FULL SYLLABUS TEST

Class: X CBSE **MATHEMATICS (STANDARD)** **Full Marks: 80**

Time: 3 hours

General Instructions

1. *This Question Paper has 5 Sections A, B, C, D and E.*
2. *Section A has 20 MCQs carrying 1 mark each.*
3. *Section B has 5 questions carrying 02 marks each.*
4. *Section C has 6 questions carrying 03 marks each.*
5. *Section D has 4 questions carrying 05 marks each.*
6. *Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.*
7. *All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.*
8. *Draw neat figures wherever required. Take* $\pi = \frac{22}{7}$ *wherever required if not stated.*

SECTION – A

(*Section A consists of 20 questions of 1 mark each*)

1. The number of the two digit natural numbers divisible by 3 is

   (a) 29 (b) 30 (c) 31 (d) 32

2. The decimal expansion of the rational number $\frac{13873}{1250}$ will terminate after

   (a) One decimal place (b) Two decimal places

   (c) Three decimal places (d) Four decimal places

3. The discriminant of the quadratic equation $3\sqrt{3}x^2 + 10x + \sqrt{3} = 0$ is

   (a) 64 (b) 8 (c) $-\sqrt{3}$ (d) 32

4. If $\sin\theta = \frac{1}{3}$, then the value of $9\cot^2\theta + 9$ is

   (a) 1 (b) 81 (c) 9 (d) $\frac{1}{3}$

5. Volume and surface area of a solid hemisphere are numerically equal. Then the diameter of hemisphere is

   (a) 8 cm (b) 6 cm (c) 9 cm (d) 4.5 cm

6. The perimeter of the triangle with vertices (4, 0), (0, 0) and (0, 3) is

   (a) 6 units (b) 10 units (c) 9 units (d) 12 units

7. The fourth vertex D of the parallelogram ABCD whose three vertices are A (–2,3), B (6,7) and C (8,3) is

   (a) (0, –1) (b) (1, 0) (c) (–1, 0) (d) (1, –1)

8. If zeroes of the quadratic polynomial $ax^2 + bx + c = 0$, a, $c \neq 0$ are equal, then

(a) c and a have opposite signs (b) a and b must have opposite signs

(c) c and a have the same signs (d) c and b must have opposite signs

9. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ have

(a) a unique solution (b) exactly two solutions

(c) infinitely many solutions (d) no solutions

10. Given $\sin\alpha = \frac{1}{2}$ and $\cos\beta = \frac{1}{2}$, value of $\cos(\alpha + \beta)$ is

(a) 1 (b) 0 (c) $\frac{\sqrt{3}}{2}$ (d) undefined

11. The minimum value of $\sin\theta$, where θ is a non-negative acute angle, is

(a) 0 (b) $-\infty$ (c) -1 (d) $\frac{1}{2}$

12. A letter of English alphabets is chosen at random. The probability that it is a letter of the word 'MATHEMATICS' is

(a) $\frac{11}{26}$ (b) $\frac{5}{13}$ (c) $\frac{9}{26}$ (d) $\frac{4}{13}$

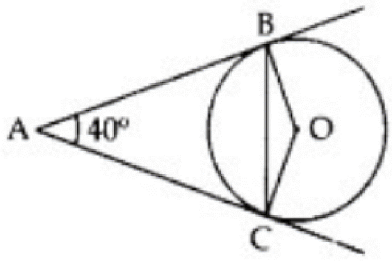
13. If the perimeter of a circle is equal to that of a square, then the ratio of their areas is

(a) 22:7 (b) 14:11 (c) 7:22 (d) 11:14

14. The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is

(a) 7 (b) 14 (c) 21 (d) 28

15. In the given figure, AB and AC are tangents to the circle with centre O such that $\angle BAC = 40^\circ$. Then the value of $\angle OBC$ is

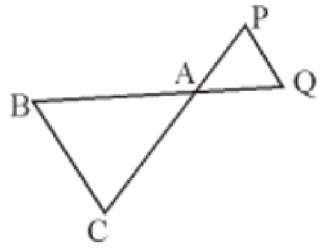


(a) 40° (b) 140° (c) 100° (d) 20°

16. A solid piece of iron of volume 38808 cubic cm is moulded to form a solid sphere. The radius of the sphere is

(a) 21 cm (b) 23 cm (c) 25 cm (d) 19 cm

17.



In the above diagram, $\Delta ABC \sim \Delta AQP$, AB = 6 cm, BC = 8 cm, PQ = 4 cm. The value of BQ is

(a) 5 cm (b) 6 cm (c) 3 cm (d) 9 cm

18. The median of the natural numbers from 26 to 50 is

(a) 36 (b) 37 (c) 38 (d) 39

19. **Statement A (Assertion):** If the nth term of a sequence of number is an + m, a, m are constants and n is a natural number, then the sequence of those numbers are in AP.

Statement R (Reason): The difference between any two consecutive numbers of an AP is constant.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

20. **Statement A (Assertion):** The only point on y-axis, which is equidistant from the points P(–4, –5) and Q(4, –5), is R(0, –5).

Statement R (Reason): The distances PR and QR are equal.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

SECTION – B

(This section comprises of very short answer type-questions (VSA) of 2 marks each)

21. One possible value of $\sin\theta$ is $a+\frac{1}{a}$, true or false? Justify your answer.

22. (a) Two unbiased dice are thrown. Find the probability of getting a sum at least 10.

OR

22. (b) Three unbiased coins are tossed together. Find the probability of getting exactly one Head.

23 (a) Can two numbers have18 as their HCF and 380 as their LCM? Give reasons.

OR

23 (b) Find the least number divisible by all the numbers from 1 to 10 (both inclusive).

24. If the point $P\left(5,\frac{5}{2}\right)$ lies on the line segment joining points A(4, 2) and B (8, 4), then find AP : PB.

25. Find any two negative integral values of 'p' for which 2x+3y – 5 = 0 and px – 6y – 8 = 0 has unique solution.

SECTION – C

(This section comprises of short answer type questions (SA) of 3 marks each)

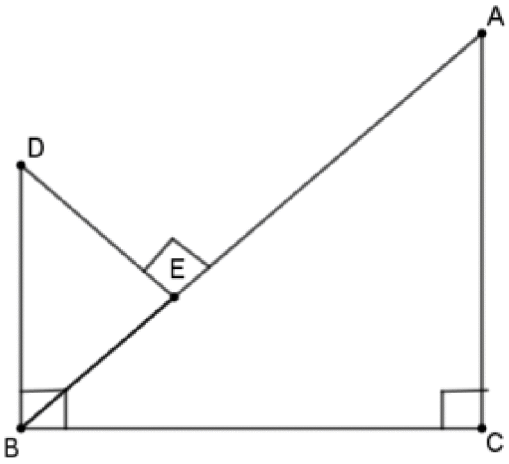
26. Prove that $5 + 6\sqrt{3}$ is an irrational number. Given $\sqrt{3}$ is an irrational number.

27. If $1 + \sin^2\theta = 3\sin\theta\cos\theta$, then prove that $\tan\theta = 1$ or $\frac{1}{2}$

28. (a) Two chords AB and CD of a circle, intersect each other inside the circle at the Point E. Prove that AE. EB = CE. ED

OR

28 (b) In given figure, $DB \perp BC$, $DE \perp AB$ and $AC \perp BC$. Prove that $\frac{BE}{DE} = \frac{AC}{BC}$.



29. Find a natural number whose square diminished by 84 is equal to thrice of 8 more than the given number.

30. Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $\frac{-3}{2}$ respectively. Also find its zeroes.

31. (a) A piece of wire 20 cm long is bent into the form of an arc of a circle subtending an angle of 60^0 at its centre. Find the radius of the circle.

OR

31. (b) Three circles each of radius 3.5 cm are drawn in such a way that each of them touches the other two. Find the area enclosed between three circles.

SECTION – D

(This section comprises of long answer-type questions (LA) of 5 marks each)

32. Prove that the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

33. (a) If 16 is subtracted from twice the greater of two positive numbers, the result is half the other number. If 1 is subtracted from half the greater number, the result is still half the other number. Find the two numbers.

OR

33. (b) Solve the following:

$$\frac{501}{x-y} - \frac{499}{x+y} = 700$$

$$\frac{499}{x-y} - \frac{501}{x+y} = 300$$

34. A ladder rests against a vertical wall at an inclination α to the horizontal. Its foot is pulled away from the wall through a distance p so that its upper end slides a distance q down the wall and then the ladder makes an angle β with the horizontal. Show that $\frac{p}{q} = \frac{\cos\beta - \cos\alpha}{\sin\alpha - \sin\beta}$

35. (a) A car assembly unit assembles a limited number of cars daily, depending on the prevailing demand. The following table presents an analysis of the number of cars assembled by the unit over 90 days, in three consecutive months:

Cars assembled per day	Number of days
0 – 4	33
4 – 8	18
8 – 12	21
12 – 16	11
16 – 20	7

(i) If the demand of the cars is doubled, estimate how many cars on an average should be assembled per day such that the increased demand is met?

(ii) Find the median of the above distribution. (3+2)

OR

35. (b) The marks obtained by 80 students of Class X in a mock test of Mathematics are given below in the table:

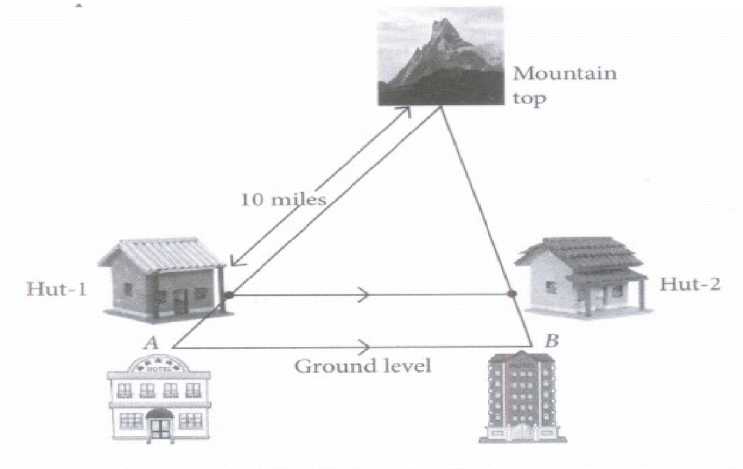
Marks	Number of students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
90 and above	8
100 and above	0

Find the median and the mode of the data. (3+2)

SECTION – E

(Case study-based questions are compulsory)

36. Two hotels are at the ground level on either side of a mountain. On moving a certain distance towards the top of the mountain two huts are situated as shown in the figure. The ratio between the distance from hotel B to hut-2 and that of hut-2 to mountain top is 3: 7.



Based on the above information, answer the following questions:

(i) Find the distance between the hotel A and hut-I. (1)

(ii) If the horizontal distance between the hut-1 and hut-2 is 8 miles, then find the distance between the two hotels. (1)

(iii) If the distance from mountain top to hut-1 is 5 miles more than that of distance from hotel B to mountain top, then what is the distance between hut-2 and mountain top? (2)

OR

What is the ratio of the perimeters of the triangle formed by both hotels and mountain top to the triangle formed by both huts and mountain top? (2)

37. In a city road of India number of cars increases by 22 each day. If on the first day of a month the number of cars is 45.

(i) What will be the number of cars on the 10^{th} day? (1)

(ii) What will be the total number of cars in the first 8 days? (1)

(iii) On which day the number of cars is closest to 500? (2)

OR

What is the total number of cars from 5^{th} to 8^{th} day? (2)

38. The Great **Stupa** at **Sanchi** is one of the oldest stone structures in India, and an important monument of Indian Architecture. It was originally commissioned by the emperor Ashoka in the 3rd century BCE. Its nucleus was a simple hemispherical brick structure built over the relics of the Buddha. It Is a perfect example of combination of solid figures. A big hemispherical dome with a cuboidal structure mounted on it.

(i) Calculate the volume of the hemispherical dome if the height of the dome is 21 m. (1)

(ii) Write the formula for the volume and surface area of a sphere. (1)

(iii) The total surface area of the combined figure i.e. hemispherical dome with radius 14m and cuboidal shaped top with dimensions 8m × 6m × 4m (Height is 4 m) (2)

OR

If only the hemispherical dome is to be coloured, then find the area is to be coloured. (2)