

MT EDUCARE LTD.**QUEST - II (Semi Prelim II)
(2018-19)**

Portion : Real Numbers, Coordinate Geometry, Trigonometry (Introduction and Application), Areas Related to Circles, Surface Areas and Volumes, Statistics, Probability

CBSE - X**Roll No.**

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Code No. 30/1**Series RLH**

- Please check that this question paper contains 6 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 30 questions.
- Please write down the serial number of the question before attempting it.

MATHEMATICS**Time allowed :** 3 hours**Maximum Marks :** 80**General Instructions:**

- i) **All questions are compulsory.**
- ii) The question paper consists of 30 questions divided in four sections: A, B, C and D.
- iii) Section **A** contains 6 questions of 1 mark each,
Section **B** contains 6 questions of 2 marks each,
Section **C** contains 10 questions of 3 marks each,
Section **D** contains 8 questions of 4 marks each.
- iv) 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, four 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 **calculator** is not permitted.

SECTION - A**Question number 1 to 6 carry 1 mark each.**

1. After how many places of decimal, will the decimal expansion of the rational number $\frac{43}{2^4 \times 5^3}$ will terminate?

OR

Find the product of the HCF and LCM of the smallest prime number and smallest composite number.

2. Find the distance between the points $A\left(\frac{\sin\theta}{2}, 0\right)$ and $B\left(0, \frac{\cos\theta}{2}\right)$.
3. Find the value of $\tan(65 - \theta)^\circ - \cot(25 + \theta)^\circ$.
4. If the class marks of a continuous frequency distribution are 1400, 1500, 1600, ... then find the class intervals corresponding to the class mark 1400.
5. Find the area of a square inscribed in a circle of radius 8 cm.

OR

A circular disc of 6 cm in radius is divided into three sectors with central angles measuring 120° , 150° , 90° . Find the ratio of the area of these sectors.

6. Find the probability that a non-leap year chosen at random has 53 Saturdays.

SECTION - B**Question number 7 to 12 carry 2 marks each.**

7. Find the ratio in which the point $P\left(\frac{3}{4}, \frac{5}{12}\right)$ divides the line segment joining the points $A\left(\frac{1}{2}, \frac{3}{2}\right)$ and $B(2, -5)$.

OR

Prove that the points $P(0, a)$, $Q\left(\frac{b}{2}, \frac{a}{2}\right)$ and $(b, 0)$ are collinear.

8. If $\tan A - \frac{1}{\tan A} = \sqrt{2}$ then find the value of $\tan^2 A + \frac{1}{\tan^2 A}$.
9. Find the angle subtended at the centre of a circle of radius 5.5 cm, by an arc whose length is 6.05 cm.
10. A die is thrown once. Find the probability of getting:
a) a prime number,
b) a number lying between 2 and 6.
11. A bucket is in the form of a frustum of a cone and holds 28490 m^3 of water. The radii of top and bottom are 28 cm and 21 cm respectively. Find the height of the bucket.

OR

A right circular cylinder and a cone have equal bases and equal heights. If their curved surface areas are in the ratio 8 : 5 then show that the ratio between radius of their bases to their height is 3 : 4.

12. Find the sum of lower limit of median class and upper limit of modal class from the following frequency distribution table for the given data:

Class	Frequency
10 – 20	1
20 – 30	3
30 – 40	5
40 – 50	9
50 – 60	7
60 – 70	3

SECTION - C

Question numbers 13 to 22 carry 3 marks each.

13. Using Euclid's division algorithm, find the HCF of the numbers 441, 567 and 693.
14. The centre of a circle has coordinates $(2a, a - 7)$. Find the values of a if the circle passes through the point whose coordinate is $(11, -9)$ and has diameter $10\sqrt{2}$ units.

15. Prove that $\sin^2\theta + \cos^2\theta = 1$.

OR

If A, B and C are interior angles of ΔABC then prove that

$$\sin\left(\frac{B+C}{2}\right) = \cos\left(\frac{A}{2}\right)$$

16. Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km per hour. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed?

OR

Marbles of diameter 1.4 cm are dropped into a cylindrical beaker of diameter 7 cm containing some water. Find the number of marbles that should be dropped into the beaker so that the water level rises by 5.6 cm.

17. To warn ships for underwater rocks, a lighthouse spreads a red coloured light over a sector of angle measuring 80° to a distance of 16.5 km. Find the area of the sea over which the ships are warned. ($\pi = 3.14$)

18. A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have?
Find the surface area of the solid.

19. Given that $\sqrt{3}$ and $\sqrt{5}$ are irrational numbers, prove that $\sqrt{3} + \sqrt{5}$ is an irrational number.

OR

Prove that if x and y are both odd positive integers then $x^2 + y^2$ is even but not divisible by 4.

20. The following distribution gives the daily income of 50 workers of a factory.

Daily income (in ₹)	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
Number of workers	12	14	8	6	10

By changing the distribution above 'to less than type' cumulative frequency distribution, draw its ogive.

21. As observed from the top of a 75 m high lighthouse from the sea level, the angles of depression of two ships measures 30° and 45° . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. ($\sqrt{3} = 1.732$)
22. Two dice are thrown at the same time and the product of numbers appearing on them is noted. Find the probability that the product is less than 9.

OR

A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears:

- a) a two digit number,
- b) a perfect square,
- c) a number divisible by 5.

SECTION - D

Question numbers 23 to 30 carry 4 marks each.

23. Show that cube of any positive integer is either of the form $9m$, $9m + 1$ or $9m + 8$, where m is an integer.
24. The coordinates of midpoints D, E and F of sides AB, BC and AC of $\triangle ABC$ are (3, 4), (8, 9) and (6, 7) respectively. Find the coordinates of the vertices of the triangle.

OR

The coordinates of two opposite vertices of a square are (-1, 2) and (3, 2). Find the coordinates of the other two vertices.

25. A hemispherical tank full of water is emptied by a pipe at the rate of $3\frac{4}{7}$ litres per second. How much time will it take to empty half the tank, if it is 3 m in diameter?
26. Prove that $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{2}{2\sin^2\theta - 1}$.

OR

Evaluate the following:
$$\frac{\tan^2 60^\circ + 4 \cos^2 45^\circ + 3 \sec^2 30^\circ + 5 \cos^2 90^\circ}{\operatorname{cosec} 30^\circ + \sec 60^\circ - \cot^2 30^\circ}$$

27. The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude measures 30° than when it is 60° . Find the height of the tower.

OR

From an aeroplane vertically above a straight horizontal road, the angles of depression of two consecutive mile stones on opposite sides of the aeroplane are observed to be α and β . Show that the height in miles of aeroplane above the road is given by $\frac{\tan \alpha \cdot \tan \beta}{\tan \alpha + \tan \beta}$.

28. Find all trigonometric ratios of an angle measuring 45° geometrically.
29. The distribution below shows the number of wickets taken by bowlers in one day cricket matches. Find the mean number of wickets by using step deviation method.

Number of wickets	20 – 60	60 – 100	100 – 150	150 – 250	250 – 350	350 – 450
Number of bowlers	7	5	16	12	2	3

OR

A survey regarding the heights (in cm) of 51 girls of class X of a school was conducted and the following data was obtained:

Height (in cm)	Number of girls
Less than 140	04
Less than 145	11
Less than 150	29
Less than 155	40
Less than 160	46
Less than 165	51

Find the median height.

30. The short and minute hands of a clock are 4 cm and 6 cm long respectively. Find the sum of the distances travelled by their tips in 48 hours. ($\pi = 3.14$).

Write the importance of time in students life.

All the Best 👍