# BLUE PRINT : CLASS IX

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Note: * - Internal Choice Questions
General Instruction:
(i) All questions are compulsory.
(ii) This question paper contains 30 questions divided into four Sections A, B, C and D.
(iii) Section A comprises of 6 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 10 questions of 3 marks each and Section D comprises of 8 questions of 4 marks each.
(iv) There is no overall choice. However, an internal choice has been provided in two questions in 1 mark each, two questions in 2 marks each, four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
(v) Use of Calculators is not permitted.

SECTION – A
Questions 1 to 6 carry 1 mark each.

1. In the given below figure, if \( \angle AOC = 50^\circ \) then find the measure of \( \angle AOD + \angle COB \).

2. In the above right sided Fig, ABCD is a cyclic quadrilateral in which AC and BD are its diagonals. If \( \angle DBC = 60^\circ \) and \( \angle BAC = 30^\circ \), find \( \angle BCD \).

3. Find the value of \( k \), if \( x = 2, y = 1 \) is a solution of the equation \( 2x + 3y = k \).

   OR

At what point the graph of the linear equation \( x + y = 5 \) cuts the x-axis?

4. The height of an equilateral triangle measures \( 9\sqrt{3} \) cm. Find its area.

5. Without actually calculating, find the value of \( (25)^3 - (75)^3 + (50)^3 \).

6. Simplify: \( \frac{\sqrt{6561}}{65536} \)

   OR

Simplify: \( 16 \frac{1}{4} \times \sqrt{16} \)

SECTION – B
Questions 6 to 12 carry 2 marks each.

7. The angle between two altitudes of a parallelogram through the vertex of an obtuse angle of the parallelogram is \( 60^\circ \). Find the angles of the parallelogram.
8. Show that $0.2353535...$ can be expressed in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

9. Factorise: $27x^3 - \frac{1}{216} - \frac{9}{2}x^2 + \frac{1}{4}x$

OR

Prove that: $(x - y)^3 + (y - z)^3 + (z - x)^3 = 3(x - y)(y - z)(z - x)$

10. In the given figure, ABC is an isosceles triangle with $AC = BC$. Find the value of $x$.

11. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.

OR

Using Heron’s formula, find the area of an equilateral triangle whose perimeter is 162 cm.

12. In the below figure, ABCD is a parallelogram; $AB = 10$ cm; $BM = 8$ cm and $DL = 6$ cm, then find AD.

SECTION – C

Questions 13 to 22 carry 3 marks each.

13. Give the geometric representations of $2x + 9 = 0$ as an equation (i) in one variable (ii) in two variables.

14. Two chords AB and CD of lengths 5 cm and 11 cm respectively of a circle are parallel to each other and are on opposite sides of its centre. If the distance between AB and CD is 6 cm, find the radius of the circle.

15. Construct the angle $105^0$ and verify it using protractor.

16. Verify: (i) $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$ (ii) $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$
17. In the below fig. ABCD is a parallelogram and BC is produced to a point Q such that AD = CQ. If AQ intersects DC at P, show that \( \text{ar}(\triangle BPC) = \text{ar}(\triangle DPQ) \)

![Diagram of parallelogram and points](image)

18. Line \( l \) is the bisector of an angle \( \angle A \) and B is any point on \( l \). BP and BQ are perpendiculars from B to the arms of \( \angle A \) (see the below figure). Show that:
   (i) \( \triangle APB \cong \triangle AQB \) (ii) \( BP = BQ \) or B is equidistant from the arms of \( \angle A \).

![Diagram of bisector and perpendiculars](image)

OR

In the above right sided figure, ABCDE is any pentagon. BP drawn parallel to AC meets DC produced at P and EQ drawn parallel to AD meets CD produced at Q. Prove that \( \text{ar} \ (\text{ABCDE}) = \text{ar} \ (\text{APQ}) \)

![Diagram of pentagon and parallel lines](image)

19. Find the area of the trapezium PQRS with height PQ given in the below Figure

![Diagram of trapezium with dimensions](image)
20. In the adjoining figure, PQ and RS are two mirrors placed parallel to each other. An incident ray AB strikes the mirror PQ at B, the reflected ray moves along the path BC and strikes the mirror RS at C and again reflects back along CD. Prove that AB || CD.

![Diagram of mirrors and reflected rays](image1)

OR

In the above right sided figure, the side QR of \( \triangle PQR \) is produced to a point S. If the bisectors of \( \angle PQR \) and \( \angle PRS \) meet at point T, then prove that \( \angle QTR = \frac{1}{2} \angle QPR \).

21. In the Fig., if \( \angle 1 = \angle 3 \), \( \angle 2 = \angle 4 \) and \( \angle 3 = \angle 4 \), write the relation between \( \angle 1 \) and \( \angle 2 \), using an Euclid’s axiom.

![Diagram of angles](image2)

22. Find the value of \( a \) and \( b \) in

\[
\frac{2+\sqrt{3}}{2-\sqrt{3}} = a + b\sqrt{3}
\]

OR

Simplify \( \frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}} \) by rationalizing the denominator.

23. AC and BD are chords of a circle which bisect each other. Prove that (i) AC and BD are diameters, (ii) ABCD is a rectangle.

OR

Bisectors of angles A, B and C of a triangles ABC intersect its circumcircle at D, E and F respectively. Prove that the angles of \( \angle DEF \) are \( 90^0 - \frac{A}{2} \), \( 90^0 - \frac{B}{2} \) and \( 90^0 - \frac{C}{2} \)

24. A rhombus shaped sheet with perimeter 40 cm and one diagonal 12 cm is painted on both sides of the rate of 6 per cm\(^2\). Find the cost of painting.

OR

A gardener has to put double fence all around a triangular field with sides 120 m, 80 m and 60 m. In the middle of each of the sides, there is a gate of width 10 m.
(i) Find the length of wire needed for fencing.
(ii) Find the cost of fencing at the rate of 6 per metre.
(iii) Find the area of triangular field.
25. Construct a triangle ABC, in which \( \angle B = 60^\circ \), \( \angle C = 45^\circ \) and \( AB + BC + CA = 11 \) cm.

26. Represent the real number \( \sqrt{2}, \sqrt{3}, \sqrt{5} \) on a single number line.

27. P, Q, R and S are respectively the mid-points of the sides AB, BC, CD and DA of a quadrilateral ABCD such that AC \( \perp \) BD. Prove that PQRS is a rectangle.

28. Plot the following points and write the name of the figure thus obtained: P\((-3, 2)\), Q\((-7, -3)\), R\((6, -3)\), S\((2, 2)\)

29. Draw the graph of the linear equation \( 2x + 3y = 12 \). At what points, the graph of the equation cuts the x-axis and the y-axis?

30. Find the values of a and b so that the polynomial \( x^3 - 10x^2 + ax + b \) is exactly divisible by \( (x - 1) \) as well as \( (x - 2) \).

\textbf{OR}

Without actual division, prove that \( 2x^4 - 5x^3 + 2x^2 - x + 2 \) is divisible by \( x^2 - 3x + 2 \).