CBSE
Class IX Mathematics
Term 1

Time: 3 hours   **Total Marks: 90**

General Instructions:
1. **All** questions are **compulsory**.
2. The question paper consists of **31** questions divided into **four sections:** A, B, C and D. **Section A** comprises of **4** 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 **10** questions of 4 marks each.
3. Question numbers **1 to 4** in **Section A** are multiple choice questions where you have to select **one** correct option out of the given four.
4. Use of calculator is **not** permitted.

Section A
(Questions 1 to 4 carry 1 mark each)

1. Which of the following is irrational?
   A. $(2 - \sqrt{5}) + (3 + \sqrt{5})$
   B. $3(2 + \sqrt{5}) - 3\sqrt{5}$
   C. $\pi - 10$
   D. $\sqrt{\sqrt{16}}$

2. Find the value of p such that (x - 1) is the factor of the polynomial $x^3 + 10x^2 + px$.
   A. p = 7
   B. p = -7
   C. p = -11
   D. p = 11

3. In $\triangle$ ABC and $\triangle$ DEF, AB = DF and $\angle$ A = $\angle$ D. The two triangles will be congruent by AS axiom if one of the following expressions is true:
   A. BC = EF
   B. AC = DE
   C. BC = DE
   D. AC = EF

4. The area of triangle, whose sides are 15 cm, 25 cm and 14 cm is
   A. $18\sqrt{26}$ cm²
   B. $15\sqrt{29}$ cm²
   C. $17\sqrt{23}$ cm²
   D. $20\sqrt{26}$ cm²

Section B
(Questions 5 to 10 carry 2 marks each)

5. Simplify:

$$\left(\frac{81}{16}\right)^{-3/4} \times \left(\frac{25}{9}\right)^{-3/2}$$

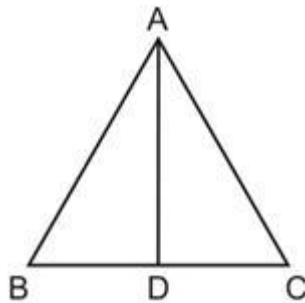6. Factorise: $x^2 + \dfrac{1}{x^2} + 2 - 2x - \dfrac{2}{x}$

7. Where do the following points lie:
   A. (-4,0)
   B. (-10,2)
   C. (0,8)
   D. (10,4)

8. Without actually calculating the cubes, find the value of $75^3 - 25^3 - 50^3$.

9. Lines PQ and RS intersect each other at point O. If $\angle POR : \angle ROQ = 5:7$, then find all the remaining angles.

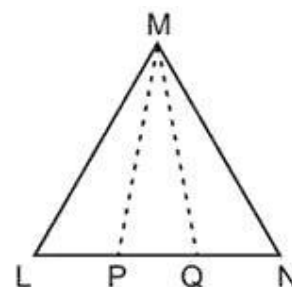10. In the figure, AD is the bisector of $\angle A$; prove that AB > BD.

Section C
(Questions 11 to 20 carry 3 marks each)

11. Simplify:

$$\frac{(25)^{\frac{3}{2}} \times (343)^{\frac{3}{5}}}{16^{\frac{5}{4}} \times 8^{\frac{4}{3}} \times 7^{\frac{3}{5}}}$$
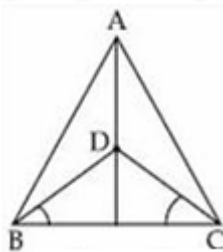
12. (x + 2) is one of the factors of the polynomial $x^3 + 13x^2 + 32x + 20$. Find its remaining factors.

13. In the figure, it is given that LM = MN and LP = QN. Prove that $\triangle LMQ \cong \triangle NMP$

14. The polynomials $p(x) = ax^3 + 3x^2 - 3$ and $q(x) = 2x^3 - 5x + a$ when divided by (x - 4) leave the remainders R_1 and R_2. Find 'a' if $R_1 + R_2 = 0$.

15. In figure, AB = AC, D is the point in the interior of $\triangle ABC$ such that $\angle DBC = \angle DCB$. Prove that AD bisects $\angle BAC$ of $\triangle ABC$.

16. Represent the irrational number $\sqrt{5}$ geometrically.
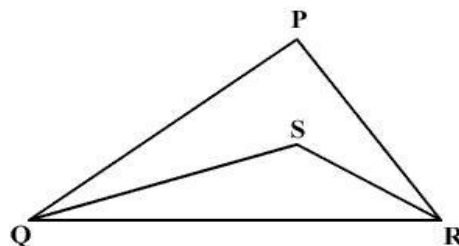
17. A point O is taken inside an equilateral four-sided figure ABCD such that its distances from the angular points D and B are equal. Show that AO and OC are in the same straight line.
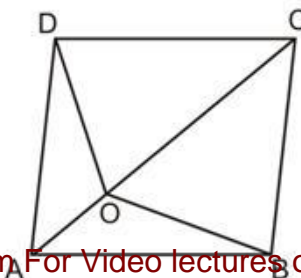
18. If x and y are two positive real numbers such that $8x^3 + 27y^3 = 730$ and $2x^2y + 3xy^2 = 15$ then show that $2x + 3y = 10$.

19. In the figure, PQ > PR, QS and RS are the bisectors of $\angle Q$ and $\angle R$, respectively. Prove that SQ > SR.

20. Factorise: $x^3 - 23x^2 + 142x - 120$.

Section D
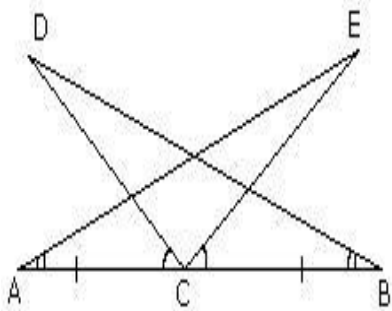### (Questions 21 to 31 carry 4 marks each)

21. Find the value of:
$$\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2}$$

22. How does Euclid's fifth postulate imply the existence of parallel lines? Give a mathematical proof.
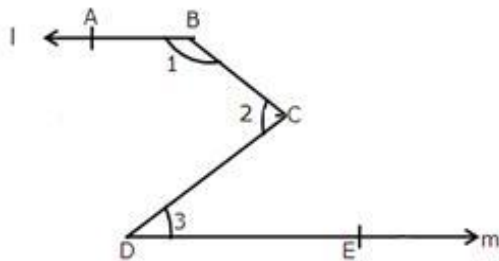
23. simplify:
$$\frac{\left(a^2 - b^2\right)^3 + \left(b^2 - c^2\right)^3 + \left(c^2 - a^2\right)^3}{\left(a-b\right)^3 + \left(b-c\right)^3 + \left(c-a\right)^3}$$

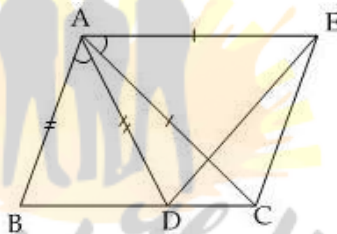24. In the figure, if AC = BC, $\angle DCA = \angle ECB$ and $\angle DBC = \angle EAC$, then prove that BD = AE.

25. In the figure, l || m, show that $\angle 1 + \angle 2 - \angle 3 = 180°$.

26. If both a and b are rational numbers, find a and b in the following expression:

$$\frac{3 - \sqrt{5}}{3 + 2\sqrt{5}} = a\sqrt{5} - b$$

27. In t he figure, AC = AE, AB = AD and $\angle$ BAD = $\angle$ EAC show that BC = DE.

28. Anju suggested a sketch plan to construct a lawn in her school playground by marking four points (-1,0) (1,0) (1,2) (-1,2) on a graph paper and also suggested planting a tree at the centre of the lawn. Plot these points on the graph paper and specify the type of the shape of the lawn suggested by Anju. Also, find the coordinates of the place where the tree is to be planted. What value is indicated from this action?

29. If M is the mid-point of the hypotenuse PR of a right-angled triangle PQR, prove that

$$QM = \frac{1}{2}PR$$
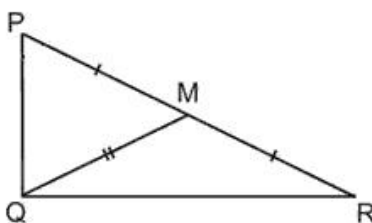
30. A garden is in the shape of quadrilateral. The sides of the garden are 9 m, 40 m, 28 m and 15 m, respectively, in consecutive order, and the angle between the first two sides is a right angle. Find the area of the garden.

31. The polynomials $x^3 + 2x^2 - 5ax - 8$ and $x^3 + ax^2 - 12x - 6$ when divided by (x - 2) and (x - 3) leave remainders p and q, respectively. If q - p = 10, then find the value of a.