

Series NBSE/1

SET-1

Code No. **041/10/1**

Roll No.

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Candidates must write the Code No. on the title page of the answer-book.

- Please check that this question paper contains **8** 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 candidate.
- Please check that this question paper contains **40** questions.
- **Please write down the Serial Number of the question before attempting it.**
- **15** minutes time has been allotted to read this question paper.

# MATHEMATICS STANDARD X

Time allowed : 3 hours

Maximum Marks : 80

## General Instructions :

- All questions are **compulsory**.
- This question paper consists of **40** questions divided into four sections – A, B, C and D.
- Section **A** contains **20** questions of **1** mark each. Section **B** contains **6** questions of **2** marks each. Section **C** contains **8** questions of **3** marks each. Section **D** contains **6** questions of **4** marks each.
- There is no overall choice. However, an internal choice has been provided in **two** questions of **1** mark, **two** questions of **2** marks, **four** questions of **3** marks each and **three** questions of **4** marks each. You have to attempt only one of the alternative in all such questions.
- Use of **calculator** is not permitted.



## SECTION - A

1. Write down the decimal expansion of  $\frac{16}{3125}$  without actual division. 1
2. If 3 is a solution of  $3x^2 + (k-1)x + 9 = 0$ , then  $k = ?$  1

**OR**

If  $x = -\frac{1}{2}$  is a solution of  $3x^2 + 2kx - 3 = 0$ , find  $k$ .

3. Determine the 10th term from the end of the AP 4, 9, 14, ....., 254. 1
4. If the points A(4, 3) and B(x, 5) are on the circle with centre O(2, 4). Find the value of  $x$ . 1
5. ABC is an isosceles triangle right angled at C. Is  $AB^2 = 2AC^2$ ? 1
6. If  $15 \cot \theta = 8$ , then find the value of  $\frac{(1 - \sin \theta)(1 + \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$ . 1

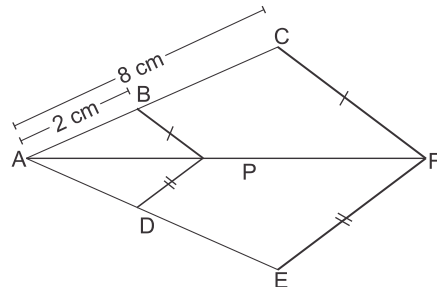
**OR**

Find the value of  $\theta$  if  $2 \sin 2\theta = \sqrt{3}$ .

7. If the zeroes of the quadratic polynomial  $ax^2 + bx + c$ ,  $c \neq 0$  are equal, then: 1
  - (a)  $c$  and  $a$  have the same sign
  - (b)  $c$  and  $b$  have the same sign
  - (c)  $c$  and  $a$  have the opposite sign
  - (d)  $c$  and  $b$  have the opposite sign
8. If a pair of linear equation is inconsistent then their graph lines will be 1
  - (a) Always coincident
  - (b) Always intersecting
  - (c) Always parallel
  - (d) Intersecting are coincident

9. If the lines given by  $3x + 2Ky = 2$  and  $2x + 5y + 1 = 0$  are parallel, then the value of K is: 1
- (a)  $\frac{-5}{5}$  (b)  $\frac{2}{5}$  (c)  $\frac{3}{2}$  (d)  $\frac{15}{4}$
10. Which constant should be added and subtracted to solve the quadratic equation  $4x^2 - \sqrt{3}x - 5 = 0$  by the method of completing the square? 1
- (a)  $\frac{-5}{5}$  (b)  $\frac{3}{64}$  (c)  $\frac{3}{14}$  (d)  $\frac{9}{10}$
11. The roots of the equation  $2x - \frac{3}{4} = 1$  are: 1
- (a)  $\frac{-1}{2}, \frac{3}{2}$  (b)  $\frac{1}{2}, -1$  (c)  $\frac{3}{2}, -1$  (d)  $\frac{3}{2}, 1$
12. If the sum of roots of the equation  $x^2 - (K + 6)x + 2(2K - 1) = 0$  is equal to half of their product, then 1
- (a)  $K = 1$  (b)  $K = 5$  (c)  $K = 6$  (d)  $K = 7$
13. If  $18, a, b, -3$  are in AP then  $a + b = ?$  1
- (a) 7 (b) 11 (c) 15 (d) 19

14. In the given figure, if  $PB \parallel CF$  and  $DP \parallel EF$ , then  $\frac{AD}{DE}$  1



- (a)  $\frac{1}{4}$  (b)  $\frac{1}{3}$  (c)  $\frac{2}{3}$  (d)  $\frac{3}{4}$
15. Area of the largest triangle that can be inscribed in a semi-circle of radius  $r$  units is: 1

- (a)  $\sqrt{2}r^2$  sq. unit (b)  $\frac{1}{2}r^2$  sq. unit (c)  $r^2$  sq. unit (d)  $2r^2$  sq. unit



16. A metallic spherical shell of internal and external diameters 4 cm and 8 cm respectively is melted and recast into the form a cone of base diameter 8 cm. The height of the cone is: 1
- (a) 12 cm                      (b) 14 cm                      (c) 15 cm                      (d) 18 cm
17. Two cubes have their volumes in the ratio 1 : 27. The ratio of their surface areas is: 1
- (a) 1 : 3                      (b) 1 : 8                      (c) 1 : 9                      (d) 1 : 18
18. If 35 is removed from the data : 30, 34, 35, 36, 37, 38, 39, 40, then the median will increased by: 1
- (a) 0.5                      (b) 1                      (c) 1.5                      (d) 2
19. If  $u_i = \frac{x_i - 25}{10}$ ,  $\Sigma f_i u_i = 20$ ,  $\Sigma f_i = 100$ , then  $\bar{x} = ?$  1
- (a) 23                      (b) 24                      (c) 25                      (d) 27
20. Two dice are thrown together. The probability of getting the same number of both dice is: 1
- (a)  $\frac{1}{2}$                       (b)  $\frac{1}{3}$                       (c)  $\frac{1}{6}$                       (d)  $\frac{1}{12}$

### SECTION B

21. If  $\frac{241}{4000} = \frac{241}{2^m \times 5^n}$ , find the values of  $m$  and  $n$  where  $m$  and  $n$  are non-negative integers. Hence write its decimal expansion without actual division. 2

**OR**

Can two numbers have 18 as their HCF and 380 as their LCM? Give reasons.

22. Find the sum of first 10 terms of the AP: 2, 7, 12, ... 2

**OR**

If the sum of first  $m$  terms of an AP is  $2m^2 + 3m$ , then find its second term.

23. If the pair of linear equations given by  $3x + 2 - Ky = 2$  and  $2x + 5y + 1 = 0$  represent parallel lines then find the value of  $K$ . 2

24. If the point  $P(x, y)$  is equidistant from the point  $A(3, 6)$  and  $B(-3, 4)$ , prove that  $3x + y - 5 = 0$ . 2
25. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is four times that of red ball, find the number of blue balls in the bag. 2
26. A pair of dice is thrown once. Find the probability of getting a number. 2
- (a) greater than 4 on each dice. (b) same number on each dice.

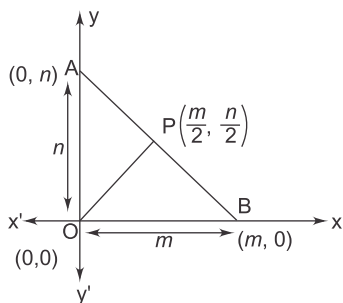
### SECTION C

27. A merchant has 120 litres of oil of one kind, 180 litres of another kind and 240 litres of third kind. He wants to sell the oil by filling the three kinds of oil in tins of equal capacity. What should be the greatest capacity of such a tin? 3
28. Solve the given system of equations 3

$$99x + 101y = 499$$

$$101x + 99y = 501$$

29. Find the area of the triangle formed by joining the midpoints of the sides of the triangle whose vertices are  $A(2, 1)$ ,  $B(4, 3)$  and  $C(2, 5)$ . 3

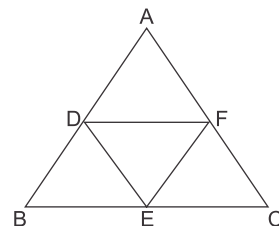


**OR**

Show that the points  $(2a, 4a)$ ,  $(2a, 6a)$ ,  $(2a + a\sqrt{3}, 5a)$  are the vertices of an equilateral triangle.



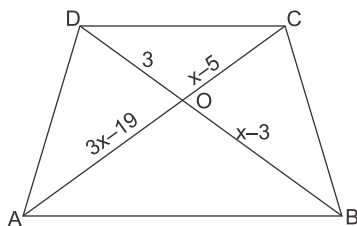
30. D, E, F are respectively the mid-point of the sides AB, BC and CA of  $\triangle ABC$ . Find the ratios of the area of  $\triangle DEF$  and  $\triangle ABC$ .



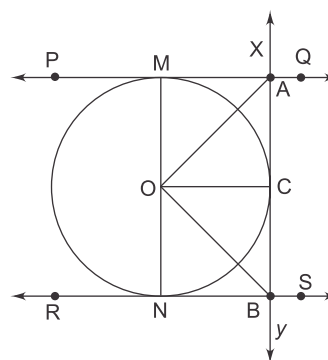
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OR

In the given figure  $AB \parallel DC$ . Find the value of  $x$ .



31. In the given figure, PQ and RS are two parallel tangents to a circle with centre O and another tangent XY, with point of contact C intersects PQ at A and RS at B. Prove that  $\angle AOB = 90^\circ$ .



3

32. Draw a line segment AB of length 7 cm. Using ruler and compass, find a point P on AB such that  $\frac{AP}{AB} = \frac{3}{5}$ .

3

33. Prove that

3

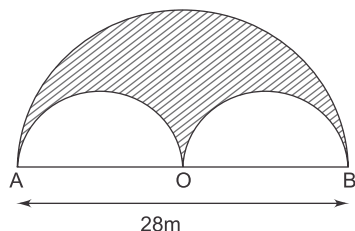
$$\frac{\sin \theta - \cos \theta}{\sin \theta + \cos \theta} + \frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} = \frac{2}{\sin^2 \theta - 1}$$

OR

If  $\sin \theta = \frac{m}{n}$ , find the value of  $\frac{\tan \theta + 4}{4 \cot \theta + 1}$

34. In the given figure, a semicircle is drawn with O as centre and AB as diameter. Semi circles are drawn with AO and BO as diameter. If  $AB = 28$  m, find the perimeter of the shaded region.

3



$$\left[ \text{Use } \pi = \frac{22}{7} \right]$$

**OR**

A hemispherical depression is cut out from one face of a cubical wooden block of edge 21 cm, such that the diameter of the hemisphere is equal to the edge of the cube. Determine the volume and total surface area of the remaining block.

### SECTION D

**35.** Solve for  $x$ :  $12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$  **4**

**OR**

A two-digit number is such that the product of its digit is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.

**36.** Prove that in a triangle, if square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle. **4**

**37.** Prove that  $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = 2\sec\theta$  **4**

**38.** From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be  $30^\circ$  and  $60^\circ$ . If the height of the lighthouse is  $h$  metres and the line joining the ships passes through the foot of the lighthouse, show that the distance between the ships is  $\frac{4}{\sqrt{3}}h$  metres. **4**

**OR**

From the top of a building, 15 m high, the angle of elevation of the top of a tower is found to be  $30^\circ$ . From the bottom of the same building the angle of elevation of the top of the tower is found to be  $60^\circ$ . Find the height of the tower and the distance between the tower and building.



39. Derive the formula for volume of the frustum of a cone, using the symbol as explained, i.e.,  $V = \frac{1}{3}\pi(r_1^2 + r_1r_2 + r_2^2)h$  4

40. The students of a Vidyalaya were asked to collect money from a colony for the welfare of the poor and needy children by performing the Drama in the colony related to subject 'cleanliness'. They performed together and the collection is as under. Find the mean and mode of the given data. 4

Collection (in ₹)	No. of families
1000 – 1500	24
1500 – 2000	40
2000 – 2500	33
2500 – 3000	28
3000 – 3500	30
3500 – 4000	22
4000 – 4500	16
4500 – 5000	7

OR

The mean of the following frequency distribution is 62.8 and the sum of all the frequencies is 50. Compute the missing frequencies  $f_1$  and  $f_2$ .

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	$f_1$	10	$f_2$	7	8