

Pre- Board Examination1 -2019-2020  
**Mathematics – Standard (041)**

Class: X

Marks:80

Date:

Time: 3hrs

**General Instructions:**

- All the questions are compulsory.
- The question paper consists of 40 questions divided into 4 sections A, B, C, and D.
- Section A comprises of 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 of 6 questions of 4 marks each.
- There is no overall choice. However, internal choices have been provided in two questions of 1 mark 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.
- Use of calculators is not permitted.

**Section: A**

Answer the following:

1.  $\alpha, \beta$  are zeroes of the polynomial  $x^2 - (k + 6)x + 2(2k - 1)$ . 1  
Find the value of  $k$  if  $\alpha + \beta = \frac{1}{2} \alpha\beta$ .

OR

If two zeroes of the polynomial  $x^3 - 4x^2 - 3x + 12$  are  $\sqrt{3}$  and  $-\sqrt{3}$ , then find its third zero.

2. For what value of  $p$  are  $2p + 1, 13, 5p - 3$  three consecutive terms of an A.P.? 1
3. Find the centroid of the triangle whose vertices are  $(3, -7), (-8, 6)$  1

& (5,10).

4. If  $\tan 2A = \cot (A-18^\circ)$ , where  $2A$  is an acute angle, find the value of  $A$ . 1
5. If  $x \cdot \tan 45^\circ \cdot \cos 60^\circ = \sin 60^\circ \cdot \cot 60^\circ$ , then find the value of  $x$ . 1

Fill in the blanks appropriately:

6. The decimal expansion of  $\frac{6}{1250}$  will terminate after ----- decimal places. 1
7. The number of common solutions for the system of linear equations  $5x + 4y + 6 = 0$  &  $10x + 8y = 12$  is ----- 1
8. Given  $\Delta ABC \sim \Delta DEF$  and their areas are  $64\text{cm}^2$  &  $121\text{cm}^2$  respectively. If  $EF = 15.4\text{cm}$ , then  $BC =$  ----- 1
9. If the points  $(a, 0)$ ,  $(0, b)$  &  $(1, 1)$  are collinear, then  $\frac{1}{a} + \frac{1}{b} =$  ----- 1  
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10. Number of tangents to a circle which are parallel to a secant is ----- 1

OR

A tangent to a circle intersects it in ----- point(s).

State True or False with reason:

11.  $n^2-1$  is divisible by 8, if  $n$  is an even integer. 1
12.  $(x^2 + 1)^2 - x^2 = 0$  has four real roots. 1
13. The value of the expression  $\sqrt{x^2 + y^2}$  is the distance of the point  $P(x, y)$  from the origin. 1
14.  $\cos^4 A - \sin^4 A = \sin^2 A - \cos^2 A$  1
15. The sum of the probabilities of all the elementary events of an 1

experiment is 1.

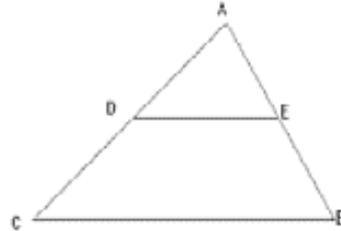
Choose the correct option:

16. The least number which is a perfect square and is divisible by each of 16, 20 & 24 is 1
- (i) 240
  - (ii) 2400
  - (iii) 1600
  - (iv) 3600
17. The number of two-digit numbers which are divisible by 3 is 1
- (i) 33
  - (ii) 30
  - (iii) 31
  - (iv) 29
18. The length of the side of a square whose diagonal is 16cm, is 1
- (i)  $2\sqrt{8}$
  - (ii)  $8\sqrt{2}$
  - (iii)  $4\sqrt{2}$
  - (iv)  $2\sqrt{2}$
19. If the perimeter of one face of a cube is 20cm, then its surface area is 1
- (i) 120 sq.cm
  - (ii) 150 sq.cm
  - (iii) 125 sq.cm
  - (iv) 400 sq.cm
20. If the difference of mode and median of a data is 24, then the difference of median and mean is 1
- (i) 12
  - (ii) 24
  - (iii) 18
  - (iv) 36

**Section: B**

21. Divide 56 into four parts such that they form an A.P. In that A.P the ratio of the product of the extremes to the product of means is 5:6 2

22. In the adjoining figure of  $\triangle ABC$ , D divides AC in the ratio 4:3. If  $ED \parallel BC$ , Then find  $\text{ar}(\text{quad. BCDE}) : \text{ar}(\triangle ABC)$  2

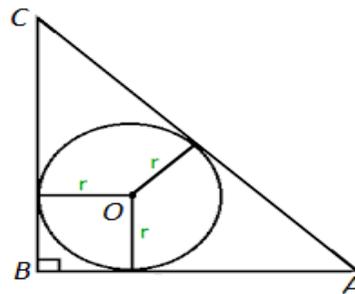


OR

Prove that the area of the equilateral triangle described on the side of a square is half of area of the equilateral triangle described on its diagonal.

23. The angle of elevation of the top of a hill from the foot of a tower is  $60^\circ$  and the angle of depression from the top of the tower to the foot of the hill is  $30^\circ$ . If the tower is 50m high, find the height of the hill. 2

24. In the given figure, ABC is a triangle in which  $\angle B = 90^\circ$ ,  $BC = 48\text{cm}$  &  $AB = 14\text{cm}$ . A circle is inscribed in the triangle, whose centre is O. Find radius r in the circle. 2



25. A spherical bowl of internal radius 9cm is full of liquid. The liquid is to be filled into cylindrical shaped bottles each of radius 1.5cm and height 4cm. How many bottles are needed to empty the bowl? 2

26. The probability of selecting a red ball at random from a jar that contains only red, blue and orange balls is  $\frac{1}{4}$ . The probability of selecting a blue ball at random from the same jar is  $\frac{1}{3}$ . If the jar contains 10 orange balls, find the total number of balls in the 2

jar.

OR

At a fete, cards bearing numbers 1 to 1000, one number is on one card, are put in a box. Each player selects one card at random and that card is not replaced. If the selected card has a perfect square number greater than 500, the player wins a prize. What is the probability that

- (i) The first player wins a prize?
- (ii) The second player wins a prize, if the first has won?

### Section: C

27. In a seminar the number of participants from the departments of Mathematics, Physics and Biology are 336, 240 & 96 respectively. Find the minimum number of rooms required if in each room same number of participants are to be seated and all in a room belong to the same department. 3

OR

Find the smallest number which when divided by 35, 56 & 91 leaves remainder 3 in each case.

28. If the polynomial  $x^4 - 6x^3 + 16x^2 - 25x + 10$  is divided by  $x^2 - 2x + k$  the remainder comes out to be  $x + a$ , find  $k$  &  $a$ . 3
29. Solve the following pair of equations graphically  $2x + y = 6$  &  $2x - y + 2 = 0$  Find the ratio of the areas of the two triangles formed by the lines representing these equations with the x-axis and the lines with the y-axis. 3

OR

A boat goes 24km upstream and 28km downstream in 6 hrs. It goes 30km upstream and 21km downstream in  $6\frac{1}{2}$  hrs. Find the speed of the boat in still water and also speed of stream.

30. Find the middle term of the sequence formed by all three digit numbers which leave a remainder 3, when divided by 4. Also find the sum of all numbers on both sides of the middle terms separately. 3

31. The coordinates of midpoints D, E & F of the sides AB, BC & AC of a  $\Delta ABC$  are (3,4), (8,9) & (6,7) respectively. Find the coordinates of the vertices of the  $\Delta ABC$ . 3

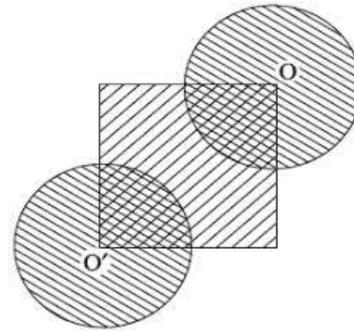
32. Find the value of  $x$  if 3

$$4\left(\frac{\sec^2 59^\circ - \cot^2 31^\circ}{3}\right) - \frac{2}{3} \sin 90^\circ + 3 \tan^2 56^\circ \times \tan^2 34^\circ = \frac{x}{3}$$

OR

If  $\sec \theta = x + \frac{1}{4x}$ , Prove that  $\sec \theta + \tan \theta = 2x$  or  $\frac{1}{2x}$

33. In the given figure, the side of square is 28cm and radius of each circle is half of the length of the side of the square where  $O$  &  $O^1$  are centres of the circles. Find the area of shaded region. 3



34. The mean of the following frequency distribution is 62.8 and the sum of all the frequencies is 50. Compute the missing frequencies  $x$  &  $y$ . 3

Class	0-20	20-40	40-60	60-80	80-100	100-120
frequency	5	$x$	10	$y$	7	8

**Section: D**

35. Find three consecutive positive integers whose product is equal to sixteen times their sum. 4

OR

Solve for  $x$  :  $\frac{x+1}{x-1} + \frac{x-2}{x+2} = 4 - \frac{2x+3}{x-2}$ ;  $x \neq 1, -2, 2$

36. Prove that in a right-angle triangle the square on the hypotenuse is equal to the sum of the squares on the other two sides. Point D is the midpoint of the side BC of a right triangle 4

ABC, right angled at C. Prove that,  $4AD^2 = 4AC^2 + BC^2$

37. The angle of elevation of a cloud from a point 60m above the surface of the water of a lake is  $30^\circ$  and the angle of depression of its shadow in water of lake is  $60^\circ$ . Find the height of the cloud from the surface of water. 4

38. Water is flowing at the rate of 15km/hr through a pipe of diameter 14cm into a cuboidal pond which is 50m long and 44m wide. In what time will the level of water in the pond rise by 21cm? 4

OR

Derive the formula for the volume of the frustum of a cone.

39. Draw an isosceles triangle ABC in which  $AB=AC=6\text{cm}$  and  $BC=5\text{cm}$ . Construct a triangle PQR similar to  $\triangle ABC$  in which  $PQ=8\text{cm}$ . Also justify the construction. 4

OR

Draw two concentric circles of radii 2cm and 5cm. Take a point P on the outer circle and construct a pair of tangents PA & PB to the smaller circle. Measure PA.

40. Draw 'less than ogive' & 'more than ogive' for the following distribution and hence find its median. 4

Class	50-60	60-70	70-80	80-90	90-100
frequency	3	5	9	12	6