BLUE PRINT OF THE QUESTION PAPER 2018

CHAPTER NAME	MAXIMUM MARKS	1 MARK QUESTION	2 MARK QUESTION	3 MARK QUESTION	4 MARK QUESTION
REAL NUMBER	6	1	1	1	
ALGEBRA	20	2	2	2	2
COORDINATE GEOMETRY	6	1	1	1	
GEOMETRY	15	1		2	2
TRIGONOMETRY	12	1		1	2
MENSURATION	10			2	1
STATICS AND PROBABILITY	11		2	1	1
TOTAL	80	6 QUESTIONS	6 QUESTIONS	10 QUESTIONS	8 QUESTIONS

ANNUAL EXAMINATION 2017-18

MATHEMATICS

Class X

Time allowed : 3 hours   **Maximum Marks :80**

GENERAL INSTRUCTIONS

1. All questions are compulsory.
2. The paper consists of 30 questions divided into four **sections A, B, C and D**.
3. **Section A** contains **6** very short 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.
4. Use of calculator is not permitted.

Section A (1 Marks Each)

1.   If product of two numbers is 3691 and their LCM is 3691, find their HCF.

2.   Find the roots/solution of the quadratic equation by factorisation: $x^2 - 9x + 20 = 0$

3.   The nth term of an AP is $7 - 4n$. Find its common difference.

4.   If the areas of two similar triangles are in ratio 25 : 64, write the ratio of their corresponding sides.

5.   Point P divides the line segment joining the points A(2, –5) and B(5, 2) in the ratio 2 : 3. Name the quadrant in which P lies.

6.   If $\sin 3\theta = \cos (\theta - 6°)$ here, 3θ and $(\theta - 6°)$ are acute angles, find the value of θ.

Section B (2 Marks Each)

7.   Use Euclid's division algorithm to find the HCF of 504 and 980.

8.   Find the values of a and b for which the following system of linear equations has infinite number of solutions: $2x - 3y = 7$, $(a + b) x - (a + b - 3) y = 4a + b$

9.   Find the number of terms in the AP 17, 14½ , 12, ..., – 38.

10.   Find the coordinates of the point of trisection of the line segment joining (1, –2) and (–3, 4).

11. Convert the following data to a less than type distribution.

C.I.	50 – 55	55 – 60	60 – 65	65 – 70	70 – 75	75 – 80
Frequency	2	8	12	24	38	16

12. Two dice are rolled once. Find the probability of getting such numbers on the two dice, whose product is 12.

Section C (3 Marks Each)

13. Express the HCF of 234 and 111 as $234x + 111y$, where x and y are integers.

14. Find all the zeroes of the polynomial $2x^3 + x^2 - 6x - 3$, if two of its zeroes are $-\sqrt{3}$ and $\sqrt{3}$.

15. Divide the polynomial $x^4 - 9x^2 + 9$ by the polynomial $x^2 - 3x$ and verify the division algorithm.

16. Solve the following system of linear equations graphically:

$3x - 2y - 1 = 0;$ $\qquad$ $2x - 3y + 6 = 0$

Shade the region bounded by the lines and x-axis.

<p align="center">Or</p>

The sum of numerator and denominator of a fraction is 3 less than twice the denominator. If each of the numerator and denominator is decreased by 1, the fraction becomes $\frac{1}{2}$. Find the fraction. (Graphically)

17. Prove that, if a line divides any two sides of a triangle in the same ratio, the line must be parallel to the third side.

<p align="center">Or</p>

In the given fig.   B < 90° and segment AD ⊥ side BC, show that $b^2 = h^2 + a^2 + x^2 - 2ax$.
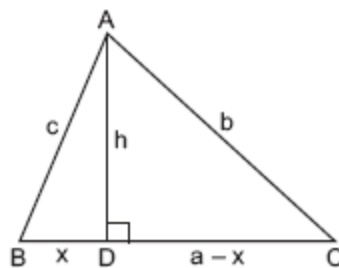
18. The area of triangle formed by the points $(p, 2 - 2p)$, $(1 - p, 2p)$ and $(- 4 - p, 6 - 2p)$ is 70 sq. units. How many integral values of p are possible?

19. Evaluate without using trigonometric tables:

$$\frac{\sin^2\theta + \sin^2(90° - \theta)}{3(\sec^2 61° - \cot^2 29°)} - \frac{3\cot^2 30° . \sin^2 54° . \sec^2 36°}{2(\csc^2 65° - \tan^2 25°)}$$

Or

Prove the following identities: $\sin^6 A + \cos^6 A = 1 - 3 \sin^2 A \cos^2 A$

20. In figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of $\triangle$ABC is 54 cm², then find the lengths of sides AB and AC.
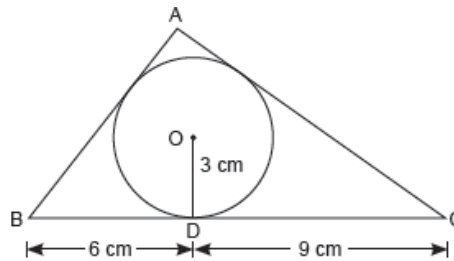
21. Draw a circle of radius 4 cm. Take two points P and Q on one of its extended diameter each at a distance of 6 cm from its centre. Draw tangents to the circle from these two points P and Q.

22. Floor of a room is of dimensions 5 m × 4 m and it is covered with circular tiles of diameters 50 cm each as shown in Fig. Find the area of floor that remains uncovered with tiles. (Use $\pi = 3.14$)
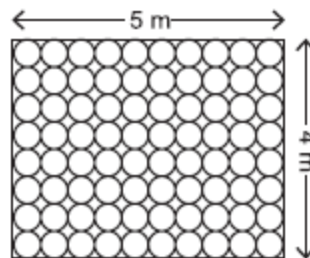
A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of base of the cone is 21 cm and its volume is $2/3$ of the volume of the hemisphere calculate the height of the cone and the surface area of the toy. [Use $\pi = 22/7$]

Section D (4 Marks Each)

23.   Find median for the following data:

Wages (in ₹)	Number of workers
More than 150	Nil
More than 140	12
More than 130	27
More than 120	60
More than 110	105
More than 100	124
More than 90	141
More than 80	150

24.   Two water taps together can fill a tank is 6 hours. The tap of larger diameter takes 9 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

25.   In an equilateral triangle ABC, D is a point on side BC such that 4BD = BC. Prove that $16AD^2 = 13BC^2$.

Or

In figure AB || PQ || CD, AB = x units, CD = y units and PQ = z units, prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$
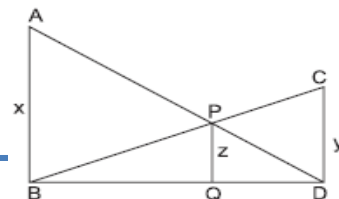
26. Evaluate:

$$\frac{2\cos^2 90° + 4\cos^2 45° + \tan^2 60° + 3\csc^2 60° + 1}{3\sec 60° - \frac{7}{2}\sec^2 45° + 2\csc 30° - 1}$$

Or

Prove that $\sqrt{\dfrac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\dfrac{1-\sin\theta}{1+\sin\theta}} = 2\sec\theta$

27. The angles of elevation and depression of the top and bottom of a light-house from the top of a 60 m high building are 30° and 60° respectively. Find

    (i)   the difference between the heights of the light-house and the building.

    (ii)   the distance between the light-house and the building.

28. Milk in a container, which is in the form of a frustum of a cone of height 30 cm and the radii of whose lower and upper circular ends are 20 cm and 40 cm respectively, is to be distributed in a camp for flood victims. If this milk is available at the rate of ₹35 per litre and 880 litres of milk is needed daily for a camp, find how many such containers of milk are needed for a camp and what cost will it put on the donor agency for this? What value is indicated through this by the donor agency?

29. The table below gives the percentage distribution of female teachers in the primary schools of rural areas of various states and union territories of India. Find the mean percentage of female teachers by assumed mean method.

Percentage of female teachers	Number of states/U.T.
15 – 25	6
25 – 35	11
35 – 45	7
45 – 55	4
55 – 65	4
65 – 75	2
75 – 85	1

Or

Find mean, median and mode of the following data:

Classes	Frequency
0 – 20	6
20 – 40	8
40 – 60	10
60 – 80	12
80 – 100	6
100 – 120	5
120 – 140	3

30. In a school, students thought of planting trees in and around the school to reduce air pollution. It was decided that the number of trees, that each section of each class will plant, will be the same as the class, in which they are studying, *e.g.*, a section of class I will plant 1 tree, a section of class II will plant 2 trees and so on till class XII. There are three sections of each class.

(a) How many trees will be planted by the students ?

(b) How this act will help in the 'Save Earth Campaign?

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