SAMPLE PAPER 13
(SELF ASSESSMENT)

CBSE - Class 10

MATHEMATICS
(STANDARD)

Time Allowed: 3 Hours *Maximum Marks: 80*

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 40 questions divided into four sections A, B, C & D.

(iii) Section A contains **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. Section D comprises **6** questions of **4** marks each.

(iv) There is no overall choice. However internal choices have been provided in **two** questions of **1** marks 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.

(v) Use of calculators is **not** permitted.

SECTION - A

Q 1 – 10 are multiple choice questions. Select the most appropriate answer from the given options.

1. The common root of the equations $x^2 - 7x + 10 = 0$ and $x^2 - 10x + 16 = 0$ is: **1**

(A) –2 (B) 2 (C) 3 (D) 5

2. If 6^{th} and 8^{th} terms of an AP are 12 and 22 respectively, then its 2^{nd} term is: **1**

(A) 8 (B) –8 (C) 6 (D) –3

3. The point $\left(\frac{3}{5}, \frac{11}{5}\right)$ divides the line segment joining the points (3, 5) and (–3, –2) in the ratio: **1**

(A) 3 : 2 (B) 2 : 3 (C) 3 : 4 (D) 4 : 3

4. A right circular cone, a hemi-sphere and a right circular cylinder on equal bases and have the same height. The ratio of their volumes is: **1**

(A) 1 : 2 : 3 (B) 2 : 1 : 3 (C) 2 : 3 : 1 (D) 3 : 2 : 1

5. If $0° < \theta < 90°$ and $\sin\theta = \cos(\theta - 45°)$, then θ is equal to: **1**

(A) 60° (B) 45° (C) 30° (D) 67.5°

6. If $x \cos A = 1$ and $y = \tan A$, then the value of $(x^2 - y^2)$ is: **1**

(A) –1 (B) 0 (C) 1 (D) 2

7. A number is selected at random from the numbers 1 to 20. What is the probability that the selected number is prime and is divisible by 3? **1**

(A) 0 (B) $\frac{2}{5}$ (C) $\frac{9}{20}$ (D) $\frac{1}{20}$

8. If the difference between circumference and diameter of a circle is 135 cm, its diameter is: **1**

(A) 31.5 cm (B) 63 cm (C) 94.5 cm (D) 21.4 cm

9. In which of the following, the variable x, y, z, u represent an irrational number? **1**

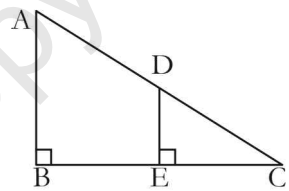
(A) $x^2 = 5$ (B) $y^2 = 9$ (C) $z^2 = 0.04$ (D) $u^3 = 27$

10. Prime factorisation of the denominator of any rational number having terminating decimal cannot be in of the form: **1**

(A) $3^m \times 5^m$ (B) $2^m \times 5^n$ (C) 2^m (D) 5^m

(Q 11 – 15) Fill in the blanks:

11. In the figure, AB ⊥ BC, DE ⊥ BC, AB = 9 units, DE = 3 units and AC = 25 units. Then, AD is equal to **1**



12. If D is a point on the side BC of a ΔABC such that ∠ADC = ∠BAC, then CA^2 = BC × **1**

13. The zeros of the polynomial $x^2 - 3$ are ……. **1**

OR

The graph of a polynomial of degree 2 crosses x-axis at most .....points. **1**

14. For a 'less than ogive', we plot the points with ..... limits of the class as abscissae and the corresponding less than cumulative frequencies as **1**

15. When a sphere is cut into two equal parts, each part is called a **1**

(Q 16 – 20) Answer the following:

16. Two dice are thrown simultaneously. Determine the probability of getting a doublet. **1**

17. A bucket 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 slant height of the bucket. **1**

18. Determine the length of the tangents drawn from a point 8 cm away from the centre of a circle of radius 6 cm. **1**

19. In a quadrilateral ABCD, $\angle B = 90°$ **1**

If $AD^2 = AB^2 + BC^2 + CD^2$, prove that $\angle ACD = 90°$.

20. Find the number of terms in the A.P. : $18, 15\frac{1}{2}, 13, \cdots, -47$ **1**

OR

Which term of the AP : 2, 6, 10, ⋯ is 210? **1**

SECTION - B

21. Explain, why $11 \times 13 \times 15 \times 17 + 17$ is a composite number. **2**

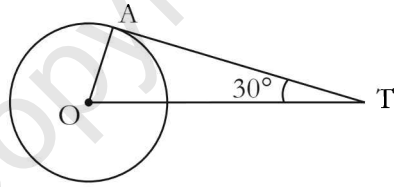
OR

Using prime factorisation method, find LCM (160, 275). **2**

22. For any positive integer n, prove that $(n^3 - n)$ is divisible by 6. **2**

23. If α and β are two zeros of the polynomial $p(x) = x^2 + 3x - 2$, then find the values of $\frac{1}{\alpha} + \frac{1}{\beta}$. **2**

24. In the figure, AT is a tangent to the circle with centre O such that OT = 8 cm and $\angle OTA = 30°$. Find the length of OT. **2**



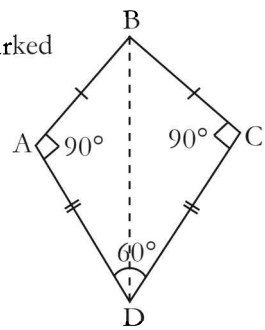
OR

ABC is an isosceles triangle with AC = BC. If $AB^2 = 2AC^2$, then prove that ABC is a right triangle. **2**

25. Two line segments AB and AC include an angle 60°, where AB = 5 cm and AC = 7 cm. Locate points P and Q on AB and AC respectively such that $AP = \frac{3}{4}AB$ and $AQ = \frac{1}{4}AC$. Join P and Q. **2**

26. Ramesh has a kite. The figure shows his kite with the corners marked as ABCD, **2**

where $\angle ADC = 60°$, $\angle DAB = \angle DCB = 90°$, AB = BC and AD = CD



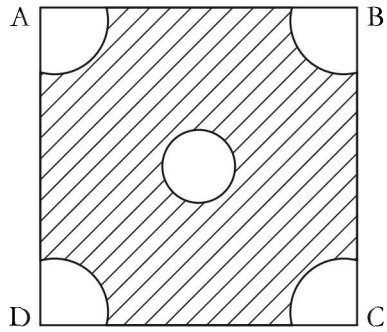
Given that the area of the kite is $25\sqrt{3}$ sq units, find:

i. the lengths of AB and AD;

ii. the perimeter of the kite.

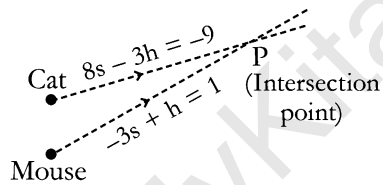
SECTION - C

27. From each corner of a square of side 4 cm, a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2 cm is cut as shown in the figure. Find the area of the remaining portion of the square (shaded portion). **3**



28. A computer animation below shows a cat moving in a straight line. **3**

Its height, h metres, above the ground, is given by $8s - 3h = -9$, where s is the time in seconds after it starts moving. In the same animation, a mouse starts to move at the same time as the cat and its movement is given by $-3s + h = 1$.



i. Draw the graph of the two equations on the same sheet of graph paper;

ii. Will the mouse be able to catch the cat?

iii. If Yes, after how much time and at what height?

29. Find the zeros of the polynomial $y^2 + \frac{3}{2}\sqrt{5}y - 5$ by factorisation method and verify the relations between the zeros and the coefficients of the polynomial. **3**

30. Prove that: **3**

$$\frac{1+\tan^2 A}{1+\cot^2 A} = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A.$$

OR

If $\sin 3\theta = \cos(\theta - 6°)$, where 3θ and $\theta - 6°$ are both acute angles, Find the value of θ. **3**

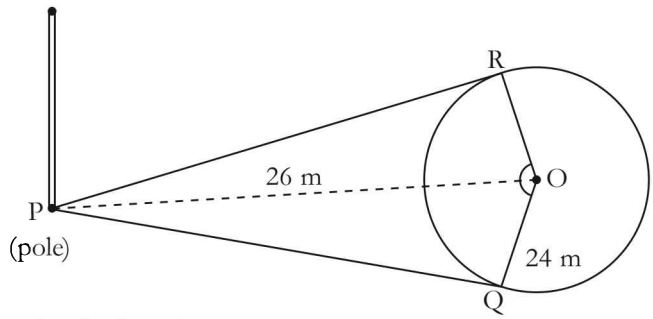
31. Show that: **3**

$$\frac{\cos^2(45° + \theta) + \cos^2(45° - \theta)}{\tan(60° + \theta)\tan(30° - \theta)} = 1$$

32. Find the area of the quadrilateral whose vertices, taken in order, are (–4, –2), (–3, –5), (3, –2) and (2, 3). **3**

OR

There is a circular park of radius 24 m and there is a pole at a distance of 26 m from the centre of the park as shown in the figure. It is planned to enclose the park by planting trees along line segments PQ and PR tangential to the park. **3**

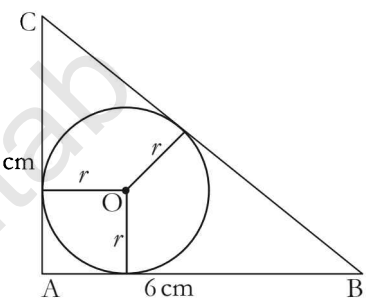


i. Find the length of PQ and PR;

ii. If six trees are to be planted along each tangential line segments at equal distances, find the distance between any two consecutive trees.

33. The barrel of a fountain pen, cylindrical in shape is 7 cm long and 5 mm in dicimeter. A full barrel of ink in the pen is used upon writing 3300 words on an average. How many words can be written in a bottle of ink containing one-fifth of a litre? **3**

34. In the figure, ABC is a right-angled triangle with AB = 6 cm and AC = 8 cm. A circle with centre O has been inscribed inside the triangle. Calculate the value of *r*, the radius of the inscribed circle. **3**



OR

Triangles ABC is right-angled at B and D is the mid-point of BC. Show that: **3**

$$AC^2 = 4AD^2 - 3AB^2$$

SECTION - D

35. A tree is broken by the wind. The top struck the ground at an angle of 30° and at a distance of 30 metres from its root. Find the whole height of the tree. **4**

[Use $\sqrt{3} = 1.732$]

36. The difference of squares of two numbers is 180. The square of the smaller number is 8 times the greater number. Find the two numbers. **4**

37. The n^{th} term (a_n) of an AP is given by $a_n = 5n - 3$. Find the sum of first 20 terms. **4**

OR

The sum of the 4^{th} and 8^{th} terms of an AP is 24, and the sum of the 6^{th} and 10^{th} terms is 44. Find the first three terms of the AP. **4**

38. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides. **4**

OR

Prove that the length of tangents drawn from an external point to a circle are equal. Using the above result, prove the following: **4**

If a circle touches all the four sides of a parallelogram, show that the parallelogram is a rhombus.

39. The weights (in kg) of 50 wrestlers are recorded in the following table: **4**

Weight (in kg)	100-110	110-120	120-130	130-140	140-150
Number of Wrestlers	4	14	21	8	3

Find the **mean** and **median** weights of the wrestlers.

OR

If the **mean** of the following data is 14.7, find the values of p and q. **4**

Class	0-6	6-12	12-18	18-24	24-30	30-36	36-40	Total
Frequency	10	p	4	7	q	4	1	40

40. A dice has its six faces marked 0, 1, 1, 1, 6, 6. Two such dice are thrown together and the total score is recorded. **4**

(i) How many different scores are recorded?

(ii) What is the probability of getting a total of 7?

(iii) What is the probability of getting a total of at least 10?