CBSE 10th Mathematics Question Paper 2023 with Solutions - Set 2

Section A:

1: In what ratio, does the x-axis divide the line segment joining the points A(3, 6) and B(-12, -3)?

(A) 1:2

(B) 1:4

(C) 4:1

(D) 2:1

Solution: (D)

Given points are A(3, 6) and B(-12, -3). Let P(x, 0) be the point on the x axis. Using the section formula, we have P(x, y) = $((m_1x_2 + m_2x_1)/(m_1+m_2), (m_1y_2 + m_2y_1)/(m_1+m_2))$ (x, y) = (x, 0) Equate y component to zero => $m_1(-3) + m_26)/(m_1+m_2) = 0$ $3m_1 = 6m_2$ => $m_1/m_2 = 6/3$ = 2/1 The required ratio is 2:1. Hence option D is the answer.

2: In the given figure, PQ is a tangent to the circle centred at O. If $\angle AOB = 95^{\circ}$, then the measure of $\angle ABQ$ will be



(B) 42.5°

(C) 85°

(D) 95°





We know the tangent at any point of a circle is perpendicular to the radius through the point of contact.

 $\angle OBQ = 90^{\circ}$ OA = OB (Radius of circle) So $\angle OAB = \angle OBA$ 95 + 2x = 180 (Sum of angles of a triangle is 180) 2x = 85 => x = 42.5 $\angle ABQ = 90 - 42.5$ = 47.5 Hence option A is the answer.

3. If 2 tan A = 3, then the value of $(4 \sin A + 3 \cos A)/(4 \sin A - 3 \cos A)$ is

(A) 7/√13
(B) 1/√13
(C) 3
(D) does not exist

Solution:

Given 2 tan A = 3 tan A = 3/2sin A = $3/\sqrt{13}$ cos A = $2/\sqrt{13}$ So (4 sin A + 3 cos A)/(4 sin A - 3 cos A) = 3 Hence option C is the answer.

Question 4. In a group of 20 people, 5 can't swim. If one person is selected at random, then the probability that he/she can swim, is

- (A) 3/4
- (B) 1/3
- (C) 1
- (D) 1/4

Solution:

Total number of people = 20No. of people who can swim = 15Required probability = 15/20 = 3/4Hence option A is the answer.

Marks	Less than					
	10	20	30	40	50	60
No. of students	3	12	27	57	75	80

The modal class of this distribution is

(A) 10-20

(B) 20-30



(C) 30-40 (D) 50-60

Solution:

In a frequency distribution, the class that consists of the highest frequency is known as the modal class.

Marks	Frequency
0-10	3
10-20	12-3 = 9
20-30	27-12 = 15
30-40	57-27 = 30
40-50	75-57 = 18
50-60	80-75 = 5

Modal class is 30-40.

Hence option C is the answer.

Question 6. The curved surface area of a cone having height 24 cm and radius 7 cm,

is

- (A) 528 cm²
- (B) 1056 cm²
- (C) 550 cm²
- (D) 500 cm²

Solution:

Given that height of cone = 24 cm Radius = 7 cm Slant height, I = $\sqrt{(h^2+r^2)}$ = $\sqrt{625}$ = 25 CSA = πrI = (22/7)×7×25 = 550 cm² Hence option C is the answer.

Question 7. The end-points of a diameter of a circle are (2, 4) and (-3, -1). The radius of the circle is

(A) 2√5 (B) (5/2)√5 (C) (5/2)√2 (D) 5√2

Solution:

The length of the diameter can be found by using the distance formula.



Distance between (2, 4) and (-3, -1) = $\sqrt{((-3-2)^2 + (-1-4)^2)}$ = $\sqrt{50}$ = $5\sqrt{2}$ Radius = diameter/2 = $(5/2)\sqrt{2}$ Hence option C is the answer.

Question 8. Which of the following is a quadratic polynomial with zeros (5/3) and 0?

(A) 3x(3x-5) (B) 3x(x-5) (C) x²-5/3 (D) 5x²/3

Solution:

Sum of zeros, S = 5/3 Product of zeros, P = 0 Quadratic polynomial is given by $x^2 - Sx + P$ Check the given options 3x(3x-5) = 0 $=> 9x^2 - 15x = 0$ Solving using quadratic formula, we get zeros are 5/3 and 0. Hence option A is the answer.

Question 9. The graph of y = p(x) is given, for a polynomial p(x). The number of zeroes of p(x) from the graph is



(A) 3

- (B) 1
- (C) 2
- (D) 0

Solution:

Look at the graph and find how many points the graph cuts or touches the x-axis. Here it is only at 1 point.

Hence option B is the answer.



Question 10. The value of k for which the pair of equations kx = y + 2 and 6x = 2y + 3 has infinitely many solutions,

(A) k = 3
(B) does not exist
(C) k = -3
(D) k = 4

Solution:

Given that kx = y + 2 6x = 2y + 3Rearranging above equations kx - y = 2 6x - 2y = 3Condition for infinite solutions is $a_1/a_2 = b_1/b_2 = c_1/c_2$ $k/6 = 1/2 = \frac{2}{3}$ No value of k satisfies the equation. => does not exist. Hence option B is the answer.

11. If a, b, c form an A.P. with common difference d, then the value of a -2b-c is equal to

(A) 2a+4d(B) 0 (C) -2a-4d(D) -2a-3d **Solution:** Given a, b, c are in AP b = a+d c = a+2d a -2b-c = a -2(a+d) - a - 2d= a - 2a - 2d - a - 2d= -2a - 4dHence option C is the answer.

12. If the value of each observation of a statistical data is increased by 3, then the mean of the data

(A) remains unchanged(B) increases by 3(C) increases by 6(D) increases by 3n

Solution:

If each observation of the data is increased by 3, then their mean is increased by 3. Hence option B is the answer.

13. Probability of happening of an event is denoted by p and probability or non-happening of the event is denoted by q. Relation between p and q is (A) p+q = 1



(B) p=1, q=1 (C) p = q-1 (D) p+q+1 = 0

Solution: We know that P(Event A will occur) + P(Event A will not occur) = 1 So p+q = 1 Hence option A is the answer.

14. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought ?

(A) 40

(B) 240

(C) 480

(D) 750

Solution:

Given, total number of tickets sold = 6000Probability of her winning = 0.08Total number of tickets she bought = 6000×0.08 = 480Hence option C is the answer.

15. If α , β are the zeroes of a polynomial $p(x) = x^2 + x - 1$, $(1/\alpha) + (1/\beta)$ equals is

(A) 1 (B) 2 (C) -1

(D) -1/2

Solution:

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Given x^2+x-1 = 0

Here a = 1, b = 1, c = -1

Sum of roots = \alpha + \beta

= -b/a

= -1

Product of roots = \alpha\beta

= c/a

= -1

(1/\alpha) + (1/\beta) = \alpha + \beta)/\alpha\beta

= -1/-1

= 1

Hence option A is the answer.
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16. The least positive value of k, for which the quadratic equation $x^2 + kx-4 = 0$ has rational roots, is

A) ±2√2 (B) 2 (C) ±2



(D) √2

Solution:

If D > 0 and a perfect square, then the roots of the quadratic equation are real, unequal and rational.

The least positive value of k is 2.

Hence option B is the answer.

17. [(5/8)sec²60 - tan²60 + cos²45] is equal to

(A) -5/3 (B) -1/2 (C) 0 (D) -1/4

Solution:

We know $\sec^2 60 = 4$ $\tan^2 60 = 3$ $\cos^2 45 = 1/2$ Substituting the values in [(5/8) $\sec^2 60 - \tan^2 60 + \cos^2 45$] We get 0 Hence option C is the answer.

18. Curved surface area of a cylinder of height 5 cm is 94.2 cm². Radius of the cylinder

is (A) 2 cm (B) 3 cm (C) 2.9 cm (D) 6 cm

Solution:

Given height of cylinder = 5 cm Curved surface area = 94.2 cm² CSA = 2π rh 94.2 = $2\times3.14\times$ r×5 Solving we get, r = 3 Hence option B is the answer.

Assertion-Reason Type Questions

In Question 19 and 20, an Assertion (A) statement is followed by a statement of Reason (R). Select the correct option out of the following:

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the 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.

19. Assertion (A) :The perimeter of triangle ABC is a rational number.







Solution:

The hypotenuse of the triangle ABC = $\sqrt{(4+9)}$ = $\sqrt{13}$ (irrational) Assertion is false Hence option D is the answer.

20. Assertion (A) : Point P(0, 2) is the point of intersection of y-axis with the line 3x + 2y = 4.

Reason (R) : The distance of point P(0, 2) from x-axis is 2 units.

Solution:

Put (0, 2) in 3x+2y = 4 We get LHS = RHS Assertion is true. Reason is also true. But it is not the correct explanation of Assertion (A). Hence option B is the answer.

Section B

21. Find the least number which when divided by 12, 16 and 24 leaves the remainder 7 in each case.

Solution:

The least number which is divisible by 12, 16, and 24 is the LCM of 12, 16, and 24. LCM of 12, 16 and 24 = 48 So the least number which when divided by 12, 16 and 24 leaves the remainder 7 in each case = 48+7= 55

22. A bag contains 4 red, 3 blue and 2 yellow balls. One ball is drawn at random from the bag. Find the probability that drawn ball is

(i) red

(ii) yellow

Solution:

No. of red balls = 4 No. of blue balls = 3 No. of yellow balls = 2



Total number balls = 4+3+2 = 9 Probability of getting red ball = 4/9 Probability of getting yellow ball = 2/9

23 (a). Solve the pair of equations x = 5 and y = 7 graphically. Solution:

Below is the graph of x = 5 and y = 7The lines intersect at (5, 7)



23. (b) Using graphical method, find whether pair of equations x = 0 and y = -3, is consistent or not.

Solution:





Unique solution exists. Hence the equations are consistent.

24 (a). If sin x + cos x = $\sqrt{3}$, then find the value of sin x cos x.

Solution:

Given sin x + cos x = $\sqrt{3}$ Squaring both sides 1+ 2 sin x cos x = 3 2 sin x cos x = 2 So sin x cos x = 1

24 (b) If sin A = $1/\sqrt{2}$ and cot B = $\sqrt{3}$, then find the value of cosec A + cosec B.



Solution:

Given sin A = $1/\sqrt{2}$ and cot B = $\sqrt{3}$ We get A = 45 and B = 30 So cosec A + cosec B = $\sqrt{2}$ + 2

25. In the given figure, XZ is parallel to BC. AZ = 3 cm, ZC = 2 cm, BM = 3 cm and MC = 5 cm. Find the length of XY.



Solution:

Given that AZ = 3 cm, ZC = 2 cm, BM = 3 cm and MC = 5 cm. Here triangle AXZ and triangle ABC are similar. AZ/AC = XZ/BC = AX/AB 3/5 = XZ/8 XZ = 4.8 Solving XY = 1.8

