

**MATHEMATICS PAPER**

**CLASS X**

**CBSE-2019-2020**

**Time allowed: 3 Hours**

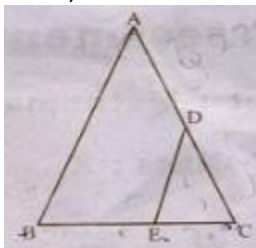
**Max. Marks: 80**

**General Instructions:**

- i. All the questions are compulsory.
  - ii. The questions paper consists of 30 questions divided into 4 sections A, B, C and D.
  - iii. Section A comprises 6 questions of 1 mark each. Section B comprises 6 questions of 2 marks each. Section C comprises 10 questions of 3 marks each. Section D comprises 8 questions of 4 marks each.
  - iv. There is no overall choice. However, an internal choice has been provided. You have to attempt only one of the alternatives in all such questions.
  - v. Use of calculators is not permitted.
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**SECTION A**

1. In the given figure,  $DE \parallel AB$ , if  $AD=2x$ ,  $DC=x+3$ ,  $BE=2x-1$  and  $CE=x$ . Find the value of  $x$ .



2. Evaluate:  $\frac{\tan 28}{\cot 62} \div \frac{1}{\sqrt{3}} [\sec 20. \tan 60. \sin 70]$
3. Find the relation between  $x$  and  $y$  if the points  $A(x, y)$ ,  $B(-5, 7)$  and  $C(-4, 5)$  are collinear.
4. If the quadratic equation  $px^2 - 2\sqrt{5}px + 15 = 0$  has two equal roots, then find the value of  $p$ .
5. Prove that  $7 + 2\sqrt{3}$  is irrational given that  $\sqrt{3}$  is irrational.
6. For what value of  $k$  will  $k+9$ ,  $2k-1$  and  $2k+7$  are the consecutive terms of an AP ?

## SECTION B

7. 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 number of balls in the jar.
8. If the vertex of a triangle ABC is A(5,7) and its centroid is E(7,5). Find the length of the median of the triangle that cuts side BC at D.
9. Prove that  $(n^2 + n)$  is divisible by 2 for any positive integer 'n'.
10. A card is drawn at random from a deck of 52 playing cards. Find the probability that it is neither a king nor a red card.
11. Solve for x:

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

12. Solve the following pair of linear equations:

$$\frac{ax}{b} - \frac{by}{a} = a + b; \quad ax - by = 2ab$$

## SECTION C

13. Solve the following equation for X:

$$\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}, \quad x \neq -1, -2, -4$$

14. In an equilateral triangle ABC, D is a point on side BC such that  $BD = \frac{1}{3} BC$ . Prove that  $9AD^2 = 7AB^2$ .
15. The volume of a frustum of a right circular cone is  $1176\pi$  cu. cm. The altitude of the frustum of the cone is 18 cm. Find the radii of the upper and lower base, respectively, if the product of their radii is 60 sq. cm.
16. Find the HCF of 65 and 117 and express in the form  $65m + 117n$ .
17. Find the zeroes of the polynomial  $p(x) = x^3 - 5x^2 - 2x + 24$ , if it is given that the product of its two zeroes is 12.
18. Prove that the tangent drawn at the midpoint of an arc of a circle is parallel to the line joining the end points of the arc.
19. Using trigonometric identities, Prove that:  $\frac{(1 + \cot A + \tan A)(\sin A - \cos A)}{\sec^3 A - \operatorname{cosec}^3 A} = \sin^2 A \cos^2 A$

20. A hemispherical bowl of internal diameter 36cm contains liquid and this liquid is filled into 72 cylindrical bottles of diameter 6 cm find the height of the each bottle if 10 % liquid is waste in this transfer.

21. Find the mean of the following distribution, using step deviation method:

<i>Classes</i>	<i>Number of students</i>
4 – 8	2
8 – 12	12
12 – 16	15
16 – 20	25
20 – 24	18
24 – 28	12
28 – 32	13
32 – 36	3

22. If A(-2,1),B(a,0),C(4,b),and D(1,2) are the vertices of a parallelogram ABCD find the value of a and b. Hence find the length of its side

### SECTION D

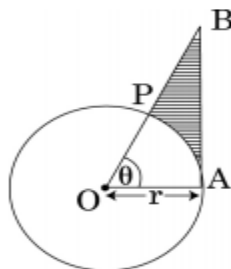
23. Draw a circle of radius 4cm. draw tangents to this circle inclined at an angle of 60 to each other.

24. The sum of four consecutive numbers in an AP is 32 and the ratio of the product of the first and the last term to the product of two middle terms is 7:15. Find the numbers.

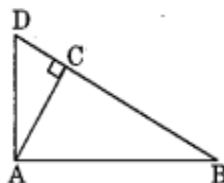
25. At a Point A, 20m above the level of water in a lake , the angle of elevation of a cloud is 30. The angle of depression of the reflection of the cloud in the lake, at A is 60. Find the distance of the cloud from A.

26. Below fig. shows a sector of a circle, centre O. containing an angle  $\theta^\circ$ . Prove that

- (i) Perimeter of shaded region is  $r (\tan \theta + \sec \theta + (\frac{\pi \theta}{180}) - 1)$
- (ii) Area of shaded region is  $(\frac{r^2}{2})(\tan \theta - \frac{\pi \theta}{180})$



27. In figure, ABD is a triangle in which  $\angle DAB = 90^\circ$  and  $AC \parallel BD$ . Prove that  $AC^2 = BC \times DC$ .



28. Formulate the following problems as a pair of equations and hence find their solutions. 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work and also that taken by 1 man alone.

29. For the data given below draw less than ogive curve and hence, find median.

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Number of students	7	10	23	51	6	3

30. Prove that:

$$\frac{1}{\operatorname{cosec} \theta - \tan \theta} - \frac{1}{\sin \theta} = \frac{1}{\sin \theta} - \frac{1}{\operatorname{cosec} \theta + \cot \theta}$$

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