PRE BOARD EXAMINATION, JANUARY 2020
Mathematics

Class: X **Max. Marks:** 80
Date: 12/01/2020 **Time:** 3 hrs

General Instructions:

1. All the questions are compulsory.
2. This question paper comprises 4 printed pages.
3. The question paper contains 40 questions divided into four sections A, B, C and D. Section-A comprises 20 questions of 1 mark each; Section-B, 6 questions of 2 marks each; Section-C, 8 questions of 3 marks each and Section-D, 6 questions of 4 marks each.
4. 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, 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.
5. Use of calculator is not permitted.

Section A

Choose the most appropriate answers for the following questions. **$10 \times 1 = 10$**

1. Which of the following relation is correct?
   a) 2mean = 3median + mode b) 3mode = 2mean + median
   c) 3median = mean + 2mode d) mode = 3median – 2mean
2. If the equation $x^2 - ax + 1 = 0$, has two distinct roots, then
   a) $a < 2$ b) $a > 2$ c) $a > \mp 2$ d) $a < \mp 2$
3. The distance between the points $(0, 0)$ and (a, b) is
   a) $\sqrt{a+b}$ b) $\sqrt{a-b}$ c) $\sqrt{a^2-b^2}$ d) $\sqrt{a^2+b^2}$
4. Two tangents TP and TQ drawn from an external point T to a circle of centre O. If $\angle PTQ = 56°$ and $\angle POQ = 6x - 2$, then value of x is,
   a) 21 b) 11 c) 19 d) 29
5. The graph of $x - 5 = 0$
   a) Parallel to $y - axis$ b) Parallel to $x - axis$
   c) Passes through origin d) both (a) and (c)
6. Which of the following is true for $\frac{27}{18}$?
   a) Terminating decimal expansion
   b) Non terminating repeating decimal expansion
   c) Non terminating non repeating decimal expansion
   d) None of the above
7. If α and β are the zeros of the polynomial $x^2 - 4x + 2 = 0$, then the value of $(\alpha + 1)(\beta + 1)$ is
   a) 0 b) 3 c) 6 d) 7
8. When sum of probabilities of two events are equal to 1, then the events are called
   (a) Equal trials b) Unique events c) Equally likely d) Complementary
9. In a right angle triangle ABC, $\angle C = 90°$, then sec(A+B) =
   a) 0 b) 1 c) $\sqrt{2}$ d) Not defined
10. The ratio of length of a rod and its shadow is 1: $\sqrt{3}$. Then the angle of elevation of the sun is
    a) 30° b) 60° c) 45° d) 90°

Fill in the blanks. $5 \times 1 = 5$

11. The pair of equations $y = 0$ and $y = -7$ has _____ solutions.

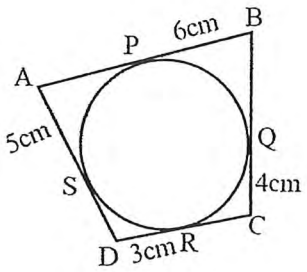
OR

Two lines given to be parallel. The equation of one of the lines is $4x + 3y = 14$, then the equation of a second line is _____.

12. $n^2 - 1$ is divisible by 8, if n is an _____ integer.
13. In any two triangles if the corresponding sides are equal then the triangles are _____.
14. If $x + 1$, $3x - 2$ and $4x + 2$ are in arithmetic progression, then the value of x is _____.
15. If two consecutive days of a week are chosen, then probability of getting Friday will be _____.

Answer the following. $5 \times 1 = 5$

16. The radius of a circle and the side of a square are equal. What ratio of area of circle is area of square?
17. If the midpoint of a line segment joining the points $A(x, y + 1)$ and $A(x + 1, y - 3)$ is $C(5, -2)$, then find x.
18. Name the angle formed by the line of sight with the horizontal when object is viewed as below the horizontal level.
19. The quadrilateral ABCD circumscribes the circle as given in the adjacent figure. Find the perimeter of the quadrilateral ABCD.



20. Find the $HCF(3000, 525)$ by division method.

OR

Define Euclid's division lemma.

Section B

21. A die is thrown twice. Find the probability, which verifies the equation $3x + 2y = 13$, where x and y are the outcomes of the first and the second throws respectively.
22. If $\alpha + \beta = 3$ and $\alpha - \beta = 1$, then find the quadratic equation whose zeros are α and β.

OR

Find the nature of the roots of quadratic polynomial $p(x) = 3x^2 - 3\sqrt{3}x + 2$.

23. In ΔABC, AB = 3cm, BC = 2cm and CA = 2.5cm. If $\Delta ABC \sim \Delta DEF$ and EF = 4cm, then, find perimeter of ΔDEF.
24. A metallic sphere of radius 4.2cm is melted and recast into the shape of a cylinder of radius 6cm. Find the height of the cylinder.
25. If A, B, C are the interior angles of a ΔABC, show that:

$$cosec\left(\frac{B + C}{2}\right) = sec\left(\frac{A}{2}\right)$$

OR

If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, then find the value of A and B where A and B are acute angles.

26. Find the mean of the following distribution.

Classes	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	8	7	12	13	10

Section C

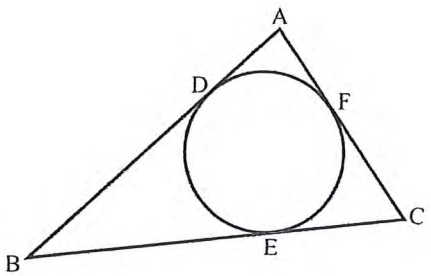
27. In a school, the duration of a period of junior section is 30 minutes and in senior section is 40minutes. If the first bell for each section rings at 8:30am, when will the two bells ring together again?

OR

Show that $5 + 2\sqrt{3}$ is irrational.

28. Find all the zeros of the polynomial $f(x) = 2x^4 - 2x^3 - 7x^2 + 3x + 6$, if two of its zeros are $\sqrt{\frac{3}{2}}$ and $-\sqrt{\frac{3}{2}}$.

29. A circle is inscribed in a triangle ABC, having sides AB = 8cm, BC =12cm and AC = 10cm. Find the length of AD, BE and CF.



OR

Two tangents AP and BP are drawn to a circle of centre O from an external point T. Prove that $\angle APB = 2\angle OAB$.

30. A manufacturer of Tablets produced 550 Tabs in the third month and 650 Tabs in the seventh month. Assuming that the production increases uniformly by a fixed number every month, find production in,
    (i) 11^{th} month
    (ii) 6 months

31. Draw a right triangle in which the sides (other than hypotenuse) are 8cm and 6cm. Then construct another triangle whose sides are in the ratio $\frac{2}{3}$ times the sides of the given triangle.

32. Determine the values of m and n such that the following system of linear equation have infinite number of solutions:

$$(2m - 1)x + 3y - 5 = 0$$
$$3x + (n - 1)y - 2 = 0$$

33. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, prove that,

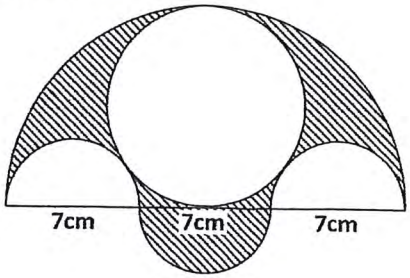
$$a^2 + b^2 = m^2 + n^2$$

OR

Prove that:

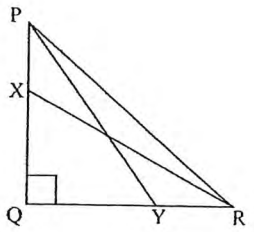
$$\tan^2 A - \tan^2 B = \frac{\cos^2 B - \cos^2 A}{\cos^2 A \cos^2 B}$$

34. Find the area of the shaded region.



Section D

35. In the given figure, PQR is a right angled triangle, right angled at Q. X and Y are the points on PQ and QR such that PX:XQ = 1:2 and QY:YR = 2:1. Prove that $9(PY^2 + XR^2) = 13PR^2$.



OR

Prove that,

"The ratio of the areas of two similar triangles is equal to the square of the ratio of the corresponding sides."

36. A bucket is open at the top is in the shape of frustum of a cone with capacity 12308.8 cu.cm. The radii of the top and bottom of circular ends of bucket are 20cm and 12cm respectively. Find the height of the bucket. (use $\pi = 3.14$)

37. Find the coordinates of the centre of the circle passing through the points $(0, 0)$, $(-2, 1)$ and $(-3, 2)$.

OR

Show that the median of the triangle divides the triangle into two triangles of equal areas, whose varices are $(4, -6)$, $(3, -2)$ and $(5,2)$.

38. The following data gives the information about diabetic patients of a hospital during the month of December.

Ages	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
No. of People	4	12	14	16	20	16	10	8

Draw less than type ogive and hence find the median using the curve.

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

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

    (ii) Distance between the light house and the building.

OR

From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45°, respectively. If the bridge is at a height of 3m from the banks, find the width of the river.

40. A shopkeeper buys a number of books for Rs. 80. If he had bought 4 more books for the same amount, each book would have cost Rs. 1 less. How many books did he buy and what is the cost of each book?

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