Sample Paper (Session 2017-18)
Class: IX  Subject: Mathematics

Time : 3Hr  M.M: 80

Section A  1 x 6 = 6

1. How many rational numbers can be inserted between 2 and 3?
2. State true or false: \(\sqrt{8} + \sqrt{32} - \sqrt{2} = 5\sqrt{2}\)
3. Which of these two points \((0, -5)\) and \((-5, 0)\) lies on x axis?
4. Simplify \((\sqrt{5} - \sqrt{2}) (\sqrt{5} + \sqrt{2})\)
5. Find the length of each side of an equilateral triangle having an area \(9\sqrt{3}\) cm\(^2\).
6. Express \(\frac{34}{9}\) in the decimal form.

Section B  2 x 6 = 12

7. Find the probability of getting an ace from a well shuffled pack of 52 cards.
8. Plot the points \(A(-4, 0)\) & \(B(3, 0)\) on the cartesian plane and hence find:
   (i) Distance of \(A\) from origin  (ii) Distance between points \(A\) and \(B\).
9. Prove that every line segment has one and only one midpoint. Give Euclid’s axiom which is used.
10. The sum of the two angles of a triangle is \(80^\circ\) and their difference is \(20^\circ\). Find all the angles of the triangle.
11. ABCD is a parallelogram, if the two diagonals are equal, find the measure of \(\angle ABC\)
12. An isosceles right triangle has area \(8\) cm\(^2\). Find the length of its hypotenuse.

Section – C  3 x 10 = 30

13. Two dice are thrown simultaneously 500 times. Each time the sum of the two numbers appearing on their tops is noted and recorded as given in the following table:

<table>
<thead>
<tr>
<th>Sum</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>14</td>
<td>30</td>
<td>42</td>
<td>55</td>
<td>72</td>
<td>75</td>
<td>70</td>
<td>53</td>
<td>46</td>
<td>28</td>
<td>15</td>
</tr>
</tbody>
</table>

If the dice is thrown once more, what is the probability of getting a sum (i) 3 (ii) more than 10 (iii) less than or equal to 5

14. Factorise: \(x^3 - 3x^2 - 9x - 5\)
15. Find the coordinates of the point:
   i) which lies on x and y axes both?
   ii) whose ordinate is -4 and which lies on y-axis.
   iii) whose abscissa is 5 and which lies on x-axis.
17. AP and BQ are bisectors of the two alternate interior angles formed by the intersection of a transversal \(t\) with parallel lines \(l\) and \(m\). Show that \(AP \parallel BQ\).

18. In the given figure \(\angle EAB = \angle EBA\) and \(AC = BD\). Prove that \(AD = BC\).
19. If \( a = 7 - 4\sqrt{3} \), find the value of \( \sqrt{a} + \frac{1}{\sqrt{a}} \) or if \( a = \frac{4}{3\sqrt{5}} \), find the value of \( a + \frac{4}{a} \).

20. If \( a + b + c = 14 \), \( a^2 + b^2 + c^2 = 74 \) and \( a^3 + b^3 + c^3 = 434 \), find the value of \( abc \).

Or

If \( l + m + n = 0 \), then prove that \( \frac{l^2}{mn} + \frac{m^2}{nl} + \frac{n^2}{lm} = 3 \).

21. Plot the points whose vertices are the point (-1, 1), (-3, 2) and (-1, 2) in a certain plane. Name the figure so obtained & find its area.

22. Prove that “Two triangles are congruent if two angles and the included side of one triangle are equal to two angles and the included side of other triangle.”

Or

\( \triangle ABC \) is an isosceles triangle with \( AB = AC \) and \( BD, CE \) are its two median. Show that \( BD = CE \).

Section D

4 x 8 = 32

23. If \( \frac{2}{\sqrt{3} + \sqrt{5}} + \frac{5}{\sqrt{3} - \sqrt{5}} = \sqrt{3} + b\sqrt{5} \), find \( a \) and \( b \).

24. Without actually calculating the cubes, find the value of 
\( 2 (0.3)^3 + (0.4)^3 + (0.5)^3 + (-0.7)^3 + (-0.8)^3 \)

25. If the bisector of angles \( \angle B \) and \( \angle C \) of a triangle \( \triangle ABC \) meet at a point \( O \), then prove that \( \angle BOC = 90^\circ + \frac{1}{2} \angle A \).

26. \( \triangle ABC \) is an isosceles triangle in which \( AB = AC \). Side \( BA \) is produced to \( D \) such that \( AD = AB \). Show that \( \angle BCD \) is a right angle.

27. A rhombus shaped field has green grass for 18 cows to gaze. If each side of the rhombus is 30m and its longer diagonal is 48m, how much area of grass field will each cow be getting?

Or

Find the area of a quadrilateral \( ABCD \), where \( AB = 7 \text{cm}, DA = 15 \text{cm}, AC = 9 \text{cm}, BC = 6 \text{cm} \) and \( CD = 12 \text{cm} \).

28. Bisectors of interior \( \angle B \) and exterior \( \angle ACD \) of a \( \triangle ABC \) intersect at a point \( T \). Prove that \( \angle BTC = \frac{1}{2} \angle BAC \).

Or

In the given figure, \( ABCD \) and \( BPQ \) are lines. \( BP = BC \) and \( DQ \parallel CP \). Prove that (a) \( CP = CD \) (b) \( DP \) bisects \( \angle CDQ \).

29. Show that the difference of any two sides of a triangle is less than the third side.

Or

\( \triangle PQR \) is a triangle & \( S \) is any point in its interior. Show that \( SQ + SR < PQ + PR \).

30. An umbrella is made by stitching 10 triangular pieces of cloth of two different designs, each piece measuring 20cm, 50 cm & 50cm. How much cloth of each design is required by Mr. Amit if he wants to donate 20 such umbrella to the children of slum areas? Which values are depicted here?