

② PRE BOARD EXAMINATION 2018-19

MATHEMATICS -X

TIME: 3Hrs

MARKS: 80

**General Instructions:**

1. All the questions are compulsory.
2. The question paper consists of 30 questions divided into 4 sections A, B, C and D.
3. Section A comprises of 6 questions of 1mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 10 questions of 3 marks each. Section D comprises of 8 questions of 8 questions of 4 marks each.
4. There are no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2marks 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.
5. Use of calculators is not permitted.

**Section A**

1. For what value of  $p$  are  $8p + 4, 6p - 2, 2p - 7$  are in AP.
2. What point on x- axis is equidistant from  $(7,6]$  and  $(-3,4)$ .

**OR**

If the mid-point of the line segment joining the points  $P(6, b - 2)$  and  $Q(-2,4)$ . Find the value of  $b$ .

3. Find the value(s) of  $k$  for which the equation  $3x^2 - k\sqrt{3}x + 4 = 0$  has real or equal roots.
4. If  $\sqrt{3} \cos \theta - \sin \theta = 0$  and  $0^\circ < \theta < 90^\circ$ , find the value of  $\theta$ .

**OR**

Find the value of  $x$  if  $\tan 3x = \sin 45^\circ \cdot \cos 45^\circ + \sin 30^\circ$ .

5. In  $\triangle ABC$ ,  $DE \parallel BC$  such that  $BC = 8\text{cm}$ ,  $AB = 6\text{cm}$ ,  $DA = 7.5\text{cm}$ . Find  $DE$ .
6. If  $a$  and  $b$  are two positive integers such that  $a = 5b$ . Find the HCF of  $a$  and  $b$ .

**Section B**

7. Prove that  $2 - 3\sqrt{5}$  is irrational.

**OR**

The LCM and HCF of two numbers are 180 and 6 respectively. If one of the numbers is 30, find the other number.

8. Find the middle term of the AP 213, 205, 197, ..... 37.

**OR**

If the 6<sup>th</sup> term of an AP is -10 and its 10<sup>th</sup> term is -26. Find its 15<sup>th</sup> term.

9. Find the ratio in which the point  $(2, y)$  divides the line segment joining the points  $A(-2, 2)$  and  $B(3, 7)$ . Also find the value of  $y$ .
10. A card is drawn from the pack of 52 playing cards. Find the probability that the card drawn is neither an ace nor a king.
11. A bag contains 24 balls out of which  $x$  are white. If one ball is drawn at random the probability of drawing a white ball is  $y$ . 12 more white

balls are added to the bag. Now if a ball is drawn from the bag, the probability of drawing the white ball is  $\frac{5}{3}y$ . Find the value of  $x$ .

12. For what value of  $a$  and  $b$  does the following pair of equations have an infinitely many solutions:

$$2x + 3y = 7 \quad ; \quad 2ax + (a + b)y = 28$$

### Section C

13. Find HCF of 441, 567 and 693 using Euclid's division algorithm.
14. Find the zeroes of the polynomial  $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$ . Also verify the relationship between the zeroes and their coefficient.
15. The difference of two numbers is 4 and the difference of their reciprocals is  $\frac{4}{21}$ . Find the numbers.
16. For what value of  $k$  ( $k > 0$ ) is the area of the triangle with vertices  $(-2, 5)$ ,  $(k, -4)$  and  $(2k+1, 10)$ .

**OR**

Show that the points  $(7, 10)$ ,  $(-2, 5)$  and  $(3, -4)$  are the vertices of an isosceles right triangle.

17. Prove that: 
$$\left[ \frac{1 + \sin\theta - \cos\theta}{1 + \sin\theta + \cos\theta} \right]^2 = \frac{1 - \cos\theta}{1 + \cos\theta}$$

**OR**

Prove that: 
$$\frac{\cos^2\theta}{1 - \tan\theta} + \frac{\sin^2\theta}{\sin\theta - \cos\theta} = 1 + \sin\theta\cos\theta$$

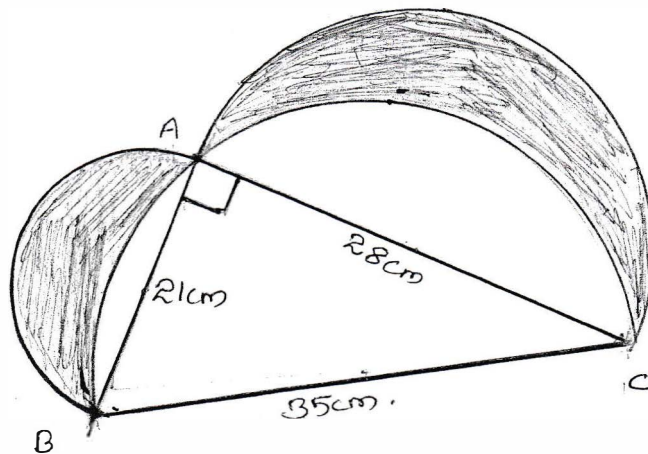
18. A circle touches the side  $BC$  of a triangle  $ABC$  at a point  $P$  and touches  $AB$  and  $AC$  when produced at  $Q$  and  $R$  respectively. Show that  $AQ = \frac{1}{2}(\text{Perimeter of } \triangle ABC)$ .

19. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding side.

**OR**

Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points then the other two sides are divided in the same ratio.

20. In figure ABC is a right-angled triangle right angled at A. Semicircles are drawn on AB, AC and BC as diameters. Find the area of the shaded region.



21. The rainwater from a roof of 22m x 20m drains into a cylindrical vessel having diameter of base 2m and height 3.5m. If the vessel is just full, find the rainfall in cm.

**OR**

A solid sphere of radius 10.5cm is melted and recast into smaller solid cones each of radius 3.5cm and height 3cm. Find the number of cones so formed.

22. The median of the distribution given below is 14.4. Find the values of x and y, if the sum of frequencies is 20.

Class Interval	Frequency
0-6	4
6-12	x
12-18	5
18-24	y
24-30	1

### Section D

23. Solve for x:  $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

OR

A train travels at a certain average speed for a distance of 54km and then travels a distance of 63km at an average speed of 6km/hr more than the first speed. If it takes 3hours to complete the total journey. What is its first speed?

24. In an AP the sum of first ten terms is -150 and the sum of its next ten terms is -550. Find the AP.

25. State and prove Pythagoras theorem.

26. Draw a  $\Delta ABC$  with side  $BC=6\text{cm}$ ,  $\angle B=30^\circ$ ,  $\angle A=120^\circ$ . Then construct another  $\Delta$  whose sides are  $\frac{4}{3}$  times the corresponding sides of  $\Delta ABC$ .

27. The angle of elevation of an aeroplane from a point on the ground is  $60^\circ$ . After a flight of 30sec the angle of elevation becomes  $30^\circ$ . If the

aeroplane is flying at a constant height of  $3000\sqrt{3}$  m, find the speed of the aeroplane.

OR

From the top of a building 60m high, the angles of depression of the top and bottom of a vertical lamp post are observed to be  $30^\circ$  and  $60^\circ$  respectively. Find

- i) The horizontal distance between the building and the lamp post.
- ii) The height of the lamp post, ( $\sqrt{3} = 1.732$ )

28. If the median of the following frequency distribution is 32.5, find the value of  $f_1$  and  $f_2$ :

C.I	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
F	$f_1$	5	9	12	$f_2$	3	2	40

OR

Draw **more than type ogive** for the following distribution and hence **find its median**:

Class	20-30	30-40	40-50	50-60	60-70	70-80	80-90
F	25	15	10	6	24	12	8

29. A cone of radius 8cm and height 12cm is divided into two parts by a plane through the mid -point of its axis parallel to its base. Find the ratio of the volumes of two parts.

30. Evaluate:

$$\frac{2\sin 68^\circ}{\cos 22^\circ} - \frac{2\cot 15^\circ}{5\tan 75^\circ} - \frac{3\tan 45^\circ \tan 20^\circ \tan 40^\circ \tan 50^\circ \tan 70^\circ}{5}$$

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