# Blue Print : Class X

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<th>FIB (1 mark)</th>
<th>VSA (1 mark)</th>
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Note: * - Internal Choice Questions and Yellow shaded with ** - PISA type questions
General Instruction:
(i) All the questions are compulsory.
(ii) The question paper consists of 40 questions divided into 4 sections A, B, C, and D.
(iii) **Section A** comprises of 20 questions of 1 mark each. **Section B** comprises of 6 questions of 2 marks each. **Section C** comprises of 8 questions of 3 marks each. **Section D** comprises of 6 questions of 4 marks each.
(iv) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three 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 20 carry 1 mark each.

1. If two positive integers \( p \) and \( q \) can be expressed as \( p = ab^2 \) and \( q = a^3b; \) \( a, b \) being prime numbers, then LCM \((p, q)\) is
   (a) \( ab \) (b) \( a^2b^2 \) (c) \( a^3b^2 \) (d) \( a^3b^3 \)

2. The decimal expansion of the rational number \( \frac{14587}{1250} \) will terminate after:
   (a) one decimal place (b) two decimal places (c) three decimal places (d) four decimal places

3. If the distance between the points \((2, -2)\) and \((-1, x)\) is 5, one of the values of \( x \) is
   (a) -2 (b) 2 (c) -1 (d) 1

4. The mid-point of the line segment joining the points \(A (-2, 8)\) and \(B (-6, -4)\) is
   (a) \((-4, -6)\) (b) \((2, 6)\) (c) \((-4, 2)\) (d) \((4, 2)\)

5. The coordinates of the point which is equidistant from the three vertices of the \(\Delta AOB\) as shown in the below figure is
   (a) \((x, y)\) (b) \((y, x)\) (c) \(\left(\frac{x}{2}, \frac{y}{2}\right)\) (d) \(\left(\frac{y}{2}, \frac{x}{2}\right)\)

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Prepared by: M. S. KumarSwamy, TGT(Maths)
6. If the pair of equations $2x + 3y = 5$ and $5x + \frac{15}{2}y = k$ represent two coincident lines, then the value of $k$ is:
   (a) $-5$  (b) $\frac{-25}{2}$  (c) $\frac{25}{2}$  (d) $\frac{-5}{2}$

7. If $\tan \theta = \cot (30^\circ + \theta)$, find the value of $\theta$.
   (a) $0^\circ$  (b) $90^\circ$  (c) $60^\circ$  (d) $30^\circ$

8. If triangle ABC is right angled at C, then the value of cosec (A+B) is
   (a) 0  (b) 1  (c) $\frac{2}{\sqrt{3}}$  (d) not defined

9. The value of $(\sin 45^\circ + \cos 45^\circ)$ is
   (a) $\frac{1}{\sqrt{2}}$  (b) $\sqrt{2}$  (c) $\frac{\sqrt{3}}{2}$  (d) 1

10. The lower limit of the median class in the below data is
   
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<td>12</td>
<td>24</td>
<td>6</td>
<td>10</td>
<td>15</td>
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   (a) 30  (b) 40  (c) 50  (d) 60

11. If $ax^2 + bx + c = 0$ has equal roots, then the value of $c$ is ________

   OR

   If one of the zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then the value of $k$ is ______

12. The common difference of the AP: $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}, \ldots$ is ______

13. The total surface area of the given solid figure is ________

14. The perimeters of two similar triangles $\Delta ABC$ and $\Delta PQR$ are 35cm and 45cm respectively, then the ratio of the areas of the two triangles is________

15. A number is chosen at random from the numbers -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5. Then the probability that square of this number is less than or equal to 1 is ________

16. How many three digit natural numbers are divisible by 7?

17. Show that $12^n$ cannot end with the digit 0 or 5 for any natural number $n$.

18. Find the value of $k$ for which the quadratic equation $4x^2 - 3kx + 1 = 0$ has two real equal roots.
19. If the angle between two tangents drawn from an external point ‘P’ to a circle of radius ‘r’ and centre O is 30°, then find the length of OP.

OR
If the radii of two concentric circles are 3 cm and 5 cm, then find the length of each chord of one circle which is tangent to the other circle.

20. In triangle ABC, DE || BC and \( \frac{AD}{DB} = \frac{3}{5} \). If AC = 4.8 cm, find AE.

SECTION – B
Questions 21 to 26 carry 2 marks each.

21. Gardening with children provides the perfect combination of skills and tasks to address the child's development. Young children can practice locomotions skills, body management skills and object control skills while they move from one place to other carrying tools, soil and water. Mayank is in Class X and he is very interested in gardening. One day he made a bird-bath for his garden in the shape of a cylinder with a hemispherical depression at one end (see below figure). The height of the cylinder is 1.45 m and its radius is 30 cm. Find the total surface area of the bird-bath.

22. Two poles of heights 6 m and 11 m stand on a plane ground. If the distance between the feet of the poles is 12 m, find the distance between their tops.

OR
In the below figure, the line segment XY is parallel to side AC of \( \Delta ABC \) and it divides the triangle into two equal parts of equal areas. Find the ratio \( \frac{AX}{AB} \).

23. The 6th term of an Arithmetic Progression (AP) is –10 and its 10th term is –26. Determine the 15th term of the AP.
24. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that \( \angle PTQ = 2 \angle OPQ \).

25. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability that the drawn card is (i) neither a king nor a queen (ii) red queen card.

\textbf{OR}

A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a prime-number less than 23 (ii) a perfect square number.

26. A pedestal is an architectural support for a column, statue, vase, or the like. A statue is a carved or cast figure of a person or animal, especially one that is life-size or larger. A boy visited a museum. A museum is an institution that cares for (conserves) a collection of artifacts and other objects of artistic, cultural, historical, or scientific importance. Many public museums make these items available for public viewing through exhibits that may be permanent or temporary

He saw a statue, 1.6 m tall, stands on the top of a pedestal. He observes from a point on the ground, the angle of elevation of the top of the statue is \( \alpha \) and from the same point the angle of elevation of the top of the pedestal is \( \beta \) such that \( \tan 2\alpha = \cot (150^0 - 3\alpha) \) and \( \sec 4\beta = (135^0 - 5\beta) \). Find the height of the pedestal.

SECTION – C

Questions 27 to 34 carry 3 marks each.

27. Prove that \( \sqrt{3} + \sqrt{5} \) is an irrational number.

\textbf{OR}

Find HCF and LCM of 448, 1008 and 168 using fundamental theorem of arithmetic.

28. Find the number of terms of the AP \( 18,15\frac{1}{2},13,\ldots\ldots,-49\frac{1}{2} \) and find the sum of all its terms.

29. Evaluate: \( \frac{3\cos 55^0}{7\sin 35^0} - \frac{4(\cos 70^0 \cos ec 20^0)}{7(\tan 5^0 \tan 25^0 \tan 45^0 \tan 65^0 \tan 85^0)} \)

\textbf{OR}

If \( x = a \sin \theta + b \cos \theta \) and \( y = a \cos \theta - b \sin \theta \), prove that \( x^2 + y^2 = a^2 + b^2 \).
30. Students of a school are standing in rows and columns in their playground for a drill practice. A, B, C and D are the positions of four students as shown in below figure. Is it possible to place Jaspal in the drill in such a way that he is equidistant from each of the four students A, B, C and D? If so, what should be his position?

![Diagram showing positions of students A, B, C, and D]

31. For the month of February, a class teacher of Class IX has collected absentee record from Class Attendance register for his 45 students. After collecting the data, he analyzed the data and prepared a report on the absentees. Using this report, he drew the following graph for a particular of absentees for the month of February:

![Graph showing number of absentees against number of days absent]

Based on the above graph, answer the following questions:
(i) Form the frequency distribution table for the data.
(ii) Find the mean number of days, a student was absent.
32. If \( \alpha \) and \( \beta \) are the zeroes of the quadratic polynomial \( f(x) = 3x^2 - 4x + 1 \), then find a quadratic polynomial whose zeroes are \( \frac{\alpha^2}{\beta} \) and \( \frac{\beta^2}{\alpha} \).

33. The sum of a two-digit number and the number formed by interchanging its digits is 110. If 10 is subtracted from the original number, the new number is 4 more than 5 times the sum of the digits of the original number. Find the original number.

OR

Solve the following system of equations: \[
\frac{7x - 2y}{xy} = 5 \quad \text{and} \quad \frac{8x + 7y}{xy} = 15
\]

34. In the below figure, AB and CD are two diameters of a circle with centre O, which are perpendicular to each other. OB is the diameter of the smaller circle. If \( OA = 7 \) cm, find the area of the shaded region. (use \( \pi = \frac{22}{7} \))

![Figure with shaded region]

SECTION – D
Questions 35 to 40 carry 4 marks each.

35. A vessel is in the form of hemispherical bowl surmounted by a hollow cylinder of same diameter. The diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 13 cm. Find the total surface area of the vessel. (use \( \pi = \frac{22}{7} \))

OR

A wooden toy was made by scooping out a hemisphere of same radius from each end of a solid cylinder. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the volume of wood in the toy. (use \( \pi = 22/7 \))

36. A highway leads to the foot of 300 m high tower. An observatory is set at the top of the tower. It sees a car moving towards it at an angle of depression of 30°. After 15 seconds angle of depression becomes 60°. Find the distance travelled by the car during this time.

37. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60°.

OR

Construct a triangle with sides 5 cm, 4 cm and 6 cm. Then construct another triangle whose sides are \( \frac{2}{3} \) times the corresponding sides of first triangle.
38. A peacock is sitting on the top of a pillar, which is 9m high. From a point 27 m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal at what distance from the whole is the snake caught?

OR

In a class test, the sum of the marks obtained by P in mathematics and science is 28. Had he got 3 more marks in mathematics and 4 marks less in science, the product of marks obtained in the two subjects would have been 180. Find the marks obtained by him in the two subjects separately.

39. Prove that “In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle.

40. From the following data, draw the two types of cumulative frequency curves and determine the median from the graph.

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