Time: 3 Hours **MATHS TEST 3** **Max. Marks: 80**

General Instructions:

(1) *All questions are compulsory.*

(2) *The Question Paper consists of thirty questions divided into 4 Sections A, B, C and D. Section A comprises of ten questions of 1 mark 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 question 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 questions of 3 marks each and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.*

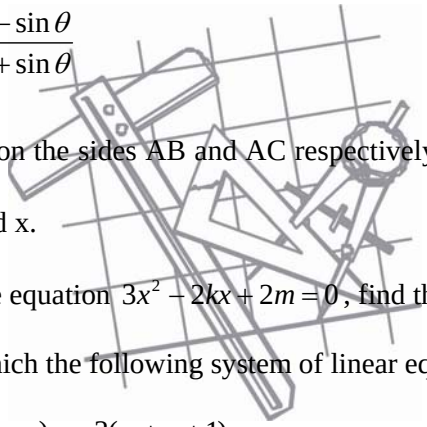
(5) *In question on construction, drawings should be neat and exactly as per the given measurements.*

(6) *Use of calculators is not permitted. However, you may ask for mathematical tables.*

SECTION A

1. A black die and a white die are thrown at the same time. . What is the probability of obtaining the same number on both dice?

2. If $\tan\theta = \frac{4}{3}$, find the value of $\frac{1-\sin\theta}{1+\sin\theta}$



3. In a $\Delta ABC, D$ and E are points on the sides AB and AC respectively such that DE || BC. If AD = 4, AE = 8, DB = x -4 and EC = 3x – 19, find x.

4. If x = 2 and x = 3 are roots of the equation $3x^2 - 2kx + 2m = 0$, find the value of k and m.

5. Find the values of p and q for which the following system of linear equations has infinite number of solutions

$2x + 3y = 7$; $(p+q)x + (2p-q)y = 3(p+q+1)$

6. A cistern can be filled by two pipes in 33 1/3 minutes; if the larger pipe takes 15 minutes less than the smaller to fill the cistern, represent this in equation form

7. Without actually performing the long division, state whether the rational number $\frac{29}{343}$ will have terminating decimal expansion or a non-terminating repeating decimal expansion:

8. It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.992. What is the probability that the 2 students have the same birthday?

9. Find a point on the y-axis which is equidistant from the point A(6, 5) and B(-4, 3).

10. A pendulum swings through an angle of 30^o and describes an arc 8.8 cm in length. Find the length of the pendulum. (*Use* $\pi = \frac{22}{7}$)

SECTION B

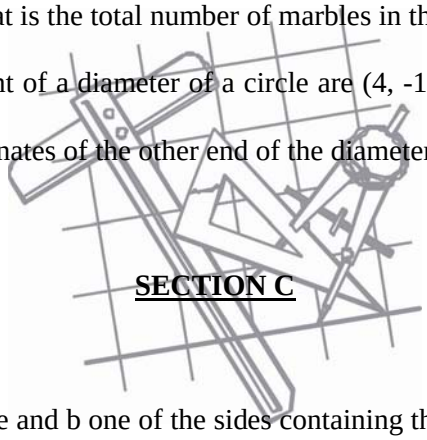
11. Find the values of a and b so that $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $x^2 + 1$.

12. If A, B, C are the interior angles of a triangle ABC, prove that $\tan\left(\frac{B+C}{2}\right) = \cot\left(\frac{A}{2}\right)$

13. If A(5, -1), B(-3, -2) and C(-1, 8) are the vertices of triangle ABC, find the length of median through A

14. The probability of selecting a green marble at random from a jar that contains only green, white and yellow marbles is $\frac{1}{4}$. The probability of selecting a white marble at random from the same jar is $\frac{1}{3}$. If this jar contains 10 yellow marbles. What is the total number of marbles in the jar ?

15. The coordinates of one end point of a diameter of a circle are (4, -1) and the coordinates of the centre of the circle are (1, -3). Find the coordinates of the other end of the diameter.



SECTION C

16. If A be the area of a right triangle and b one of the sides containing the right angle, prove that the length of the altitude on the hypotenuse is $\frac{2Ab}{\sqrt{b^4 + 4A^2}}$.

17. Points A and B are 90 km apart from each other on a highway. A car starts from A and another from B at the same time. If they same time. If they go in the same direction they meet in 9 hours and if they go in opposite directions they meet in $\frac{9}{7}$ hours. Find their speeds, grapically

18. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taken B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

OR

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

19. In an equilateral triangle of side 24 cm, a circle is inscribed touching its sides. Find the area of the remaining portion of the triangle. (Take $\sqrt{3} = 1.732$).

20. Three sets of English, Hindi and Mathematics books have to be stacked in such a way that all the books are stored topic-wise and the height of each stack is the same. The number of English books is 96, the number of Hindi books is 240 and the number of Mathematics books is 336. Assuming that the books are of the same thickness, determine the number of stacks of English, Hindi and Mathematics books.

OR

Show that $n^2 - 1$ is divisible by 8, if n is an odd positive integer.

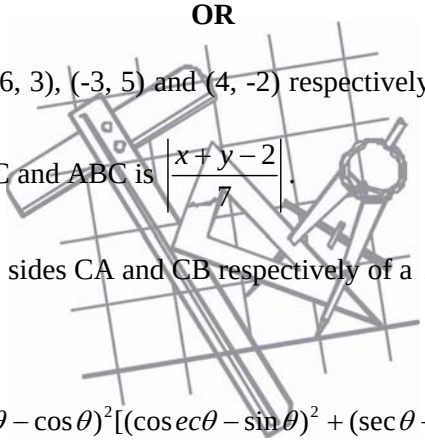
21. If p^{th}, q^{th} and r^{th} terms of an A.P. are a, b, c respectively, then show that $(a-b)r + (b-c)p + (c-a)q = 0$

22. Find a number whose square diminished by 119 is equal to ten times the excess of the number over 8.

23. If a $\neq$ b $\neq$ c, prove that the points $(a, a^2), (b, b^2), (c, c^2)$ can never be collinear.

OR

The coordinates of A, B, C are (6, 3), (-3, 5) and (4, -2) respectively and P is any point (x, y). Show that the ratio of the areas of triangles PBC and ABC is $\left|\frac{x+y-2}{7}\right|$.



24. P and Q are the mid-points of the sides CA and CB respectively of a ΔABC, right angled at C. Prove that : $4(AQ^2 + BP^2) = 5AB^2$

25. Prove that $(\operatorname{cosec}\theta - \sin\theta)^2 (\sec\theta - \cos\theta)^2 [(\operatorname{cosec}\theta - \sin\theta)^2 + (\sec\theta - \cos\theta)^2 + 3] = 1$

SECTION D

26. A man rides one third of the the distance from A to B at the rate of a km an hour, & the remainder at the rate of 2b km an hour. If he had travelled at a uniform rate of 3c km an hour, he could ridden from A to B & back again in the same time. Prove that $\frac{1}{a}, \frac{1}{c}, \frac{1}{b}$ are in AP

27. The length of tangents drawn from external point to a circle are equal. Prove it.

The radius of the in circle of a triangle is 4 cm and the segments into which one side is divided by point of contact are 6 cm and 8 cm. Determine the other two sides of the triangle, Using the above theoram

28. If the angle of elevation of a cloud from a point *h* metres above a lake is α and the angle of depression of its reflection in the lake is β, find that the height of the cloud?

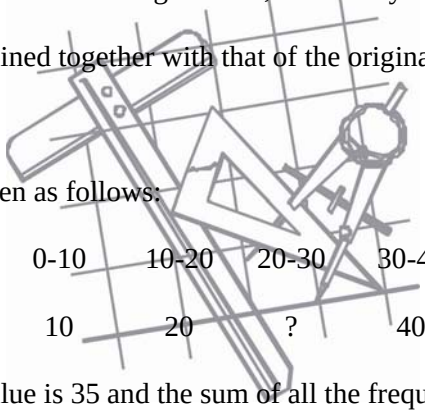
29. (i) Water flows at the rate of 10 metres per minute through a cylindrical pipe 5 mm in diameter. How long would it take to fill a conical vessel whose diameter at the base is 40 cm and depth 24 cm ?

(ii) If The radii of the internal and external surfaces spherical shell are 3 cm and 5 cm respectively. It is melted and recast into a solid right circular cylinder of height $10\frac{2}{3}$ cm. Find the diameter of the base of the cylinder.

OR

(i)The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be 1/27 of the volume of the given cone, at what height above the base, the section has been made?

(ii) An iron spherical ball has been melted and recast into smaller balls of equal size. If the radius of each of the smaller balls is 1/4 of the radius of the original ball, how many such balls are made? Compare the surface area of all the smaller balls combined together with that of the original ball.



30. An incomplete distribution is given as follows:

Variable :	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency :	10	20	?	40	?	25	15

You are given that the median value is 35 and the sum of all the frequencies is 170.
Fill up the missing frequencies, using the median formula.

OR

The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the modal monthly expenditure of the families. Also, find the mean monthly expenditure:

Expenditure (in Rs.)	Frequency
1000-1500	24
1500-2000	40
2000-2500	33
2500-3000	28
3000-3500	30
3500-4000	22
4000-4500	16
4500-5000	7