CBSE Board
Class X Mathematics
Sample Paper 1 (Standard)

Time: 3 hrs **Total Marks: 80**

General Instructions:

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

Section A
(Questions 1 to 10 are multiple choice questions.
Select the most appropriate answer from the given options)

1. Euclid's division lemma states that for two positive integers a and b, there exist unique integers q and r such that a = bq + r, where r must satisfy
   A. $1 < r < b$
   B. $0 < r \leq b$
   C. $0 \leq r < b$
   D. $0 < r < b$

2. If the arithmetic mean of x, x + 3, x + 6, x + 9 and x + 12 is 10, the x =
   A. 1
   B. 2
   C. 6
   D. 4

3. If the LCM of a and 18 is 36 and the HCF of a and 18 is 2, then a =
   A. 2
   B. 3
   C. 4
   D. 1

4. The value of k for which the system of equations $3x + 5y = 0$ and $kx + 10y = 0$ has a non-zero solution is

A. 0
B. 2
C. 6
D. 8

5. Sin 2A = 2sin A is true when A =

A. 0
B. 30°
C. 45°
D. 60°

6. The value of cos 1° cos 2° cos 3° …..cos180° is

A. 1
B. 0
C. -1
D. None of these

7. If $x\sin(90 - \theta) \cot(90 - \theta) = \cos(90 - \theta)$ then x =

A. 0
B. 1
C. -1
D. 2

8. The distance between the points $(a \cos \theta + b \sin \theta, 0)$ and $(0, a \sin \theta - b \cos \theta)$ is

A. $a^2 + b^2$
B. $a + b$
C. $a^2 - b^2$
D. $\sqrt{a^2 + b^2}$

9. If the distance between the points (4, p) and (1, 0) is 5, then p =

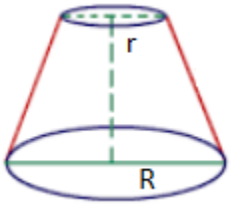
A. ± 4
B. 4
C. -4
D. 0

10. If the centroid of the triangle formed by the points (3, -5), (-7, 4), (10, -k) is at the point (k, -1) then k =

A. 3
B. 1
C. 2
D. 4

(Q 11 – Q 15) Fill in the blanks

11. The volume of the given figure is ____



12. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then the value of k is ___

OR

If the product of two zeros of the polynomial $f(x) = 2x^3 + 6x^2 - 4x + 9$ is 3, then its third zero is ___

13. If ΔABC and ΔDEF are two triangles such that $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD} = \frac{3}{4}$ then write $\frac{A(\Delta ABC)}{A(\Delta DEF)} =$

14. The nth term of an A.P., the sum of whose n terms is S_n is ___

15. From the letters of the word "MOBILE", a letter is selected. The probability that the letter is a vowel is____

(Q 16 – Q 20) Answer the following

16. Find the sum of the exponents of the prime factors in the prime factorization of 196.

17. Find the length of the hypotenuse of an isosceles right triangle whose one side is $4\sqrt{2}$ cm.

18. If PT is a tangent at T to a circle whose centre is O and OP = 17 cm, OT = 8 cm, find the length of the tangent segment PT.

OR

Two concentric circles are of radius 30 cm and 18 cm. Find the length of the chord of the larger circle which touches the smaller circle.

19. Find the sum of the -26, -24, -22,....to 36 terms.

20. Find the condition on k if the equation $x^2 + 4x + k = 0$ has real and distinct roots.

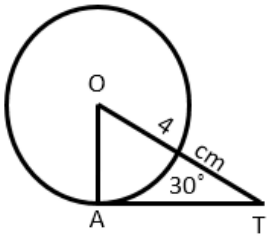
Section B

21. Use Euclid's division algorithm to find H.C.F. of 870 and 225.

OR

If HCF (26, 169) = 13, then find LCM(26, 169).

22. In the given figure, AT is a tangent to the circle with centre O. Find the length of AT.



OR

Show that the tangents at the end points of a diameter of a circle are parallel.

23. An umbrella has 10 ribs which are equally spaced. Assuming the umbrella to be a flat circle of radius 40 cm, find the area between two consecutive ribs of the umbrella.

24. The angle of depression of a car parked on the road from the top of a 150 m high tower is 30°. Find the distance of the car from the tower (in metres).

25. A box contains 20 cards numbered from 1 to 20. A card is drawn at random from the box. Find the probability that the number on the drawn card is

1. Divisible by 2 or 3

2. A prime number

26. Corresponding sides of two triangles are in the ratio 2:3. If the area of the smaller triangle is 48 cm^2, determine the area of the larger triangle.

Section C

27. Prove that: $\sqrt{\frac{\sec\theta-1}{\sec\theta+1}}+\sqrt{\frac{\sec\theta+1}{\sec\theta-1}}=2\operatorname{cosec}\theta$

OR

Without using trigonometric table, find the value of $\frac{\cos 70^\circ}{\sin 20^\circ}+\frac{\cos 59^\circ}{\sin 31^\circ}-8\sin^2 30^\circ$

28. A park with flower plants is to be developed within a quadrilateral with points A(0, −1), B(6, 7), C(−2, 3) and D(8, 3) as vertices and AB and CD as diagonals. Show that

AB and CD bisect each other and $AD^2 + DB^2 = AB^2$. Find the area of the park. (All distances are in km)

As P.M. of your country, will you make a policy of creating green parks and gardens inevery village and town of you country? Give reasons.

29. For what values of a and b does the following pairs of linear equations have an infinite number of solutions : $2x + 3y = 7$; $(a - b)x + (a + b)y = 3a + b - 2$

30. In a seminar, the number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively. Find the minimum number of rooms required if in each room the same number of participants are to be seated and all of them being in the same subject.

31. Find the ratio in which the line segment joining the points A(3, –3) and B(–2, 7) is divided by x-axis. Also find the coordinates of the point of division.

32. If mean of the following data is 86, then what is the value of p?

Wages (in Rs.)	50-60	60-70	70-80	80-90	90-100	100-110
No. of workers	5	3	*4*	p	2	13

OR

A fair dice is rolled. Find the probability of getting

(i) 3 on the face of the dice.

(ii) an odd number on the face of the dice.

(iii) a number greater than 1 on the face of the dice.

33. Find three terms of an A.P. whose sum is 3 and product is −8.

OR

Which term of series 3, 8, 13, 18, …. is 498?

34. If one of the zero of the quadratic polynomial $2x^2 - 3x + p$ is 3, then find its other zero. Also find the value of p.

Section D

35. Draw a triangle ABC with side BC = 6 cm, $\angle C = 30^o$ and $\angle A = 105^o$. Then construct another triangle whose sides are $\frac{2}{3}$ times the corresponding sides of Δ ABC.

36. In triangle ABC, D is the mid-point of BC and AE $\perp$ BC. If AC > AB, then show that: $AB^2 = AD^2 - BC \times DE + \frac{BC^2}{4}$.

37. The angle of elevation of a cloud from a point 60 metres above a lake is 30° and the angle of depression of the reflection of the cloud in the lake is 60°. Find the height of the cloud.

OR

The angle of elevation of a cloud from a point 'h' m above a lake is α and the angle of depression of its reflection in the lake is β. Prove that height of the cloud is $\frac{h(\tan\beta+\tan\alpha)}{\tan\beta-\tan\alpha}$.

38. A lead pencil consists of a wood cylinder with a solid cylinder of graphite fitted into it. The diameter of the pencil is 7 mm. The diameter of the graphite is 1 mm and length of the pencil is 10 cm. Calculate the weight of whole pencil in grams if the density of the wood is 0.6 gm/ cm^3 and of graphite 2.3 gm/ cm^3.

39. For the data given below draw less than ogive curve.

Marks	0 - 10	10 - 20	20 – 30	30 - 40	40 - 50	50 – 60
Number of students	7	10	23	51	6	3

OR

Find the value of p, if the mean of the following distribution is 7.5

x	3	5	7	9	11	13
f	6	8	15	p	8	4

40. The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, find the length of the sides of the field.

OR

A sailor can row a boat 8 km downstream and return to the start point in 1 hour 40 minutes. If the speed of the stream is 2 km ph, then find the speed of the boat in still water.