ANNUAL EXAMINATION–2023-24

CLASS–IX

SUBJECT–MATHEMATICS

Time : 3 Hours **M.Marks : 80**

General Instructions:

1. *This question paper contains 38 questions. All are compulsory.*
2. *Question paper is divided into five sections–A, B, C, D & E.*
3. *In Section-A Q.No. 1-18 are multiple choice questions of 1 mark each. Q.No. 19 & 20 are Assertion-Reason based question of 1 mark each.*
4. *In Section-B Q.No. 21-25 are of 2 marks each.*
5. *In Section-C Q.No. 26-31 are of 3 marks each.*
6. *In Section-D Q.No. 32-35 are of 5 marks each.*
7. *In Section-E Q.No. 36-38 are Case Study based questions of 4 marks each.*
8. *There is no overall choice. However, an internal choice has been provided in 2 questions in Section-B, 2 questions in Section-C, 2 questions in Section-D and in one part of questions in Section-E.*

SECTION-A

1. The value of $2.\overline{45} + 0.\overline{36}$ in the simplest form is :

   (a) $\frac{16}{33}$ (b) $\frac{24}{11}$ (c) $\frac{31}{11}$ (d) $\frac{167}{110}$

2. If $7^{5x-8} \times 5^{x+2} = 30625$, then value of x is :

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

3. The point P(5, –1) on reflection in x-axis is mapped as Q and the point Q on reflection in y-axis is mapped as R, then the coordinates of R are:

   (a) (–5, 1) (b) (5, 1) (c) (1, 5) (d) (5, –1)

4. If points P(3, 0) and Q(a, 0) are equidistant from the origin, then value of a is :

(a) 3 (b) –3 (c) 6 (d) 9

5. Which of the linear equation has $x = 1$, $y = 3$ as solution :

(a) $3x - y = 2$ (b) $3x + y = 3$

(c) $3x + y = 5$ (d) $3x - y = 0$

6. The coefficient of x^2 in $(2x^2 - 5)(4 + 3x^2)$ is :

(a) –7 (b) 7 (c) 2 (d) 3

7. If $P(x) = x^2 - 2\sqrt{2}x + 1$, then $P(2\sqrt{2})$ is :

(a) 0 (b) 1 (c) $4\sqrt{2}$ (d) –1

8. Euclid stated that all right angles are equal to each other in the form of :

(a) An axiom (b) a definition

(c) a postulate (d) a proof

9. The number of dimensions, a surface has :

(a) 0 (b) 1 (c) 2 (d) 3

10. $\angle AOB$ and $\angle BOC$ are two adjacent supplementary angles such that $\angle AOB = 70°$, $\angle BOC = 2x$, then value of x is :

(a) 35° (b) 40° (c) 45° (d) 55°

11. In ΔABC, if $\angle A = 100°$, AD bisects $\angle A$ and $AD \perp BC$, then $\angle B$ is :

(a) 40° (b) 50° (c) 90° (d) 100°

12. Side BC of a triangle ABC has been produced to a point D such that $\angle ACD = 120°$. If $\angle B = \frac{1}{2}\angle A$, then A is equal to :

(a) 60° (b) 75° (c) 80° (d) 90°

13. If an angle of a parallelogram is two thirds of its adjacent angle, the smallest angle of the parallelogram is :

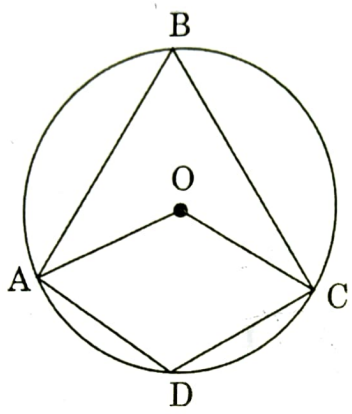
(a) 108° (b) 72° (c) 54° (d) 81°

14. If a chord of a circle is at a distance of 8cm from the centre of a circle of radius 17cm, then the length of the chord is :

(a) 25cm (b) 15cm (c) 30cm (d) 9cm

15. In the given figure, O is the centre of the circle. If $\angle AOC = 150°$, then value of $\angle ADC$ is :

(a) 70° (b) 75° (c) 60° (d) 105°



16. If the perimeter of an isosceles triangle is 32 cm and the ratio of the equal side to its base is 5 : 2 cm, then area of the triangle is :

(a) $32\sqrt{2}\,cm^2$ (b) $30\sqrt{2}\,cm^2$ (c) $20\sqrt{2}\,cm^2$ (d) $16\sqrt{2}\,cm^2$

17. The height of a cone is 16cm and its base radius is 12cm. The ratio of the curved surface area and the total surface area of the cone is :

(a) 8:5 (b) 5:8 (c) 5:3 (d) 3:5

18. The class mark of the class 90-120 is :

(a) 90 (b) 105 (c) 115 (d) 120

Assertion-Reasoning :

Directions: In Q.No. 19 & 20 a statement of Assertion(A) is followed by a statement of Reason(R).

Mark the correct choice as :

(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 and 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):** $\sqrt{2}, \sqrt{3}$ are examples of irrational numbers.

Reason(R): An irrational number can be expressed in the form p/q.

20. **Assertion(A):** If the ratio of the surface areas of two spheres is 4:25, then the ratio of their radii is 4:5.

Reason(R): If the ratio of radii of two spheres is 2:3, then the ratio of their volumes is 8:27.

SECTION-B

21. Find two rational numbers between $-\frac{2}{3}$ and $\frac{3}{4}$.

22. If $25^{x-1} = 5^{2x-1} - 100$, find the value of x.

23. Find the values of x and y if $(2x + 5, 2y + 3) = (10, 9)$.

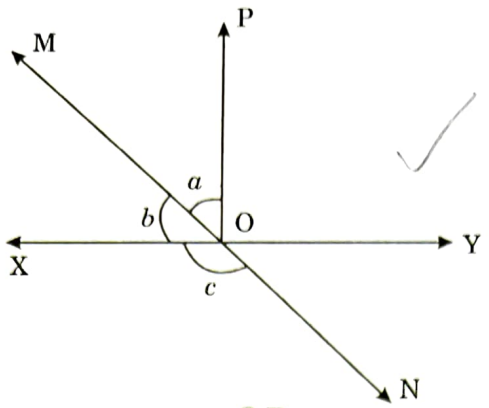
24. If $2x + 3y = 13$ and $xy = 6$, find the value of $8x^3 + 27y^3$

OR

Simplify using suitable identity:

$(7a - 5b)(49a^2 + 35ab + 25b^2)$

25. In the figure, lines XY and MN intersect at O. If $\angle POY = 90^0$ and $a:b = 2:3$, find c.



OR

If a transversal intersects two lines such that the bisectors of a pair of corresponding angles are parallel, then prove that the two lines are parallel.

SECTION-C

26. If $\frac{5+\sqrt{11}}{3-2\sqrt{11}} = x + y\sqrt{11}$ find the values of x and y.

OR

If $x = 3 + \sqrt{8}$, find the value of $x^2 + \frac{1}{x^2}$.

27. If x years represents the present age of the father and y years represents the present age of the son, then find the equation of the statement, "present age of the father is 5 more than 6 times age of the son." Also find the age of father when age of son is 10 years.

28. Factorise : $x^3 - 6x^2 + 11x - 6$

29. 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.

OR

ABC is a triangle right angled at C. A line through the mid point M of hypotenuse AB and parallel to BC intersects AC at D. Show that :

(a) D is the mid point of AC

(b) MD $\perp$ AC

(c) CM = MA = ½ AB

30. The lengths of the sides of a triangle are 5cm, 12cm and 13cm. Find the length of perpendicular from the opposite vertex to the side whose length is 13cm.

31. Along a path 100 conical pillars are constructed. Each pillar has base radius 7cm and height 24cm. Find the total cost of painting these pillars at the rate of Rs 120 per cm^2.

SECTION-D

32. Without actual division prove that $x^4 + 2x^3 - 2x^2 + 2x - 3$ is exactly divisible by $x^2 + 2x - 3$.

OR

Factorise :

(a) $25x^2 + 16y^2 + 4z^2 - 40xy + 16yz - 20xz$

(b) $2\sqrt{2}a^3 + 3\sqrt{3}b^3 + 6\sqrt{3}a^2b + 9\sqrt{2}ab^2$

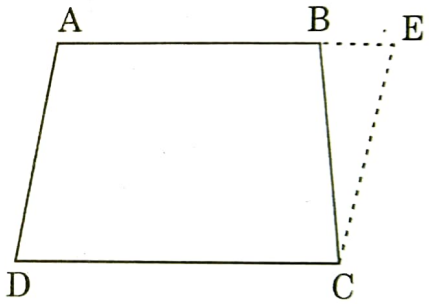
33. ABCD is a trapezium in which AB || CD and AD = BC. Show that

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

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

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

(d) Diagonal AC = diagonal BD



OR

In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ. Show that :

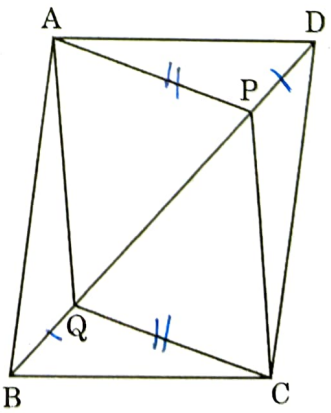
(a) $\Delta APD \cong \Delta CQB$

(b) AP = CQ

(c) $\Delta AQB \cong \Delta CPD$

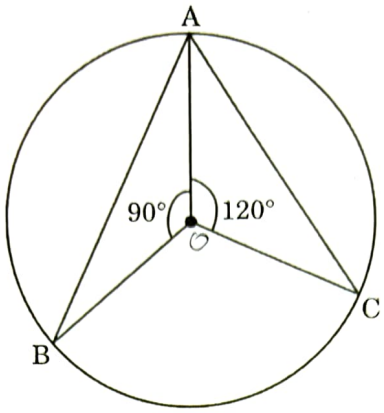
(d) AQ = CP

(e) APCQ is a parallelogram



34. 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.

Also using the above, find $\angle BAC$ if O is the centre of the circle.



35. The following data shows the marks scored by 150 students in an examination:

Marks	0-20	20-40	40-60	60-80	80-100	Total
No. of Students	10	15	40	45	40	150

(a) Represent the above information by a histogram and frequency polygon on the same graph.

(b) How many students got marks more than or equal to 60?

SECTION-E

36. Soumya wanted to hire a taxi. On enquiring the taxi charges from the prepaid taxi booking office, she got the following information:

The taxi fare in Delhi is as follows:

For the first kilometer, the fare is ₹ 20 and for the subsequent distance, it is ₹ 15 per km. Refer the given information and answer the following questions by taking the distance covered as x km and the total fare as ₹ y.

(a) Write the linear equation for the above mentioned information.

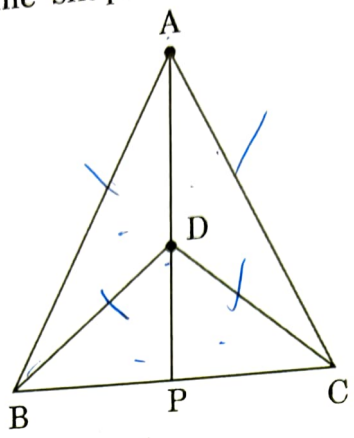
(b) Express the linear equation obtained in (a) in the form $ax + by + c = 0$ and indicate the values of a, b and c.

(c) If Soumya hired the taxi for 25km, then find the amount to be paid by her as taxi fare.

OR

If (2K, 3K + 1) lies on the given line, then what is the value of K?

37. A farmer in his triangular field wants to grow wheat, rice, sugarcane and cotton. He divides his field in four parts as shown in the figure. He wants to grow wheat and rice in triangles of exactly same shape and similarly in other two triangles of same shape he wants to grow sugarcane and cotton.



In figure ΔABC and ΔDBC are two isosceles triangles and AP is perpendicular to side BC.

Based on above information, answer the following questions:

(a) In which triangle farmer will grow wheat if he grows rice in triangle ABD.

(b) Which triangles farmer will choose for cotton and sugarcane?

(c) Prove that ΔAPB ≅ ΔAPC.

OR

If $\angle A = 90^0$ then find the values of $\angle B$ and $\angle C$ in ΔABC.

38. Two friends bring clay in the classroom to present the topic mensuration. First they form a cone of radius 8cm and height 4cm and then they mould that cone into sphere of radius 4cm.

Based on the above information, answer the following questions:

(a) Find the volume of cone

(b) Find the volume of sphere in terms of π.

(c) Find the surface area of the sphere.

OR

Find the curved surface area of the cone. [Take $\sqrt{80} = 8.9$ and $\pi = 3.14$]