Series: DPS/ST/M/PB/17- 18 **Code:041**

DELHI PUBLIC SCHOOL:: SURAT

MATHEMATICS

Roll No: | | | | **Class:X Marks: 80** **Time Allowed: 3 hours**

General Instructions :

(i) The question paper comprises of **four Sections A,B , C and D**. You are to attempt all the sections.

(ii) **All** questions are **compulsory**.

(iii) **All** questions of **Section-A, Section-B, Section-C and Section-D** are to be attempted separately.

(iv) Question numbers **1** to **6** in **Section-A** are **one mark** questions.

(v) Question numbers **7- 12** in **Section-B** are **two marks** questions.

(vi) Question numbers **13** to **22** in **Section-C** are **three marks** questions.

(vii) Question numbers **23** to **30** in **Section-D** are **four marks** questions.

(viii) There is no overall choice. However, an internal choice has been provided in 4 questions of 3 marks each and 3 questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

Section- A

1. If „a" and „b" are two positive integers such that the least prime factor of „a" is 7 and the least prime factor of „b" is 3, then find least prime factor of „a+b".

2. If the root of the quadratic equation $x^2 + kx - \frac{5}{4} = 0$ is $\frac{1}{2}$, then find the value of *k.*

3. Is series $\sqrt[3]{1}, \sqrt[3]{27}, \sqrt[3]{125}, \sqrt[3]{343}, \ldots\ldots$ an A.P? Give reason.

4. If $\Delta ABC \sim \Delta DEF, \angle B = \angle E = 90°, ar(ABC) = 6\ cm^2, BC = 4\ cm\ and\ DE = 9\ cm$ then find EF.

5. Find the distance between A(0,-3) and B(3,0).

6. For acute angles A and B, $sinA = \cos B$, then find the value of 2A + 2B.

Section- B

7. The LCM of two numbers is 5 times their HCF. The sum of LCM and HCF is 900. If one number is 250, then find the other number.

8. Find the value of α and $\beta$for which the following pair of linear equations has infinite number of solutions.

$3x + 2y = 5$ and $(\alpha + \beta)x + 2\alpha y = 20$

9. How many natural numbers are there between 200 and 900 which are divisible by both 2 and 7?

10. For a circle with centre at origin and a point P(4,0) lying on it, prove that the point Q(4,3) lies outside the circle.

11. Box A contains 30 marbles out of which 15 are blue and remaining are green. Box B contains 15 marbles out of which 7 are yellow and remaining are blue. Marbles of both the boxes are put into a big box C and one marble is selected at random. What is the probability that the selected marble is blue ?

12. A number is selected at random from first 20 natural numbers. What is the probability that it is a multiple of 5?

Section- C

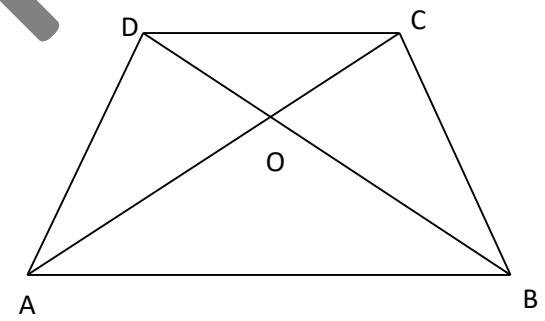
13. Show that $n^2 - 1$ is divisible by 4, if n is an odd positive integer.

14. If $x^3 + 8x^2 + kx + 18$ is completely divisible by $x^2 + 6x + 9$, then find the value of *k*.

15. Solve graphically and determine the co-ordinates of vertices of triangle formed by these two lines and x-axis.

$x - y = 1$ *and* $2x + 3y = 12$

16. In the given figure, if AB‖ CD, DO = $x - 5$, CO = $x + 1$, BO = $x - 4$, AO = $x + 3$, then find the value of *x*.



OR

Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.

17. Find the ratio in which point P $(-1, y)$ lying on the line segment joining points A $(-3,10)$ and B $(6, -8)$ divides it. Also find the value of *y*.

OR

In ΔABC, D, E and F are the mid-points of AB, AC and BC respectively. Find area of ΔABC if A $(0, -1)$, D $(1,0)$ and E $(0,1)$ are given.

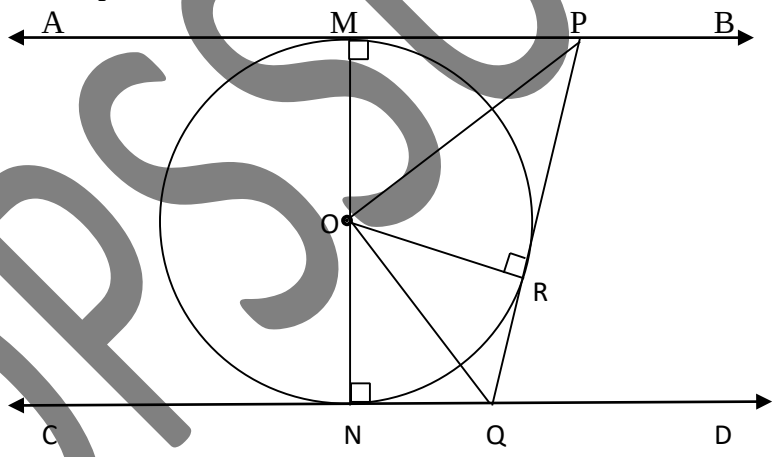
18. Evaluate : $\frac{5cos^2 60° + 4sin^2 30° - tan^2 45°}{sin^2 30° + cos^2 30°}$

OR

Prove that :

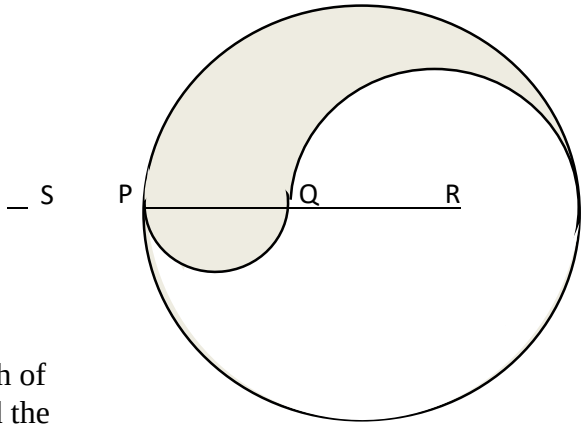
$$\frac{sec^2\theta - cot^2(90° - \theta)}{cosec^2 67° - tan^2\ 23°} + (sin^2 40° + sin^2 50°) = 2$$

19. In the adjoining figure, *AB and CD* are two parallel tangents to a circle with centre O and PQ is also a tangent with point of contact R. Prove that $\angle POQ = 90°$.



20. $PS = 6\ cm$ is the diameter of the circle and $PQ = QR = RS$. Find the area of the shaded

region.



21. Three cubes each of volume 343 cm^3 are joined end-to-end. Find the surface area of resulting cuboid.

OR

From a solid cylinder of height 2.4 cm and diameter 1.4 cm, a conical cavity of the same diameter is hollowed out. Find the total surface area of the remaining solid.

22. The annual profit earned by 30 shops of a shopping complex in a locality give rise to the following distribution. Draw "less than ogive" for the given data.

Profit(in lakhs Rs.)	**Number of shops(frequency)**
More than or equal to 5	30
More than or equal to 10	28
More than or equal to 15	16
More than or equal to 20	14
More than or equal to 25	10
More than or equal to 30	7
More than or equal to 35	3

Section – D

23. A man bought some books for orphan children for Rs. 80. If he had bought 4 more books for the same amount , each book would have cost Re. 1 less. Find the number of books he bought. What moral value is depicted in this question?

OR

An NGO sent ready to eat food packets for the soldiers by a motor boat whose speed is 18 km/h in still water and takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. What moral value is depicted in this question?

24. If S_n denotes the sum of first n terms of an AP, then prove that $S_{30} = 3\,(S_{20} - S_{10})$.

25. Prove that $\frac{1}{cosec\theta - cot\theta} - \frac{1}{sin\theta} = \frac{1}{sin\theta} - \frac{1}{cosec\theta + cot\theta}$

26. State and prove Thales theorem.

OR

Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

27. The angle of elevation of the top of a tower from certain point is 30˚. If the observer moves 20m towards the tower , the angle of elevation of the top increases by 15˚. Find the height of the tower.

28. Draw a line segment PQ of length 10 cm. Taking P as centre, draw a circle of radius 5 cm and Taking Q as centre, draw a circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

29. A container, opened from the top and made up of a metal sheet, is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm, respectively. Find the cost of milk which can completely fill the container at the rate of Rs. 28 per litre. Also find the cost of metal sheet used to make the container, if it costs Rs. 14 per 100 cm^2.

30. Find the missing frequencies in the following distribution table, if total students are 100 and median is 32.

Marks obtained	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Total
No. of students	10	?	25	30	?	10	100

OR

The following table shows the ages of customers in a gift shop during a week. Find the mode and mean of the data.

Age	5 - 15	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65
Number of people	6	11	21	23	14	5

END OF EXAMINATION