34. 500 bananas were divided equally among a certain number of students. If there were 25 more students, each would have received one banana less. Then the number of students is: **1 Mark**

A 125 **B** 100 **C** 250 **D** 500

Ans: B 100

Solution:

Let the number of students be x

∴ Each student would get $= \frac{500}{x}$ bananas

∴ if there were 25 more students, then each student would get = $\frac{500}{x+25}$ bananas

According to questions, $\frac{500}{x} - \frac{500}{x+25} = 1$

$\Rightarrow \frac{500x+12500-500x}{x(x+25)} = 1$

$\Rightarrow \frac{500}{x^2+25x} = 1$

? $x^2 + 25x - 12500 = 0$

? $x^2 + 125x - 100x - 12500 = 0$

? $x(x + 125) - 100(x + 125) = 0$

? $(x + 125)(x - 100) = 0$

? $x + 125 = 0$ and $x - 100 = 0$

? x = -125 and x = 100 [x = -125 is not possible]

∴ The number of student is 100

Q35. Directions: In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following: **1 Mark**

Assertion: $(2x - 1)^2 - 4x^2 + 5 = 0$ is not a quadratic equation.

Reason: An equation of the form $ax^2 + bx + c = 0$, $a \neq 0$, where a, b, c ∈ R is called a quadratic equation.

A If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

B If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.

C If Assertion is correct but Reason is incorrect. **D** If Assertion is incorrect but Reason is correct.

Ans: B If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.

2. If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.

Q36.Assertion: $3y^2 + 17y - 30 = 0$ have distinct roots. **1 Mark**

Reason: The quadratic equation ax2 + bx + c = 0 have distinct roots (real roots) if D > 0.

A Assertion and Reason both are correct statements and Reason is the correct explanation of Assertion.

B Assertion and Reason both are correct statements but Reason is not the correct explanation of Assertion.

C Assertion is correct statement but Reason is wrong statement.

D Assertion is wrong statement but Reason is correct statement.

Ans: A Assertion and Reason both are correct statements and Reason is the correct explanation of Assertion.

1. Assertion and Reason both are correct statements and Reason is the correct explanation of Assertion.

Q37.Assertion : $4x^2 - 12x + 9 =$ has repeated roots. **1 Mark**

Reason : The quadratic equation $ax^2 + bx + c = 0$ have repeated roots if discriminant D>0

A If both assertion and reason are true and reason is the correct explanation of assertion.

B If both assertion and reason are true but reason is not the correct explanation of assertion.

C If assertion is true but reason is false.

D If both assertion and reason are false.

Ans: C If assertion is true but reason is false.

Solution:

Assertion $4x^2 - 12x + 9 = 0$

So $D = b^2 - 4ac$

? $D = (-12)^2 - 4(4)(9)$

? $D = 144 - 144 = 0$

Roots are repeated.

Q38.Assertion : Sum and product of roots of $2x^2 - 3x + 5 = 0$ are $\frac{3}{2}$ and $\frac{5}{2}$ respectively. **1 Mark**

Reason : If a and b are the roots of ax2 + bx + c = 0, a ≠ q0, then sum of roots = $\alpha + \beta = -\frac{b}{a}$ and product of roots = $\alpha\beta = \frac{c}{a}$.

A If both assertion and reason are true and reason is the correct explanation of assertion.

B If both assertion and reason are true but reason is not the correct explanation of assertion.

C If assertion is true but reason is false.

D If both assertion and reason are false.

Ans: A If both assertion and reason are true and reason is the correct explanation of assertion.

Solution:

Assertion $2x^2 - 3x + 5 = 0$ So, a+ß

$= -\frac{b}{a} = -\frac{-3}{2} = \frac{3}{2}$ and

$= a\text{ß} = \frac{c}{a} = \frac{5}{2}$

Q39.Assertion : The value of kk for which the equation $kx^2 - 12x + 4 = 0$ has equal roots, is 9. **1 Mark**

Reason : The equation $ax^2 + bx + c = 0$,(a ≠ q0) has equal roots, if b2 - 4ac > 0.

A If both assertion and reason are true and reason is the correct explanation of assertion.

B If both assertion and reason are true but reason is not the correct explanation of assertion.

C If assertion is true but reason is false.

D If both assertion and reason are false.

Ans: C If assertion is true but reason is false.

Solution:

Clearly, Reason is wrong.

Now, the given equation is $kx^2 - 12x + 4 = 0$

If the roots are equal, then $(-12)^2 - 4(k)(4) = 0$

$\Rightarrow 144 - 16k = 0$

$\Rightarrow k = \frac{144}{16} = 9$

Assertion is correct.

Q40.Assertion: The value of k for which the equation $kx^2 - 12x + 4 = 0$ has equal roots, is 9. **1 Mark**

Reason: The equation ax2 + bx + c = 0, (0 ≠ a) has equal roots, if $(b^2 - 4ac) > 0$.

A Assertion and Reason both are correct statements and Reason is the correct explanation of Assertion.

B Assertion and Reason both are correct statements but Reason is not the correct explanation of Assertion.

C Assertion is correct statement but Reason is wrong statement.

D Assertion is wrong statement but Reason is correct statement.

Ans: C Assertion is correct statement but Reason is wrong statement.

3. Assertion is correct statement but Reason is wrong statement.

Q41. Assertion: The equation $9x^2 + 3kx + 4 = 0$ has equal roots for $k = \pm 4$. **1 Mark**

Reason: If discriminant 'D' of a quadratic equation is equal to zero then the roots of equation are real and equal.

A Both assertion (A) and reason (R) are true and reason (R) isthe correct explanation of assertion (A).

B Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

C Assertion (A) is true but reason (R) is false. **D** Assertion (A) is false but reason (R) is true

Ans: A Both assertion (A) and reason (R) are true and reason (R) isthe correct explanation of assertion (A).

Solution:

Assertion $9x^2 + 3kx + 4 = 0$

D = b2 - 4ac

= (3k)2 - 4(9) (4)

= 9k - 144

For equal roots D = 0

$= 9k^2 = 144$

$= k = \pm\frac{12}{3}$

$= k = \pm 4$

Q42. Assertion : The roots of the quadratic equation $x^2 + 2x + 2 = 0$ are imaginary. **1 Mark**

Reason : If discriminant $D = b^2 - 4ac < 0$ then the roots of quadratic equation $ax^2 + bx + c = 0$ are imaginary.

A Both assertion (A) and reason (R) are true and reason (R) isthe correct explanation of assertion (A).

B Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

C Assertion (A) is true but reason (R) is false. **D** Assertion (A) is false but reason (R) is true

Ans: A Both assertion (A) and reason (R) are true and reason (R) isthe correct explanation of assertion (A).

Solution:

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

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

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

$= 4 - 8 = - < 04$

Q43. Assertion : $2x^2 - 4x + 3 = 0$ is a quadratic equation. **1 Mark**

Reason : All polynomials of degree n, when n is a whole number can be treated as quadratic equation.

A If both assertion and reason are true and reason is the correct explanation of assertion.

B If both assertion and reason are true but reason is not the correct explanation of assertion.

C If assertion is true but reason is false. **D** If both assertion and reason are false.

Ans: C If assertion is true but reason is false.

3. If assertion is true but reason is false.

Q44. The two roots of the quadratic equation $2x^2 + 7x - 15 = 0$ **1 Mark**

A are both positive **B** are both negative **C** are of opposite signs. **D** none of these.

Ans: (C) are of opposite signs.

For a quadratic equation $ax^2 + bx + c = 0$,

If $ac > 0$, then both the zeroes are of same sign ; (If $b > 0$, then both are negative and if $b < 0$, then both are positive)

If $ac < 0$, then the two zeroes are of opposite sign.

Here, $ac = -30 < 0$, so the zeroes will be of opposite signs.

Q45. The zeroes of the quadratic equation $4x^2 - 7x + 3 = 0$ **1 Mark**

A are both negative **B** are both positive **C** are of opposite signs **D** none of these

Ans: (B) are both psitive

For a quadratic equation $ax^2 + bx + c = 0$,
If $ac > 0$, then both the zeroes are of same sign ; (If $b > 0$, then both are negative and if $b < 0$, then both are positive)
If $ac < 0$, then the two zeroes are of opposite sign.

Here, $ac = 12 > 0$, And $b = -7 < 0$, so the zeroes will be of positive signs.