CBSE MCQs Class 10 Maths Chapter 4: Quadratic Equations

1. The roots of quadratic equation $5x^2 - 4x + 5 = 0$ are

(A) Real & Equal

(B) Real & Unequal

(C) Not real

(D) Non-real and equal

Answer: (C)

Explanation: To find the nature, let us calculate $b^2 - 4ac$

 $b^{2} - 4ac$ $= 4^{2} - 4 \times 5 \times 5$ = 16 - 100= -84 < 0

2. Equation $(x+1)^2 - x^2 = 0$ has _____ real root(s).

(A) 1

(B) 2

(C) 3

(D) 4

Answer: (A)

Explanation:

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

This gives only 1 real value of x.

3. Which constant should be added and subtracted to solve the quadratic equation $4x^2 - \sqrt{3x} + 5 = 0$ by the method of completing the square?

(A) 9/16

(B) 3/16

(C) 3/4

(D) $\sqrt{3}/4$

Answer: (B)

Explanation:

This can be written as

$$4x^{2} - \sqrt{3}x - 5 = 0$$

$$(2x)^{2} - 2 \cdot (2x) \cdot \frac{\sqrt{3}}{4} - 5 + \left(\frac{\sqrt{3}}{4}\right)^{2} - \left(\frac{\sqrt{3}}{4}\right)^{2} = 0$$

$$(2x)^{2} - 2 \cdot (2x) \cdot \frac{\sqrt{3}}{4} + \left(\frac{\sqrt{3}}{4}\right)^{2} - 5 - \frac{3}{16} = 0$$

$$\left(2x - \frac{\sqrt{3}}{4}\right)^{2} = 5 + \frac{3}{16}$$

$$\left(2x - \frac{\sqrt{3}}{4}\right)^{2} = \frac{83}{16}$$

Hence the given equation can be solved by adding and subtracting 3/16.

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

(A) 2

(B) – 2

(C) 3

(D) –3

Answer: (A)

Explanation:

As one root of the equation $x^2 + kx - \frac{5}{4} = 0$ is $\frac{1}{2}$ $\Rightarrow \left(\frac{1}{2}\right)^2 + k\left(\frac{1}{2}\right) - \frac{5}{4} = 0$ $\Rightarrow \frac{1}{4} + \frac{k}{2} - \frac{5}{4} = 0$ $\Rightarrow 1 + 2k - 5 = 0$ $\Rightarrow 2k = 4$ $\Rightarrow k = 2$

5. A natural number, when increased by 12, equals 160 times its reciprocal. Find the number.

(A) 3

(B) 8

(C) 4

(D) 7

Answer: (B)

Explanation:

Let the number be x

Then according question,

$$x + 12 = \frac{160}{x}$$

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$$x^{2} + 12x - 160 = 0$$

$$x^{2} + 20x - 8x - 160 = 0$$

$$(x + 20)(x - 8) = 0$$

$$x = -20,8$$
Since the number is natural, so we are

Since the number is natural, so we consider only positive value.

6. The product of two successive integral multiples of 5 is 300. Then the numbers are:

(A) 25, 30

(B) 10, 15

- (C) 30, 35
- (D) 15, 20

Answer: (D)

Explanation:

Let the consecutive integral multiple be 5n and 5(n + 1) where n is a positive integer.

According to the question:

$$5n \times 5(n + 1) = 300$$
$$\Rightarrow n^{2} + n - 12 = 0$$
$$\Rightarrow (n - 3) (n + 4) = 0$$
$$\Rightarrow n = 3 \text{ and } n = -4.$$

As n is a positive natural number so n = -4 will be discarded.

Therefore the numbers are 15 and 20.

Then

$$\sqrt{6 + \sqrt{6 + \sqrt{6 + \sqrt{6 \dots 2}}}} = y$$

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

$$6 + y = y^{2}$$

$$\Rightarrow y^{2} - y - 6 = 0$$

$$\Rightarrow y^{2} - (3 - 2)y - 6 = 0$$

$$\Rightarrow y^{2} - 3y + 2y - 6 = 0$$

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

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

$$\Rightarrow y = 3, -2$$

Since y cannot be negative as negative square root is not real so y = 3.

8. If $p^2x^2 - q^2 = 0$, then x = ?(A) $\pm q/p$ (B) $\pm p/q$ (C) p (D) q

Answer: (A)

Explanation: $p^{2}x^{2} - q^{2} = 0$ $\Rightarrow p^{2}x^{2} = q^{2}$ $\Rightarrow x = \pm \frac{q}{p}$

- 9. The positive root of $\sqrt{3x^2+6} = 9$ is:
- (A) 3
- (B) 5
- (C) 4 (D) 7

Answer: (B)

Explanation:

 $\sqrt{3x^2 + 6} = 9$ $\Rightarrow 3x^2 + 6 = 81$ $\Rightarrow 3x^2 = 75$ $\Rightarrow x^2 = 25$ $\Rightarrow x = \pm 5$

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

- (A) ad \neq bc
- (B) ad < bc
- (C) ad > bc
- (D) all of these

Answer: (D)

Explanation:

If equation has no real roots then discriminant of the equation must be less than zero.

$$\Rightarrow 2^{2} (ac+bd)^{2} - 4 (a^{2}+b^{2})(c^{2}+d^{2}) < 0$$

$$\Rightarrow 4a^{2}c^{2} + 4b^{2}d^{2} + 8acbd < 4a^{2}c^{2} + 4b^{2}d^{2} + 4a^{2}d^{2} + 4b^{2}c^{2}$$

$$\Rightarrow 2acbd < a^{2}d^{2} + b^{2}c^{2}$$

$$\Rightarrow 2acbd < (ad-bc)^{2} + 2acbd$$

$$\Rightarrow (ad-bc)^{2} > 0$$

$$\Rightarrow ad \neq bc and ad < bc or ad > bc$$

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11. If the one root of the equation $4x^2 - 2x + p - 4 = 0$ be the reciprocal of other. Then p =

(A) 8

(B) - 8

(C) - 4

(D) 4

Answer: A

Explanation:

If one root is reciprocal of other, then product of roots is:

$$\alpha \times \frac{1}{\alpha} = \frac{p-4}{4}$$
$$4 = p-4$$
$$p = 8$$

12. Rohini had scored 10 more marks in her mathematics test out of 30 marks, 9 times these marks would have been the square of her actual marks. How many marks did she get in the test?

(A) 14 (B) 16 (C) 15 (D) 18 Answer: (C)

Explanation:

Let her actual marks be x

Therefore,

$$9 (x +10) = x^{2}$$

$$\Rightarrow x^{2} -9x -90 = 0$$

$$\Rightarrow x^{2} -15x + 6x -90 = 0$$

$$\Rightarrow x(x - 15) + 6(x -15) = 0$$

$$\Rightarrow (x + 6) (x -15) = 0$$

Therefore x = -6 or x = 15

Since x is the marks obtained, $x \neq -6$. Therefore, x = 15.

13. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/h more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed?

(A) 42 km/hr

(B) 44 km/hr

(C) 46 km/hr

(D) 48 km/hr

Answer: (A)

Explanation:

Let the original speed be x,

Then according to question

$$\frac{63}{x} + \frac{72}{x+6} = 3$$

$$\Rightarrow \frac{21}{x} + \frac{24}{x+6} = 1$$

$$\Rightarrow \frac{21(x+6) + 24x}{x(x+6)} = 1$$

$$\Rightarrow 21x + 126 + 24x = x^{2} + 6x$$

$$\Rightarrow x^{2} - 39x - 126 = 0$$

$$\Rightarrow x^{2} - (42 - 3)x - 126 = 0$$

$$\Rightarrow x^{2} - 42x + 3x - 126 = 0$$

$$\Rightarrow x(x-42) + 3(x-42) = 0$$

$$\Rightarrow (x+3)(x-42) = 0$$

This gives x = -3 and x = 42

Since speed cannot be negative, so we ignore -3,

Therefore original average speed is 42 km/hr.

14. Satvik observed that in a clock, the time needed by the minute hand of a clock to show 3 PM was found to be 3 min less than $\frac{t^2}{4}$ minutes at t minutes past 2 PM. Then t is equal to

(a) 14

(b) 15

(c) 16

(d) None of these

Answer: (A)

Explanation: We know that the time between 2 PM to 3 PM = 1 hr = 60 min

Given that at t minutes past 2 PM, the time needed by the minute's hand of a clock to show 3 PM was found to be 3 minutes less than $t^2/4$ minutes

Therefore,

$$t + \left(\frac{t^2}{4} - 3\right) = 60$$

$$4t + t^2 - 12 = 240$$

$$t^2 + 4t - 252 = 0$$

$$t^2 + 18t - 14t - 252 = 0$$

$$(t + 18)(t - 14) = 0$$

$$t = 14 \min$$

15. A takes 6 days less than B to finish a piece of work. If both A and B together can finish the work in 4 days, find the time taken by B to finish the work.

(A) 12 days

(B) 12 1/2 Days

(C) 13 days

(D) 15days

Answer: (A)

Explanation: Let B alone finish the work in x days.

Therefore, A alone can finish the work in (x - 6) days

A's one day work
$$=$$
 $\frac{1}{x-6}$
B's one day work $=$ $\frac{1}{x}$

Given that (A + B) can finish the work in 4 days.

Therefore, A's one day work + B's one day work = (A+B)'s one day work

$$\frac{1}{x-6} + \frac{1}{x} = \frac{1}{4}$$

$$\Rightarrow \frac{x+x-6}{x(x-6)} = \frac{1}{4}$$

$$\Rightarrow 4(2x-6) = x(x-6)$$

$$\Rightarrow 8x-24 = x^2 - 6x$$

$$\Rightarrow x^2 - 14x + 24 = 0$$

$$\Rightarrow x^2 - 12x - 2x + 24 = 0$$

$$\Rightarrow x(x-12) - 2(x-12) = 0$$

$$\Rightarrow (x-2)(x-12) = 0$$

$$\Rightarrow \text{Either } x = 2 \text{ or } x = 12$$

As, $x \neq 2$, because if x = 2, then A alone can finish work in (2 - 6) = -4 days which is not possible.

Therefore we consider x = 12.

This implies B alone can finish work in 12 days and A alone will finish the work in 12 - 6 = 6 days.