Roll.No. ☐☐☐☐☐☐☐☐   Code.No. 041/10

- Please check that this question paper contains **5** printed pages
- Code number given on the right hand side of the question paper should be written on the title page of the answer book by the candidates.
- Please check that this question paper contains **30** questions.
- Please write down the serial number of the question before attempting it.

MATHEMATICS

*Time allowed: 3 hours]*   *[Maximum Marks: 80*

General Instructions

1. All questions compulsory

2. The question paper consist of thirty questions divided in to 4 sections A,B,C and D. Section A comprises of ten questions of 1 marks each ,Section B comprises of five questions of 2 marks each, Section C comprises of ten questions of 3 marks each and section D comprises of five questions of 6 marks each

3. All questions in section A are to be answered in one word , one sentence or as per the exact requirement of the question

4. there is no overall choice .However internal choice has been provided in one question of 2 marks each ,three question of three marks each and two questions of 6 marks each .You have to attempt only one of the alternatives in all such questions.

5. In question on construction ,drawings should be neat and exactly as per the given measurements

6. Use of calculators is not permitted .However you may ask for mathematical tables

SECTION A

1. Write the formula for the theoretical probability of an event E?

2. Check whether the following pair of linear equations have unique solution :
   $$2x - 2y - 2 = 0; \qquad 4x - 4y - 5 = 0$$

3. A rational number x is expressed in the form p/q. What is the condition to be satisfied so that the decimal expansion of x terminates?

4. A decorative block is shown in figure below. Write the formula to calculate the surface area of the block
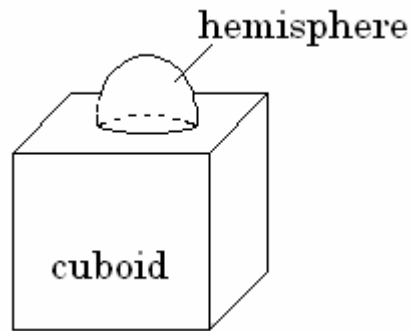
5. Write the condition to be satisfied so that $ax^2 + bx + c = 0$ represents a standard quadratic equation

6. What happens to the value of $\cos\theta$ as the value of θ increases?.

7. What is the line PQ called? What happens when A and B coincide?
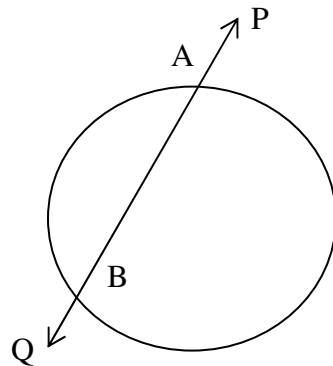
8. A(6,1), B(8,2), C(9,4), D(p,3) are the vertices of a parallelogram taken in order. Find the value of p.

9. A survey was conducted among people of a city to find the most popular TV programme being watched. Which measure of central tendency is likely to give accurate results?

10. Using formula for area of a sector, find out the area of a quadrant of a circle

SECTION B

11. The first and last terms of an AP are 5 and 45. How many terms should be taken to give the sum 400?

12. Diagonals of a quadrilateral intersect at point O such that $\dfrac{AO}{BO} = \dfrac{CO}{DO}$. Show that ABCD is a trapezium.

13. A carton consists of 100 shirts of which 88 are good, 8 have minor defects and the rest have major defects. Two traders Jim and Mike select one shirt at random. Jim will accept only shirts that are good while Mike will reject shirts which have major defects. Find the probability that the shirt selected
(i) is accepted by Jim?   (ii) is accepted by Mike?

14. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2∠OPQ
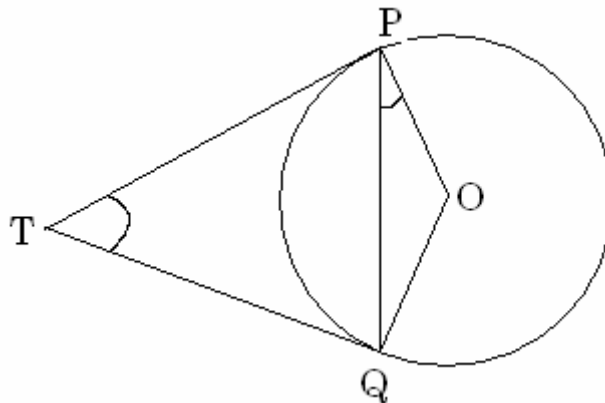
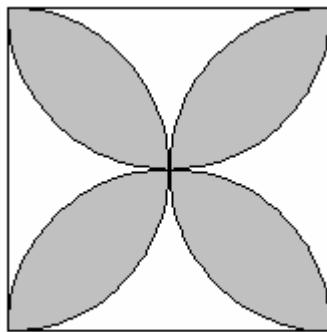15. Solve $3x^2 - 5x + 2 = 0$ by the method of completing the squares.

SECTION C

16. A polynomial $p(x) = 3x^3 - 5x^2 - 11x - 3$ has 3 as one of its zeros. Find the other two zeroes.

17. Show that $5 - \sqrt{3}$ is irrational.

    Or

    Find the HCF of 4052 and 12576

18. Find the area of the shaded region:

<······10 cm········>

19. Draw a pair of tangents to a circle of radius 4 cm inclined at angle of 60^0.

20. In an equilateral triangle ABC, D is a point on BC such that BD = 1/3 BC. Prove that $9AD^2 = 7 AB^2$

21. Find the discriminant of the quadratic equation $3x^2 - 2x + 1/3 = 0$. Find the nature if the root, Find them is they are real.

22. Find the expression for the perpendicular bisector of the line joining the points (3,5) and (7,1)

23. Prove that $\dfrac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \dfrac{1}{\sec\theta - \tan\theta}$

    Or

    Show that $\sqrt{\dfrac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta}} = \sqrt[4]{\sec^2\theta - 1}$

24. E is a point on side CB produced of an isosceles triangle ABC with AB=AC. If $AD \perp BC$ and $EF \perp AC$, prove that $\triangle ABD \sim \triangle ECF$

25. Two water taps can together fill a tank in $9\dfrac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

SECTION D

26. Check whether the following system of equation is consistent? If so, solve them graphically

      x + 3y = 6   2x − 3y = 12

27. A 1m tall girl spots a balloon moving with the wind in a horizontal line at a height of 50m from the ground. The angle of elevation of the balloon at that instant was 60^0, after sometime, the elevation decreases by 15^0. Find the distance traveled by the balloon during the interval.

28. The ratio of areas of two similar triangles is equal to the ratio of the squares of the corresponding sides. Prove the above statement.
    Using the above, do the following
    If the areas of two similar triangles are equal, prove that they are congruent.

29. The table below shows the percentage distribution of female teachers in schools of rural areas of various states in the country. Find the mean percentage of female teachers using (i) direct method (ii) assumed mean method and (iii) Step deviation method. Compare your answers

Age	$15 - 25$	$25 - 35$	$35 - 45$	$45 - 55$	$55 - 65$	$65 - 75$	$75 - 85$
Percentage	6	11	7	4	4	2	1

30. An industry runs in a shed which is in the shape of a cuboid surmounted by a half cylinder. If the cuboidal part of the shed is of dimensions 7m x 15 m x 8m, find the volume of air the shed can hold. If the machinery in the shed occupies a space of 300m³ and there are 20 workers each requiring 0.08m³ of space on an average, then how much air is in the shed? Use $\pi = \dfrac{22}{7}$

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(Important Note: Most of these questions are solved in the NCERT Textbook. The idea of setting this paper is to first make sure that the student is confident and thorough with questions from the textbook which is expected by the Board. Please do send in your opinions and suggestions to k_srijith@rediffmail.com. You could also contact this e-mail for any doubts/clarifications)