## BLUE PRINT : CLASS X

<table>
<thead>
<tr>
<th>Unit</th>
<th>Chapter</th>
<th>MCQ (1 mark)</th>
<th>FIB (1 mark)</th>
<th>VSA (1 mark)</th>
<th>SA–I (2 marks)</th>
<th>SA–II (3 marks)</th>
<th>LA (4 marks)</th>
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<td>24(8)</td>
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**Note:** * - Internal Choice Questions and Yellow shaded with ** - PISA type questions
SECTION – A  
Questions 1 to 20 carry 1 mark each.

1. \( n^2 - 1 \) is divisible by 8, if \( n \) is
   (a) an integer  
   (b) a natural number  
   (c) an odd integer  
   (d) an even integer

2. The decimal expansion of the rational number \( \frac{33}{2^{2.5}} \) will terminate after
   (a) one decimal place  
   (b) two decimal places  
   (c) three decimal places  
   (d) more than 3 decimal places

3. If \( \sin 50^\circ = \cos 40^\circ \), where 50 and 40 are acute angles, find the value of \( \theta \).
   (a) \( 10^\circ \)  
   (b) \( 20^\circ \)  
   (c) \( 30^\circ \)  
   (d) none of these

4. If \( bx + ay = a^2 + b^2 \) and \( ax - by = 0 \), then the value of \( x - y \) equals:
   (a) \( a - b \)  
   (b) \( b - a \)  
   (c) \( a^2 - b^2 \)  
   (d) \( b^2 + a^2 \)

5. If \( \sin \theta = \frac{1}{3} \), then find the value of \( (2 \cot^2 \theta + 2) \)
   (a) 9  
   (b) 11  
   (c) 18  
   (d) none of these

6. If \( \cos \theta = \frac{1}{2} \), \( \sin \phi = \frac{1}{2} \) then find the value of \( \theta + \phi \).
   (a) \( 0^\circ \)  
   (b) \( 90^\circ \)  
   (c) \( 60^\circ \)  
   (d) \( 30^\circ \)

7. The ordinate of a point \( A \) on y-axis is 5 and \( B \) has coordinates \((-3, 1)\) then the length of \( AB \) is
   (a) 3 units  
   (b) 5 units  
   (c) 9 units  
   (d) none of these

8. The perpendicular distance of \( A(5, 12) \) from the y-axis is
   (a) 3 units  
   (b) 5 units  
   (c) 9 units  
   (d) none of these

9. If the midpoint of the line segment joining \( A(3, \frac{y+1}{2}) \) and \( B(7, y - 3) \) is \( C(5, -2) \), then the value of \( y \) is
   (a) 1  
   (b) 2  
   (c) -1  
   (d) none of these
10. Consider the following frequency distribution:

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>13</td>
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<tr>
<td>6-11</td>
<td>10</td>
</tr>
<tr>
<td>12-17</td>
<td>15</td>
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<tr>
<td>18-23</td>
<td>8</td>
</tr>
<tr>
<td>24-29</td>
<td>11</td>
</tr>
</tbody>
</table>

The upper limit of the median class is (a) 17 (b) 17.5 (c) 18 (d) 18.5

11. The values of k for which the quadratic equation $2x^2 + kx + 3 = 0$ has real equal roots is _______.

12. The roots of the quadratic equation by factorisation: $x^2 - 9x + 20 = 0$ are _______

OR

If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is $-1$, then the product of the other two zeroes is

13. In triangles ABC and DEF, $\angle A = \angle E = 40^0$, AB : ED = AC : EF and $\angle F = 65^0$, then $\angle B =$ ____

14. A card is drawn from a deck of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favourable to E is _____

15. The value of y if the first three terms of an AP respectively are $3y - 1$, $3y + 5$ and $5y + 1$ is _____

16. If LCM (480, 672) = 3360, find HCF (480,672).

17. If radii of two concentric circles are 4 cm and 5 cm, then find the length of each chord of one circle which is tangent to the other circle.

OR

If angle between two radii of a circle is $130^0$, find the the angle between the tangents at the ends of the radii.

18. If $\alpha, \beta$ are the roots of the quadratic equation $4x^2 + 3x + 7 = 0$, then find $\frac{1}{\alpha} + \frac{1}{\beta}$

19. If $\triangle ABC \sim \triangle PQR$, BC = 8 cm and QR = 6 cm, the ratio of the areas of $\triangle ABC$ and $\triangle PQR$

20. Which term of the AP: 21, 42, 63, 84,... is 210?

**SECTION – B**

Questions 21 to 26 carry 2 marks each.

21. If two different dice are rolled together, find the probability of getting (i) an even number on first dice (ii) an even number on both dice.

OR

A bag contains cards numbered from 1 to 49. A card is drawn from the bag at random, after mixing the cards thoroughly. Find the probability that the number on the drawn card is: (i) a multiple of 5 (ii) a perfect square
22. A night camp was organised for Class X students for two days and their accommodation was planned in tents. Each tent is made in the form of a frustum of a cone surmounted by a conical top. The diameter of the base and the top of the frustum are 20 m and 6 m respectively and height is 24 m. If the total height of the tent is 28 m, find the area of canvas required for making the tent (Use π = 3.14).

23. Ninety-five percent of world trade is moved by sea, by roughly 50 000 tankers, bulk carriers and container ships. Most of these ships use diesel fuel. Engineers are planning to develop wind power support for ships. Their proposal is to attach kite sails to ships and use the wind’s power to help reduce diesel consumption and the fuel’s impact on the environment.

Approximately what is the length of the rope for the kite sail, in order to pull the ship at an angle of θ such that \( \sin θ = \cos(135^0 - 20) \) and be at a vertical height of 150 m, as shown in the diagram opposite?

![Diagram of kite sail](image)

24. If the seventh term of an AP is \( \frac{1}{9} \) and its ninth term is \( \frac{1}{7} \), find its 63rd term.

25. If from an external point P of a circle with centre O, two tangents PQ and PR are drawn such that \( ∠QPR = 120^0 \), prove that 2PQ = PO.

26. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.

OR

S and T are points on sides PR and QR of \( ΔPQR \) such that \( ∠P = ∠RTS \). Show that \( ΔRPQ \sim ΔRTS \).

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**SECTION – C**

Questions 27 to 34 carry 3 marks each.

27. Find HCF and LCM of 625, 1125 and 2125 using fundamental theorem of arithmetic.

OR

Find the HCF of 81 and 237 and express it as a linear combination of 81 and 237.

28. 8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys finish it in 14 days. Find the time taken by one man alone and by one boy alone to finish the work.

OR

Solve the following system of equations:

\[
(a - b)x + (a + b) y = a^2 - 2ab - b^2
\]

\[
(a + b)(x + y) = a^2 + b^2
\]

29. If the polynomial \( 6x^4 + 8x^3 - 5x^2 + ax + b \) is exactly divisible by the polynomial \( 2x^2 - 5 \), then find the values of a and b.
30. In Annual Sports day, 50 students enter for a school javelin throw competition. The sports captain was given a task to prepare the distance record of the competition. After recording the distance (in metres) thrown, he analyzed the data and drew the following graph for 50 students:

Based on the above graph, answer the following questions:
(i) Identify less than type ogive and more than type ogive from the given graph.
(ii) Calculate the median distance thrown by using this curve.
(iii) Obtain the Mode of the data if mean distance is 49.5 cm

31. In the below figure, PSR, RTQ and PAQ are three semicircles of diameters 10 cm, 3 cm and 7 cm respectively. Find the perimeter of the shaded region. [Use \( \pi = 3.14 \)]

32. In an AP of 50 terms, the sum of first 10 terms is 210 and the sum of its last 15 terms is 2565. Find the A.P.

33. Evaluate: \( \frac{\sin 18^\circ}{\cos 72^\circ} + \sqrt{3} \{ \tan 10^\circ \tan 30^\circ \tan 40^\circ \tan 50^\circ \tan 80^\circ \} \)

OR

If \( \tan (A - B) = \frac{1}{\sqrt{3}} \) and \( \tan (A + B) = \sqrt{3} \), then find the value of A and B.
34. To conduct Sports Day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1m each. 100 flower pots have been placed at a distance of 1m from each other along AD, as shown in below figure. Niharika runs \( \frac{1}{4} \) th the distance AD on the 2nd line and posts a green flag. Preet runs \( \frac{1}{5} \) th the distance AD on the eighth line and posts a red flag. What is the distance between both the flags? If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?

![Diagram]

SECTION – D

Questions 35 to 40 carry 4 marks each.

35. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 60 m high, find the height of the building.

36. Draw a triangle ABC with side BC = 7 cm, \( \angle B = 45^\circ \), \( \angle A = 105^\circ \). Then, construct a triangle whose sides are \( \frac{5}{3} \) times the corresponding sides of \( \Delta ABC \).

OR

Draw a right triangle ABC in which AB = 6 cm, BC = 8 cm and \( \angle B = 90^\circ \). Draw BD perpendicular from B on AC and draw a circle passing through the points B, C and D. Construct tangents from A to this circle.

37. In a flight for 6000 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 400 km/hr and consequently time of flight increased by 30 minutes. Find the original duration of flight.

OR

Out of a number of saras birds, one-fourth of the number are moving about in lots, \( \frac{1}{9} \) th coupled with \( \frac{1}{4} \) th as well as 7 times the square root of the number move on a hill, 56 birds remain in vakula trees. What is the total number of saras birds?
38. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank which is 10 m in diameter and 2 m deep. If the water flows through the pipe at the rate of 4 km per hour, in how much time will the tank be filled completely?

OR

A solid metallic right circular cone 20 cm high and whose vertical angle is 60°, is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter \( \frac{1}{12} \) cm, find the length of the wire.

39. Prove that “The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.”

40. The mean of the following frequency distribution is 57.6 and the sum of the observations is 50. Find \( f_1 \) and \( f_2 \).

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