ANNUAL EXAMINATION, 2023 – 24
CLASS IX
MATHEMATICS

Time Allowed: 3 Hours **Maximum Marks: 80**

General Instructions:

- This Question Paper has 5 Sections A-E.
- Section A has 20 MCQs carrying 1 mark each.
- Section B has 5 questions carrying 02 marks each.
- Section C has 6 questions carrying 03 marks each.
- Section D has 4 questions carrying 05 marks each.
- Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
- All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in one 2marks questions of Section E.
- Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

Section A: 20 questions of 1 mark each.

1. The simplified form of $\left(\frac{27}{125}\right)^{\frac{-2}{3}}$ is

   (a) $\frac{3}{5}$ (b) $\frac{5}{3}$ (c) $\frac{25}{9}$ (d) $\frac{9}{25}$

2. The reciprocal of $2 + \sqrt{3}$ is

   (a) $2 - \sqrt{3}$ (b) $\sqrt{3} - 2$ (c) $\sqrt{3} + 2$ (d) $\sqrt{2} - 3$

3. If A(-1, 3) and B(-3, 5) are two given points then (Abscissa of A)–(Abscissa of B) = ?

   (a) -2 (b) 1 (c) -1 (d) 2

4. The point which lies on the line $y = 7x$ having abscissa 3 is

   (a) (3, 7) (b) (3, 21) (c) (7, 3) (d) (7, 21)

5. Which of the following points does not lie on the line $y = 3x + 4$?

   (a) (1, 7) (b) (2, 10) (c) (-1, 1) (d) (4, 12)

6. How many linear equations in x and y can be satisfied by $x = 1$ and $y = 2$?

   (a) Only one (b) Infinitely many (c) Three (d) Two

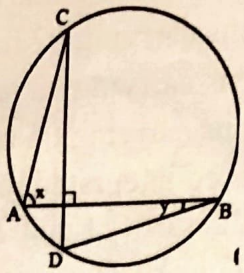
7. All right angles are equal to one another. This is which of the Euclid's postulate:

a. Euclid's postulate 4 b. Euclid's postulate 1

c. Euclid's postulate5 d. Euclid's postulate 3

8. Chords AB and CD intersect each other at right angles.

Then the sum of angle x and angle y is equal to:



(a)40° (b) 60° (c) 90° (d) 80°

9. An angle is 20° more than three times the given angle. If the two angles are supplementary, then the two angles are

(a) 20° and 120° (b) 30° and 150° (c) 40° and 140° (d) 50° and 130°

10. The value of x, when $2^{x+4} \cdot 3^{x+1} = 288$ is

(a) 1 (b) -1 (c) 0 (d) none

11. In a rectangle ABCD, AO and DO are the bisectors of ∠A and ∠D then ∠AOD is equal to

(a) ∠B + ∠C (b) 180° - (∠B + ∠C) (c) $\frac{1}{2}$ (∠B + ∠C) (d) $\frac{1}{2}$ (∠B - ∠C)

12. If chords AB and CD of congruent circles subtend equal angles at their centres, then which of the following is true?

(a) AB = CD (b) AB > CD (c) AB < AD (d) None of the above

13. Angle inscribed in a major segment is always an

(a) Obtuse angle (b) Acute angle (c) right angle (d) Could be any of these

14. The area of an equilateral triangle is $36\sqrt{3}$ cm². It's perimeter is

(a) 36 cm (b) $12\sqrt{3}$ cm (c) 24 cm (d) 30 cm

15. Each of the two equal sides of an isosceles right triangle is 10 cm long. Its area is

(a) $5\sqrt{10}$ cm^2 (b) 50 cm^2 (c) $10\sqrt{3}$ cm^2 (d) 75 cm^2

16. If p(x)= x+3 then find p(x)-p(-x)

a) 6 (b) 2x (c) 3 (d) None

17. Write the class marks of each of the class interval 6-8.

(a) 6 (b) 7 (c) 8 (d) 6.5

18. Assertion: Two lines AB and CD intersect at O. If $\angle AOC = 40^0$ then $\angle BOD = 140^0$

Reasoning: If two lines intersect then vertically opposite angles are equal.

(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.

19. Assertion: The diameter and height of a cone are 8 cm and 12cm respectively. The volume of the cone is 154cm^3.

Reasoning: Surface Area of a cone can be found using the formula: πrl.

(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.

20. The consecutive angles of a parallelogram are

(a) Complementary

(b) Supplementary

(c) Equal

(d)None of these

Section B: 5 questions of 2 marks each

21. Represent $\sqrt{3}$ on the number line.

OR

Convert $0.\overline{43}$ as a rational number in $\frac{p}{q}$ form.

22. Find the coordinates of a point (i) Abscissa is 2 and Ordinate is 1, (ii) lying in the fourth quadrant whose distance from the y-axis is 9 units and that from the x-axis is 4 units.

23. For what value of c, the linear equation $2x + cy = 8$ has equal values of $x=1$ and $y= -2$ for its solution?

24. The perimeter of an isosceles triangle is 32 cm. The ratio of the equal side to its base is 3:2. Find the area of the triangle.

OR

The sides of a triangular field are 41 m, 40 m and 9 m. Find the area of the field.

25. If $x = 9 + 4\sqrt{5}$, find the value of $x - 1/x$.

Section C: 6 questions of 3 marks each

26. If $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a - b\sqrt{3}$, find the values of a and b.

27. Find the value of k for which the point (1, -2) lies on the graph of linear equation $x - 2y + k = 0$. Hence, find two more solutions of the equation.

28. Prove that a diagonal of a parallelogram divides into two congruent triangles.

OR

ABCD is a rectangle and P, Q, R and S are mid-points of the sides AB, BC, CD and DA, respectively. Show that the quadrilateral PQRS is a rhombus.

29. Prove that the quadrilateral formed by the angle bisectors of a cyclic quadrilateral is also cyclic.

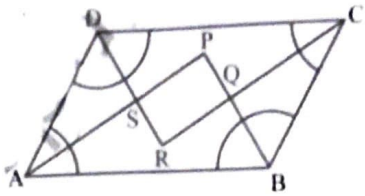
30. ABCD is a trapezium in which AB || CD and AD = BC. Show that

(i) $\angle A = \angle B$

(ii) $\angle C = \angle D$

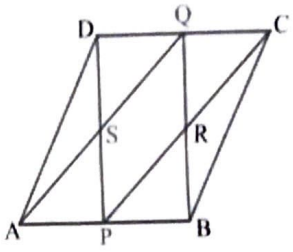
(iii) $\Delta ABC \cong \Delta BAD$

31. Show that the bisectors of angles of a parallelogram form a rectangle.



OR

ABCD is a parallelogram in which P and Q are mid-points of opposite sides AB and CD. If AQ intersects DP at S and BQ intersects CP at R, show that PSQR is a parallelogram.



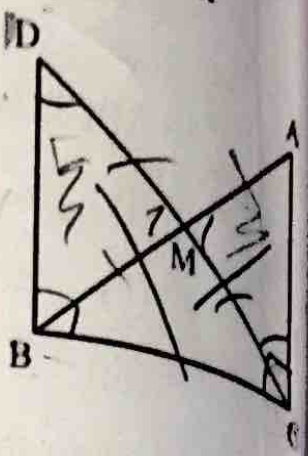
Section D: 4 questions of 5 marks each

32. The polynomials $ax^3 - 3x^2 + 4$ and $2x^3 - 5x + a$, when divided by $(x - 2)$, leave the remainders p and q respectively. If $p - 2q = 4$, find the value of a.

OR

Factorize the polynomial $2x^3 - 3x^2 - 17x + 30$ completely and find its three zeroes.

33. In right triangle ABC, right angled at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B. Show that:



(i) $\Delta AMC \cong \Delta BMD$

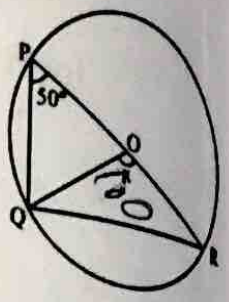
(ii) $\angle DBC$ is a right angle.

(iii) $\Delta DBC \cong \Delta ACB$

(iv) $CM = \frac{1}{2} AB$

34.(a)Prove that the angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.

(b) find the value of x in the adjoining figure.



35. 100 surnames were randomly picked up from a local telephone directory and a frequency distribution of the number of letters in the English alphabet in the surnames was found as follows:

Number of letters	1-4	4-6	6-8	8-12	12-20
No. of surnames	6	30	44	16	4

Draw a histogram to depict the given information.

OR

Draw a histogram and Frequency Polygon for the following data distribution:

Class Intervals	50-60	60-70	70-80	80-90	90-100	100-110
Frequency	30	25	45	15	20	40

Section E: 3 Case Study Based Questions 4 marks each

36. Ankur and Ranjan start a new business together. The amount invested by both partners together is given by the polynomial $p(x) = 4x^2 + 12x + 5$, which is the product of their individual shares.

(i). Find coefficient of x^2 in the given polynomial. (1)

(ii).Find total amount invested by both, if $x = 1000$. (1)

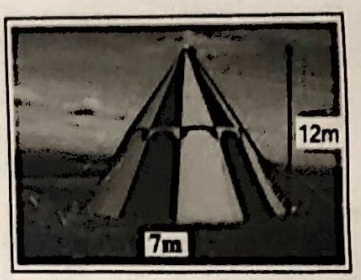
(iii).Find the shares of Ankur and Ranjan invested individually. (2)

OR

Factorize

$x^2 - y^2 + 6y - 9$ (2)

37. Once four friends Rahul, Arun, Ajay and Vijay went for a picnic to a hill station. Due to peak season, they did not get a proper hotel in the city. The weather was fine so they decided to make a conical tent at a park. They were carrying 200 m^2 of cloth with them. As shown in the figure they made the tent with height 12m and diameter 7m. Some of the remaining cloth was used for the floor.



i. Find the slant height of the conical tent. (1 mark)

ii. Write the formula to calculate volume and Curved Surface Area of Hemisphere. (1 mark)

iii. Find the volume of the conical tent? (2 marks)

38.A craft mela is organized by Welfare Association to promote the art and culture for tribal people. Fairs and festivals are the custodians of our great cultural heritage. The pandal is to be decorated by using triangular flags around the field. Each flag has dimensions 25 cm, 25 cm and 22 cm.

(i) What is the semi-perimeter of the flag for the above mentioned dimensions? (1)

(ii) What is the area of the flag?(Use $\sqrt{14} \cong 3.74$) (1)

(iii)Find the area of cloth required for making 300 such flags in cm^2 .(2)