

CBSE EXAMINATION PAPER-2023

MATHEMATICS

(Solved)

Time allowed : 3 hours

Maximum Marks : 83

General Instructions :

Read the following instructions carefully and follow them :

- i. This question paper contains **42 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 37** are case based questions
- vii. **Section E** – questions number **38 to 42** 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 graph of $y = p(x)$ is given, for a polynomial $p(x)$. The number of zeroes of $p(x)$ from the graph is:

[1 Marks]

(A) 1

(B) 2

(C) 3

(D) 0

Question 2.

The value of k for which the pair of equations $kx = y + 2$ and $6x = 2y + 3$ has infinitely many solutions is:

[1 Marks]

(A) is $k = 3$

(B) is $k = -3$

(C) is $k = 4$

(D) does not exist

Question 3.

If $p - 1, p + 1$ and $2p + 3$ are in AP, then the value of p is:

[1 Marks]

(A) -2

(B) 0

(C) 4

(D) 2

Question 4.

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

[1 Marks]

(A) 2:1

(B) 1:4

(C) 1:2

(D) 4:1

Question 5.

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

[1 Marks]

(A) 42.5°

(B) 95°

(C) 85°

(D) 47.5°

Question 6.

If $2 \tan A = 3$, then the value of $\frac{4 \sin A + 3 \cos A}{4 \sin A - 3 \cos A}$ is

[1 Marks]

(A) does not exist

(B) $7/\sqrt{13}$

(C) 3

(D) $1/\sqrt{13}$

Question 7.

If α and β are the zeroes of polynomial $p(x) = x^2 + x - 1/\alpha + 1/\beta$ equals to

[1 Marks]

(A) $-1/2$

(B) 1

(C) -1

(D) 2

Question 8.

The least positive value of k for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots is:

[1 Marks]

(A) $\pm 2\sqrt{2}$

(B) 2

(C) ± 2

(D) $\sqrt{2}$

Question 9.

$[\frac{3}{4} \tan^2 30^\circ - \sec^2 45^\circ + \sin^2 60^\circ]$ is equal to

[1 Marks]

(A) $-\frac{3}{2}$

(B) $\frac{1}{6}$

(C) $\frac{5}{6}$

(D) -1

Question 10.

Curved surface area of a cylinder of height 5 cm is 94.2 cm^2 . Radius of the cylinder is (Take $\pi = 3.14$):

[1 Marks]

(A) 2 cm

(B) 6 cm

(C) 3 cm

(D) 2.9 cm

Question 11.

The distribution below gives the marks obtained by 80 students on a test :

The modal class of the distribution with marks obtained by 80 students is:

[1 Marks]

(A) 10-20

(B) 20-30

(C) 30-40

(D) 50-60

Question 12.

The curved surface area of a cone having height 24 cm and radius 7 cm is:

[1 Marks]

(A) 500 cm²

(B) 528 cm²

(C) 550 cm²

(D) 1056 cm²

Question 13.

The distance between points $(0, 2\sqrt{5})$ and $(-2\sqrt{5}, 0)$ is:

[1 Marks]

(A) $4\sqrt{10}$ units

(B) 0

(C) $2\sqrt{10}$ units

(D) $2\sqrt{20}$ units

Question 14.

Which of the following is a quadratic polynomial having zeroes $-\frac{2}{3}$ and $\frac{2}{3}$?

[1 Marks]

(A) $4x^2-9$

(B) $x^2+9/4$

(C) $4/9 (9x^2+4)$

(D) $5(9x^2-4)$

Question 15.

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

[1 Marks]

(A) remains unchanged

(B) increases by 3

(C) increases by $3n$

(D) increases by 6

Question 16.

Probability of happening of an event is denoted by p and probability of non-happening of the event is denoted by q . Relation between p and q is:

[1 Marks]

(A) $p = 1, q = 1$

(B) $p + q + 1 = 0$

(C) $p + q = 1$

(D) $p = q - 1$

Question 17.

A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 16,000 tickets are sold, how many tickets has she bought?

[1 Marks]

(A) 750

(B) 480

(C) 240

(D) 40

Question 18.

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:

[1 Marks]

(A) $\frac{1}{3}$

(B) $\frac{1}{4}$

(C) $\frac{3}{4}$

(D) 1

Question 19.

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.

[1 Marks]

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

(B) Assertion (A) is false but Reason (R) is true.

(C) Assertion (A) is true but Reason (R) is false.

(D) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

Question 20.

Assertion (A) : The perimeter of $\triangle ABC$ is a rational number. Reason (R) : The sum of the squares of two rational numbers is always rational.

[1 Marks]

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

(B) Assertion (A) is true but Reason (R) is false.

(C) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

(D) Assertion (A) is false but Reason (R) is true.

Section B

Question 21.

Solve the pair of equations $x=3$ and $y= -4$ graphically.

[2 Marks]

Question 22.

Using graphical method, find whether the following system of linear equations is consistent or not: $x=0$ and $y =-7$

[2 Marks]

Question 23.

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

[2 Marks]

Question 24.

If $\sin \theta + \cos \theta = \sqrt{3}$, then find the value of $\sin \theta \cdot \cos \theta$.

[2 Marks]

Question 25. Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively.

[2 Marks]

Question 26.

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

(i) red

(ii) yellow.

[2 Marks]

Question 27.

If $\sin \alpha = 1/\sqrt{2}$ and $\cot \beta = \sqrt{3}$, then find the value of $\operatorname{cosec} \alpha + \operatorname{cosec} \beta$.

[2 Marks]

Section C

Question 28. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers.

[3 Marks]

Question 29. Prove that $\sqrt{5}$ is an irrational number.

[3 Marks]

Question 30.

If $(-5, 3)$ and $(5, 3)$ are two vertices of an equilateral triangle, then find coordinates of the third vertex, given that origin lies inside the triangle. (Take $\sqrt{3} = 1.7$)

[3 Marks]

Question 31. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.

[3 Marks]

Question 32.

In the given figure, a circle is inscribed in quadrilateral ABCD in which $\angle B = 90^\circ$. If $AD = 17$ cm, $AB = 20$ cm and $DS = 3$ cm, then find the radius of the circle.

[3 Marks]

Question 33.

Prove that: $\tan \theta + \sec \theta - 1 / \tan \theta - \sec \theta + 1 = 1 + \sin \theta / \cos \theta$

[3 Marks]

Question 34.

A room is in the form of a cylinder surmounted by a hemispherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find the total height of the room if it contains $(1408/21)$ m³ of air. (Take $\pi = 22/7$).

Question 35.

An empty cone of radius 3 cm and height 12 cm .Ice cream is filled is in it so that lower part of the cone which is $\frac{1}{6}$ th of the volume of

the cone is unfilled but hemisphere is formed on the top. Find

volume of the ice-cream. (Take $\pi = 3.14$)

[3 Marks]

Section D

Question 36.

India meteorological department observes seasonal and annual rainfall every year in different sub-divisions of our country.

It helps them to compare and analyse the results. The table given below shows sub-division wise seasonal (monsoon) rainfall (mm) in 2018 :

Based on the above information, answer the following questions :

(1)

Write the modal class.

[1 Marks]

(2)

Find the median of the given data.

[2 Marks]

(3)

If sub-division having at least 1000 mm rainfall during monsoon

season, is considered good rainfall sub-division, then how many subdivisions had good rainfall ?

[1 Marks]

(4)

Find the mean rainfall in this season.

[2 Marks]

Question 37.

The discus throw is an event in which an athlete attempts to throw a discus. The athlete spins anti-clockwise around one and a half times through a circle, then releases the throw. When released, the discus travels along tangent to the circular spin orbit.

In the given figure, AB is one such tangent to a circle of radius 75 cm.

Point O is centre of the circle and $\angle ABO = 30^\circ$. PQ is parallel to OA.

Based on above information :

(1) Find the length of AB.

[1 Marks]

(2) Find the length of OB.

[1 Marks]

(3) Find the length of AP.

[2 Marks]

(4)

find the length of PQ.

[2 Marks]

Section E

Question 38.

The angle of elevation of the top of a tower 24 m high from the foot of another tower in the same plane is 60° . The angle of elevation of the top of second tower from the foot of the first tower is 30° . Find the distance between two towers and the height of the other tower. Also, find the length of the wire attached to the tops of both the towers.

[5 Marks]

Question 39.

A spherical balloon of radius r subtends an angle of 60° at the eye of an observer. If the angle of elevation of its centre is 45° from the same point, then prove that height of the centre of the balloon is $\sqrt{2}$ times its radius.

[5 Marks]

Question 40. A chord of a circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle. Also, find the area of the major segment of the circle.

[5 Marks]

Question 41.

The ratio of the 11th term to the 17th term of an A.P is 3:4. Find the ratio of the 5th term to the 21st term of the same A.P. Also, find the ratio of the sum of the first 5 terms to that of the first 21 terms.

[5 Marks]

Question 42.

250 logs are stacked in in the following manner :

22 logs are in the bottom row, 21 in the next, 20 in the row next to it

and so on (as shown by an example). In how many rows, are the 250

logs placed and how many logs are there in the top row ?

[5 Marks]

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