Std: 10th CBSE **Sub: Maths**	**Rathi's Aspire Academy** Preparing You For Tomorrow **Pre- Board Set -I**	**Marks : 80** **Time : 3 Hr.** **Date : 26/12/2022**

General Instructions:

1. This question paper has 5 section A-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 question 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 π=22/7 wherever required if not stated.

SECTION - A

20 marks

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

1. The L.C.M. of ($2^3 \times 3 \times 5$) and ($2^4 \times 5 \times 7$) is:
(a) 1540 (b) 1680
(c) 1640 (d) 1200 1

2. A quadratic polynomial, whose zeros are –3 and 4 is:
(a) $x^2 + x + 5$ (b) $x^2 - x + 6$
(c) $x^2 - x - 12$ (d) $x^2 + 2x - 6$ 1

3. The 11th term of the A.P.
$\sqrt{2}, 3\sqrt{2}, 5\sqrt{2}, \ldots\ldots\ldots$ is:
(a) $21\sqrt{2}$ (b) $20\sqrt{2}$
(c) $17\sqrt{2}$ (d) $22\sqrt{2}$ 1

4. The nature of the quadratic equation $2x^2 + x + 4 = 0$ is:
(a) no real roots (b) real roots
(c) equal roots (d) None of these 1

5. The 2nd term of the AP, if its $S_n = n^2 + 2n$ is:
(a) 4 (b) 2
(c) 8 (d) 5 1

6. The roots of $x + \frac{1}{x} = 2$ are:
(a) 5, 1 (b) 2, 3
(c) 1, 1 (d) 4, –2 1

7. A pair of linear equations, which has the unique solution $x = -1, y = 3$, is:
(a) $x - y = -4, x + 2y = 5$
(b) $2x + y = 0, x - 3y = 7$
(c) $x + y = 4, x + y = 7$
(d) $x + y = 0, x - y = 2$ 1

8. If the distance between the points (4, p) and (1, 0) is 5 units, then the value of p is:
(a) 3 (b) ± 4
(c) 5 (d) – 3 1

9. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Then, the length of PQ is:
(a) $\sqrt{119}$ cm (b) 16 cm
(c) 15 cm (d) $\sqrt{211}$ cm 1

10. The distance between the points (0, 6) and (0, –2) is:
(a) 5 units (b) 6 units
(c) 8 units (d) 3 units 1

11. For the distribution given below, the median class is:

Marks	Frequency
Below 10	3
Below 20	12
Below 30	27
Below 40	57
Below 50	75
Below 60	80

(a) 20 – 30 (b) 60 – 70
(c) 30 – 40 (d) 40 – 50 1

12. The value of $(1 + \cos A)(1 - \cos A)\ \text{cosec}^2 A$ is:

(a) 0 (b) $\frac{1}{2}$

(c) 1 (d) $\frac{\sqrt{3}}{2}$ 1

13. Sarita buys a fish from a shop for her aquarium. The shopkeeper takes out a fish at random from a tank containing 10 male fishes and 12 female fishes. What is the probability that the fish taken out is a female fish?

(a) $\frac{3}{22}$ (b) $\frac{2}{22}$

(c) $\frac{5}{11}$ (d) $\frac{6}{11}$ 1

14. Write the formula used for calculating the median of a grouped frequency distribution.

(a) $l + \frac{\frac{N}{2} - cf}{f} \times h$ (b) $\frac{N}{2}$

(c) $\frac{N}{2}(l + cf)$ (d) $\frac{l + cf}{f}$ 1

15. The maximum value of $\frac{1}{\text{cosec}\,\theta}$ is:

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{\sqrt{2}}$

(c) 0 (d) 1 1

16. Find the number, if eight times of it is added to its square , the sum so obtained is –16.

(a) – 4 (b) 5
(c) 3 (d) 2 1

17. Write the formula used for calculating the mode of a grouped frequency distribution.

(a) $l + \frac{f_1 - f_0}{h}$

(b) $\frac{f_1 - f_0}{2f - f_0} \times h$

(c) $\frac{f_1 - f_0}{2} \times h$

(d) $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$

1

18. If $\tan\theta + \cot\theta = 2$, then the value of $\tan^2\theta + \cot^2\theta$ is:

(a) 2 (b) 3
(c) 4 (d) 5 1

DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of reason (R).
Choose the correct option as:

(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.

19. **Statement A (Assertion):** If a die is thrown, the probability of getting a number less than 3 and greater than 2 is zero.

Statement R (Reason): Probability of an impossible event is zero. 1

20. **Statement A (Assertion):** The radii of two cones are in the ratio 2:3 and their volumes in the ratio 1:3. Then the ratio of their heights is 3:2.

Statement R (Reason): The Volume of the cone = $\left(\frac{1}{3}\right)\pi r^2 h$. 1

SECTION - B

10 marks

(Section B consists of 5 questions of 2 marks each.)

21. Assuming that $\sqrt{2}$ is irrational, show that $5\sqrt{2}$ is an irrational number. 2

22. Find the greatest number that divides 338 and 59 and leaves remainders of 2 and 5 respectively.

OR

Find the ratio in which the line segment joining the points (–3, 10) and (6, –8) is divided by (–1, 6).

23. Prove that the lengths of tangents drawn from an external point to a circle are equal. 2

24. Find the angle of elevation of the sun when the shadow of a pole 'h' metres high is $\sqrt{3}$ h metres long. 2

25. How many terms of AP : 18, 16, 14, ... make the sum zero?

OR

Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 7 cm. 2

SECTION - C

18 marks

(Section C consists of 6 questions of 3 marks each.)

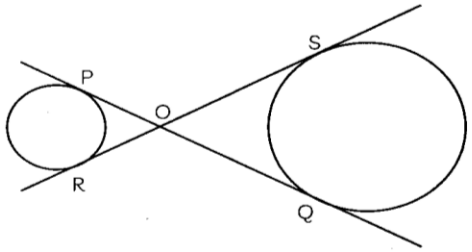
26. Determine the zeros of the polynomial $p(x) = x^3 - 2x^2$. Also verify the relationship between the zeros and the coefficient. 3

27. A sum of ₹ 250 was divided equally among a certain number of children. If there were 25 more children, each would have received 50 paise less. Find the number of children.

OR

The centre of a circle is C(2a, a, –7). Find the values of 'a' if the circle passes through the point P(11, –9) and has diameter $10\sqrt{2}$ units. 3

28. In the figure, PQ and RS are the common tangents of two circles intersecting at O.



Prove that: PQ = RS. 3

29. In ΔABC, $\angle A$ is acute. BD and CE are perpendiculars on AC and AB respectively. Prove that AB × AE = AC × AD. 3

30. If $x = a\cos^3\theta$ and $y = b\sin^3\theta$, then prove that $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$ 3

31. For the following frequency distribution, find the median marks :

Marks	Number of students
0-20	7
20-40	12
40-60	23
60-80	18
80-100	10

OR

SECTION - D

20 marks

(Section D consists of 4 questions of 5 marks each.)

32. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, prove that the other two sides are divided in the same ratio. 5

33. From the top of a building 60 m high, the angle of depression of the top and bottom of a vertical lamp-post are observed to be 30° and 60° respectively. Find the height of the lamp-post, and the distance between the top of building and the top of lamp-post.

OR

Prove that $\frac{1 + \sec A - \tan A}{1 + \sec A + \tan A} = \frac{1 - \sin A}{\cos A}$ 5

34. Solve the following pair of linear equations by the substitution method.

(A) $x + y = 14, x - y = 4$

(B) $s - t = 3, \frac{s}{3} + \frac{t}{2} = 6$

(C) $3x - y = 3, 9x - 3y = 9$

(D) $0.2x + 0.3y = 1.3, 0.4x + 0.5y = 2.3$

(E) $\sqrt{2}x + \sqrt{3}y = 0, \sqrt{3}x - \sqrt{8}y = 0$

OR

Find the mean and mode for the following frequency distribution:

Monthly consumption (in units)	Number of consumers
65-85	4
85-105	5
105-125	13
125-145	20
145-165	14
165-185	8
185-205	4

5

35. An arc subtends an angle of 60 at the centre of a circle with a radius of 21 cm. Find:

(A) the arc's length.

(B) the area of the sector the arc formed.

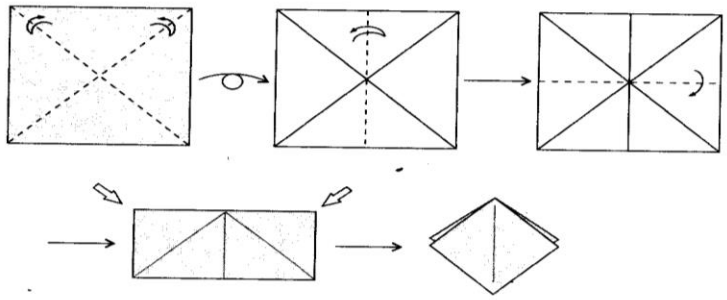
(C) the area of the segment that the corresponding chord forms. 5

SECTION - E

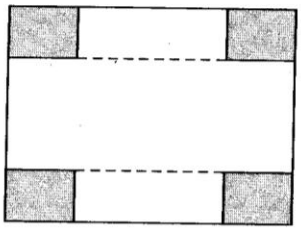
(Case Study Based Questions) **12 marks**

(Section E consists of 3 questions. All are compulsory.)

36. *'Origami' is the art of paper folding, which is often associated with Japanese culture. Gurmeet is trying to learn Origami using paper cutting and folding technique. A square base is sometimes referred to as a "preliminary" base or preliminary fold.*



Here is a 20 cm × 20 cm square. Gurmeet wants to first cut the squares of integral length from the corners and by folding the flaps along the sides.



On the basis of the above information, answer the following questions:

(A) Find the dimensions of the box with maximum volume. 1

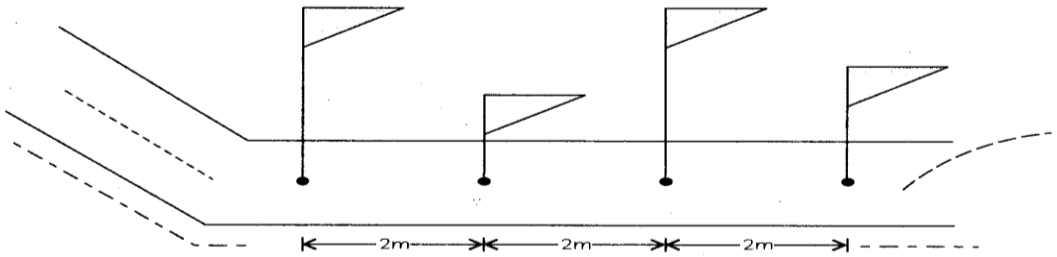
(B) Find the dimensions of the box with minimum volume. 1

(C) Find the equation relating the size of the square cut out and volume of the box.

OR

How many different sixes of boxes Gurmeet can make? If sides of the square are not integral length then find the number of boxes? 2

37. *The students of a school decided to beautify the school on the Annual day by fixing colourful flags on the straight passage of the school. They have 27 flags to be fixed at intervals of every 2 m. The flags are stored at the position of the middle most flag.*



Ruchi was given the responsibility of placing the flags. Ruchi kept her books where the flag were stored. She could carry only one flag at a time.

On the basis of the above information, answer the following questions:

(A) What is the position of the middle flag? 1

(B) Find total distance travelled for placing all the flags. 1

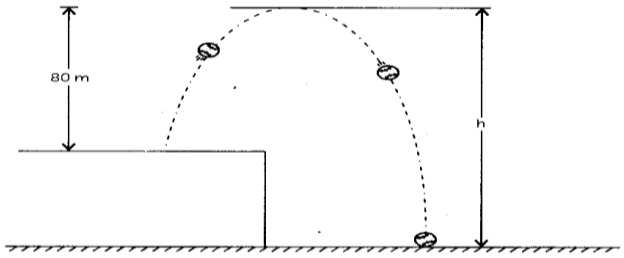
(C) Find total distance travelled for placing 13 flags on left.

OR

Find the maximum distance she travelled carrying a flag. 2

38. *Soumya throws a ball upwards, from a rooftop, 80 m above. It will reach a maximum height and then fall back to the ground. The height of the ball from the ground at time 't' is 'h', which is given by,*

$$h = -16t^2 + 64t + 80$$



On the basis of the above information, answer the following questions:

(A) What is the height reached by the ball after 1 second? 1

(B) What is the maximum height reached by the ball? 1

(C) What are the two possible times to reach the ball at the same height of 128 m?

OR

How long will the ball take to hit the ground? 2