CBSE 2024 Maths Standard — Set 1

English Medium

Time Allowed: 3 Hours | Maximum Marks: 80

General Instructions:

1. This question paper contains 38 questions. All questions are compulsory.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 6 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case-study based questions carrying 4 marks each.
7. Draw neat figures wherever required.

Section A

Multiple Choice Questions (1 mark each)

Q.1 [1 mark]

If the sum of zeroes of the polynomial p(x) = 2x^2 - k*sqrt(2)*x + 1 is sqrt(2), then the value of k is:

(a) sqrt(2)
(b) 2
(c) 2*sqrt(2)
(d) 1/2

Q.2 [1 mark]

If the probability of a player winning a game is 0.79, then the probability of his losing the same game is:

(a) 1.79
(b) 0.31
(c) 0.21%
(d) 0.21

Q.3 [1 mark]

If the roots of equation ax^2 + bx + c = 0, a != 0 are real and equal, then which of the following relation is true?

(a) a = b^2/c
(b) b^2 = ac
(c) ac = b^2/4
(d) c = b/a

Q.4 [1 mark]

In an A.P., if the first term a = 7, nth term a_n = 84 and the sum of first n terms S_n = 2093/2, then n is equal to:

(a) 22

(b) 24
(c) 23
(d) 26

Q.5 [1 mark]

If two positive integers p and q can be expressed as p = 18a^2*b^4 and q = 20a^3*b^2, where a and b are prime numbers, then LCM(p, q) is:

(a) 2a^2*b^2
(b) 180a^2*b^2
(c) 12a^2*b^2
(d) 180a^3*b^4

Q.6 [1 mark]

AD is a median of triangle ABC with vertices A(5, -6), B(6, 4) and C(0, 0). Length AD is equal to:

(a) sqrt(68) units
(b) 2*sqrt(15) units
(c) sqrt(101) units
(d) 10 units

Q.7 [1 mark]

If sec(theta) - tan(theta) = m, then the value of sec(theta) + tan(theta) is:

(a) 1 - 1/m
(b) m^2 - 1
(c) 1/m
(d) -m

Q.8 [1 mark]

From the data 1, 4, 7, 9, 16, 21, 25, if all the even numbers are removed, then the probability of getting a prime number from the remaining is:

(a) 2/5

(b) 1/5
(c) 1/7
(d) 2/7

Q.9 [1 mark]

For some data x_1, x_2, ..., x_n with respective frequencies f_1, f_2, ..., f_n, the value of sum(f_i * (x_i - x_bar)) is equal to:

(a) n * x_bar
(b) 1
(c) sum(f_i)
(d) 0

Q.10 [1 mark]

If the zeroes of a polynomial x^2 + px + q are twice the zeroes of the polynomial 4x^2 - 5x - 6, the value of p is:

(a) -5/2
(b) 5/2
(c) -5
(d) 10

Q.11 [1 mark]

If the distance between the points (3, -5) and (x, -5) is 15 units, then the values of x are:

(a) 12, -18
(b) -12, 18
(c) 18, 5
(d) -9, -12

Q.12 [1 mark]

If cos(alpha + beta) = 0, then the value of cos((alpha + beta)/2) is equal to:

(a) 1/sqrt(2)

(b) 1/2
(c) 0
(d) sqrt(2)

Q.13 [1 mark]

A solid sphere is cut into two hemispheres. The ratio of the surface areas of sphere to that of two hemispheres taken together is:

(a) 1 : 1
(b) 1 : 4
(c) 2 : 3
(d) 3 : 2

Q.14 [1 mark]

The middle most observation of every data arranged in order is called:

(a) mode
(b) median
(c) mean
(d) deviation

Q.15 [1 mark]

The volume of the largest right circular cone that can be carved out from a solid cube of edge 2 cm is:

(a) 4*pi/3 cu cm
(b) 5*pi/3 cu cm
(c) 8*pi/3 cu cm
(d) 2*pi/3 cu cm

Q.16 [1 mark]

Two dice are rolled together. The probability of getting sum of numbers on the two dice as 2, 3 or 5 is:

(a) 7/36

(b) 11/36
(c) 5/36
(d) 4/9

Q.17 [1 mark]

The centre of a circle is at (2, 0). If one end of a diameter is at (6, 0), then the other end is at:

(a) (0, 0)
(b) (4, 0)
(c) (-2, 0)
(d) (-6, 0)

Q.18 [1 mark]

In the given figure, graphs of two linear equations are shown. The pair of these linear equations is:

(a) consistent with unique solution
(b) consistent with infinitely many solutions
(c) inconsistent
(d) inconsistent but can be made consistent by extending these lines

Q.19 [1 mark]

Assertion (A): The tangents drawn at the end points of a diameter of a circle, are parallel. Reason (R): Diameter of a circle is the longest chord.

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

Q.20 [1 mark]

Assertion (A): If the graph of a polynomial touches x-axis at only one point, then the polynomial cannot be a quadratic polynomial. Reason (R): A

polynomial of degree n (n > 1) can have at most n zeroes.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

Section B

Very Short Answer Questions (2 marks each)

Q.21 [2 marks]

Solve the following system of linear equations: 7x - 2y = 5 and 8x + 7y = 15. Verify your answer.

Q.22 [2 marks]

In a pack of 52 playing cards one card is lost. From the remaining cards, a card is drawn at random. Find the probability that the drawn card is queen of heart, if the lost card is a black card.

Q.23 [2 marks]

Evaluate: 2*sqrt(2)*cos(45)*sin(30) + 2*sqrt(3)*cos(30)

OR

Q.23 [2 marks]

If A = 60 degrees and B = 30 degrees, verify that sin(A + B) = sin(A)*cos(B) + cos(A)*sin(B).

Q.25 [2 marks]

Prove that 5 - 2*sqrt(3) is an irrational number. It is given that sqrt(3) is an irrational number.

OR

Q.25 [2 marks]

Show that the number 5 * 11 * 17 + 3 * 11 is a composite number.

Q.26 [2 marks]

Find the ratio in which the point (8/5, y) divides the line segment joining the points (1, 2) and (2, 3). Also, find the value of y.

OR

Q.26 [2 marks]

ABCD is a rectangle formed by the points A(-1, -1), B(-1, 6), C(3, 6) and D(3, -1). P, Q, R and S are mid-points of sides AB, BC, CD and DA respectively. Show that diagonals of the quadrilateral PQRS bisect each other.

Section C

Short Answer Questions (3 marks each)

Q.27 [3 marks]

In a teachers' workshop, the number of teachers teaching French, Hindi and English are 48, 80 and 144 respectively. Find the minimum number of rooms required if in each room the same number of teachers are seated and all of them are of the same subject.

Q.29 [3 marks]

Three years ago, Rashmi was thrice as old as Nazma. Ten years later, Rashmi will be twice as old as Nazma. How old are Rashmi and Nazma now?

OR

Q.30 [3 marks]

A circle with centre O and radius 8 cm is inscribed in a quadrilateral ABCD in which P, Q, R, S are the points of contact. If AD is perpendicular to DC, BC

= 30 cm and BS = 24 cm, then find the length DC.

Q.31 [3 marks]

The difference between the outer and inner radii of a hollow right circular cylinder of length 14 cm is 1 cm. If the volume of the metal used in making the cylinder is 176 cm^3, find the outer and inner radii of the cylinder.

Q.32 [3 marks]

An arc of a circle of radius 21 cm subtends an angle of 60 degrees at the centre. Find: (i) the length of the arc, (ii) the area of the minor segment of the circle made by the corresponding chord.

Section D

Long Answer Questions (5 marks each)

Q.33 [5 marks]

The sum of first and eighth terms of an A.P. is 32 and their product is 60. Find the first term and common difference of the A.P. Hence, also find the sum of its first 20 terms.

OR

Q.33 [5 marks]

In an A.P. of 40 terms, the sum of first 9 terms is 153 and the sum of last 6 terms is 687. Determine the first term and common difference of A.P. Also, find the sum of all the terms of the A.P.

OR

Q.34 [5 marks]

In the given figure PA, QB and RC are each perpendicular to AC. If AP = x, BQ = y and CR = z, then prove that 1/x + 1/z = 1/y.

Q.35 [5 marks]

A pole 6 m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point P on the ground is 60 degrees and the angle of depression of the point P from the top of the tower is 45 degrees. Find the height of the tower and the distance of point P from the foot of the tower. (Use sqrt(3) = 1.73)

Q.36(a) [5 marks]

A rectangular floor area can be completely tiled with 200 square tiles. If the side length of each tile is increased by 1 unit, it would take only 128 tiles to cover the floor. Assuming the original length of each side of a tile be x units, make a quadratic equation from the above information.

Q.36(b) [5 marks]

A rectangular floor can be tiled with 200 square tiles of side x units or 128 tiles of side (x+1) units. Write the corresponding quadratic equation in standard form.

Q.36(c) [5 marks]

Find the value of x, the length of side of a tile, by factorisation of $9x^2 - 32x - 16 = 0$.

OR

Q.36(c) [5 marks]

Solve the quadratic equation $9x^2 - 32x - 16 = 0$ for x using quadratic formula.

Q.37(a) [4 marks]

BINGO is a game of chance. The host has 75 balls numbered 1 through 75. A table shows numbers announced and frequency before Tara said BINGO (48 balls used): 0-15: 8, 15-30: 9, 30-45: 10, 45-60: 12, 60-75: 9. Write the

median class.

Q.37(b) [4 marks]

In a BINGO game, 48 balls were used. The frequency distribution is: 0-15: 8, 15-30: 9, 30-45: 10, 45-60: 12, 60-75: 9. When the first ball was picked up, what was the probability of calling out an even number?

Q.37(c) [4 marks]

Find the median of the given data: 0-15: 8, 15-30: 9, 30-45: 10, 45-60: 12, 60-75: 9.

OR

Q.37(c) [4 marks]

Find the mode of the given data: 0-15: 8, 15-30: 9, 30-45: 10, 45-60: 12, 60-75: 9.

Q.38(a) [4 marks]

A backyard is in the shape of a triangle ABC with right angle at B. AB = 7 m and BC = 15 m. A circular pit was dug inside it such that it touches the walls AC, BC and AB at P, Q and R respectively such that AP = x m. Find the length of AR in terms of x.

Q.38(b) [4 marks]

A backyard is in the shape of a triangle ABC with right angle at B. AB = 7 m and BC = 15 m. A circular pit touches AB at R, BC at Q and AC at P with AP = x m. Write the type of quadrilateral BQOR where O is the centre of the circle.

Q.38(c) [4 marks]

A backyard triangle ABC has right angle at B, AB = 7 m, BC = 15 m. A circle inscribed touches AC at P, BC at Q, AB at R. AP = x. Find the length PC in

terms of x and hence find the value of x.

OR

Q.38(c) [4 marks]

A backyard triangle ABC has right angle at B, AB = 7 m, BC = 15 m. A circle inscribed touches AC at P, BC at Q, AB at R with AP = x. Find x and hence find the radius r of the circle.