CBSE EXAMINATION PAPER-2024

MATHEMATICS

(Solved)

Time allowed : 3 hours | Maximum Marks : 88

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **44 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 20** are multiple choice questions Each question carries **1 marks.**

iv. **Section B** – questions number **21 to 27** are very short answer Each question carries **2 marks.**

v. **Section C** – questions number **28 to 35** are short answer Each question carries **3 marks.**

vi. **Section D** – questions number **36 to 38** are case based questions

vii. **Section E** – questions number **39 to 44** are long answer Each question carries **5 marks.**

viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

Section A

Question 1.

The value of k for which the system of equations $3x - y + 8 = 0$ and $6x - ky + 16 = 0$ has infinitely many solutions, is

[1 Marks]

(A) 2

(B) -1/2

(C) 1/2

(D) -2

Question 2.

Point P divides the line segment joining points A(4, –5) and B(1, 2) in the ratio 5:2. Coordinates of point P are

[1 Marks]

(A) (5/2,-3/2)

(B) (13/7, 0)

(C) (0,13/7)

(D) (11/7,0)

Question 3.

The common difference of an A.P. in which $a_{15} - a_{11} = 48$, is

[1 Marks]

(A) -12

(B) 12

(C) -16

(D) 16

Question 4.

The quadratic equation $x^2 + x + 1 = 0$ has _____ roots.

[1 Marks]

(A) real and distinct

(B) irrational

(C) not-real

(D) real and equal

Question 5.

If HCF(2520, 6600) = 40 and LCM(2520, 6600) = 252 × k, then the value of k is

[1 Marks]

(A) 1600

(B) 1650

(C) 165

(D) 1625

Question 6.

In the given figure, ΔABC is shown. DE is parallel to BC. If AD = 5 cm, DB = 2.5 cm and BC = 12 cm, then DE is equal to

[1 Marks]

(A) 10 cm

(B) 7.5 cm

(C) 6 cm

(D) 8 cm

Question 7.

If $\sin\theta = \cos\theta$, $(0^\circ < \theta < 90^\circ)$, then value of $(\sec\theta \cdot \sin\theta)$ is:

[1 Marks]

(A) 0

(B) 1

(C) $\sqrt{2}$

(D) $1/\sqrt{2}$

Question 8.

Two dice are rolled together. The probability of getting the sum of the two numbers to be more than 10, is

[1 Marks]

(A) 1/9

(B) 1/12

(C) 7/12

(D) 1/6

Question 9.

If α and β are zeroes of the polynomial $5x^2 + 3x - 7$, the value of $1/\alpha + 1/\beta$ is

[1 Marks]

(A) 3/5

(B) -5/7

(C) -3/7

(D) 3/7

Question 10.

The perimeters of two similar triangles ABC and PQR are 56 cm and 48 cm respectively. PQ/AB is equal to

[1 Marks]

(A) 8/7

(B) 7/6

(C) 7/8

(D) 6/7

Question 11.

AB and CD are two chords of a circle intersecting at P. Choose the correct statement from the following :

[1 Marks]

(A) ΔADP ~ ΔCBA

(B) ΔADP ~ ΔBPC

(C) ΔADP ~ ΔCBP

(D) ΔADP ~ ΔDBCP

Question 12.

If each observation in a data is increased by 2, then the median of the new data

[1 Marks]

(A) remains same

(B) increases by 2n

(C) decreases by 2

(D) increases by 2

Question 13.

A box contains cards numbered 6 to 55. A card is drawn at random from the box. The probability that the drawn card has a number which is a perfect square, is

[1 Marks]

(A) 7/55

(B) 1/10

(C) 7/50

(D) 5/49

Question 14.

In the given figure, tangents PA and PB to the circle centered at O, from point P are perpendicular to each other. If PA = 5 cm, then length of AB is equal to

[1 Marks]

(A) $5\sqrt{2}$cm

(B) 5 cm

(C) $2\sqrt{5}$cm

(D) 10 cm

Question 15.

XOYZ is a rectangle with vertices X(−3, 0), O(0, 0), Y(0, 4) and Z(x, y). The length of each diagonal is

[1 Marks]

(A) $x^2 + y^2$ units

(B) 4 units

(C) 5 units

(D) $\sqrt{5}$ units

Question 16.

Which term of the A.P. −29, −26, −23, ..., 61 is 16?

[1 Marks]

(A) 10^{th}

(B) 11^{th}

(C) 16^{th}

(D) 31^{st}

Question 17.

In the given figure, AT is tangent to a circle centered at O. If ∠CAT = 40°, then ∠CBA is

[1 Marks]

(A) 40°

(B) 50°

(C) 65°

(D) 70°

Question 18.

After an examination, a teacher wants to know the marks obtained by the maximum number of students in her class. She requires to calculate _____ of marks.

[1 Marks]

(A) median

(B) range

(C) mode

(D) mean

Question 19. Assertion (A) : If $\sin A = 1/3$ $(0^\circ < A < 90^\circ)$, then the value of $\cos A$ is $2\sqrt{2}/3$
Reason (R) : For every angle θ, $\sin^2\theta + \cos^2\theta = 1$.

[1 Marks]

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

(B) Assertion (A) is true but Reason (R) is not true.

(C) Both Assertion (A) and Reason (R) are true. Reason (R) does not give correct explanation of (A).

(D) Assertion (A) is not true but Reason (R) is true.

Question 20.

Assertion (A): Two cubes each of edge length 10 cm are joined together. The total surface area of newly formed cuboid is 1200 cm^2. Reason (R) : Area of each surface of a cube of side 10 cm is 100 cm^2.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true. Reason (R) does not give correct explanation of (A).

(B) Both Assertion (A) and Reason (R) are true. Reason (R) is the correct explanation of Assertion (A).

(C) Assertion (A) is not true but Reason (R) is true.

(D) Assertion (A) is true but Reason (R) is not true.

Section B

Question 21.

Can the number $(15)^n$, n being a natural number, end with the digit 0? Give reasons.

[2 Marks]

Question 22. Find the type of triangle ABC formed whose vertices are A(1, 0), B(−5, 0) and C(−2, 5).

[2 Marks]

Question 23. Evaluate: $2 \sin^2 30° \sec 60° + \tan^2 60°$.

[2 Marks]

Question 24.

If $2 \sin(A + B) = 3$ and $\cos(A - B) = 1$, then find the measures of angles A and B. $(0 \leq A, B, A+B) \leq 90°)$.

[2 Marks]

Question 25. In the given figure, AB and CD are tangents to a circle centred at O. Is $\angle BAC = \angle DCA$? Justify your answer.

[2 Marks]

Question 26. In what ratio is the line segment joining the points (3, −5) and (−1, 6) divided by the line y = x?

[2 Marks]

Question 27. A(3, 0), B(6, 4) and C(−1, 3) are vertices of triangle ABC. Find length of its median BE.

[2 Marks]

Section C

Question 28. If the sum of first m terms of an A.P. is same as sum of its first n terms $(m \neq n)$, then show that the sum of its first (m + n) terms is zero.

[3 Marks]

Question 29. In an A.P., the sum of three consecutive terms is 24 and the sum of their squares is 194. Find the numbers.

[3 Marks]

Question 30.

Prove that $\sqrt{5}$ is an irrational number.

[3 Marks]

Question 31. In the given figure, PQ is tangent to a circle centred at O and $\angle BAQ = 30^\circ$. Show that BP = BQ.

[3 Marks]

Question 32. In the given figure, AB, BC, CD and DA are tangents to the circle with centre O forming a quadrilateral ABCD. Show that $\angle AOB + \angle COD = 180^\circ$.

[3 Marks]

Question 33.

Prove that $\frac{1 + \sec\theta - \tan\theta}{1 + \sec\theta + \tan\theta} = \frac{1 - \sin\theta}{\cos\theta}$

[3 Marks]

Question 34.

In a test, the marks obtained by 100 students (out of 50) are given below:

Find the mean marks of the students.

[3 Marks]

Question 35. In a 2-digit number, the digit at the unit's place is 5 less than the digit at the ten's place. The product of the digits is 36. Find the number.

[3 Marks]

Section D

Question 36.

A ball is thrown in the air so that t seconds after it is thrown, its height h metre above its starting point is given by the polynomial $h = 25t - 5t^2$. Observe the graph of the polynomial and answer the following questions:

Observe the graph of the polynomial and answer the following questions :

(1) Find the two different values of t when the height of the ball was 20 m.

[2 Marks]

(2) Find the maximum height achieved by ball.

[1 Marks]

(3) Write zeroes of the given polynomial.

[1 Marks]

(4) After throwing upward, how much time did the ball take to reach the height of 30 m?

[2 Marks]

Question 37.

The word 'circus' has the same root as 'circle'. In a closed circular area, various entertainment acts including human skill and animal training are presented before the crowd.

A circus tent is cylindrical up to a height of 8 m and conical above it. The diameter of the base is 28 m and total height of tent is 18.5 m.

Based on the above, answer the following questions:

(1) Find slant height of the conical part.

[1 Marks]

(2) Determine the floor area of the tent.

[1 Marks]

(3) Find area of the cloth used for making tent.

[2 Marks]

(4) Find total volume of air inside an empty tent.

[2 Marks]

Question 38.

In a survey on holidays, 120 people were asked to state which type of transport they used on their last holiday. The following pie chart shows the results of the survey.

Observe the pie chart and answer the following questions :

(1) If one person is selected at random, find the probability that he/she travelled by bus or ship.

[1 Marks]

(2) Which is most favourite mode of transport and how many people used it?

[1 Marks]

(3) The probability that randomly selected person used aeroplane is 7/60. Find the revenue collected by air company at the rate of ₹ 5,000 per person.

[2 Marks]

(4) A person is selected at random. If the probability that he did not use train is 4/5, find the number of people who used train.

[2 Marks]

Section E

Question 39. Using graphical method, solve the following system of equations: $3x + y + 4 = 0$ and $3x - y + 2 = 0$.

[5 Marks]

Question 40. Tara scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each wrong answer, then Tara would have scored 50 marks. Assuming that Tara attempted all questions, find the total number of questions in the test.

[5 Marks]

Question 41. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

[5 Marks]

Question 42.

Sides AB and AC and median AD to Δ ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that ΔABC ~ ΔPQR.

[5 Marks]

Question 43. From the top of a 45 m high lighthouse, the angles of depression of two ships, on the opposite side of it, are observed to be 30° and 60°. If the line joining the ships passes through the foot of the lighthouse, find the distance between the ships. (Use √3 = 1.73)

[5 Marks]

Question 44. The perimeter of a certain sector of a circle of radius 5.6 m is 20.0 m. Find the area of the sector.

[5 Marks]