

MATHEMATICS

CLASS - X

Time Allowed : 3 hours

Total Marks :90

**SET A**

**General Instructions**

1. All questions are compulsory.
2. The question paper consists of 31 questions divided into 4 sections A, B, C and D.  
*Section- A* comprises of 4 questions of 1 mark 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 11 questions of 4 mark each.
3. Use of calculator is not permitted.

**SECTION – A**

Question numbers 1 to 4 carry 1 mark each.

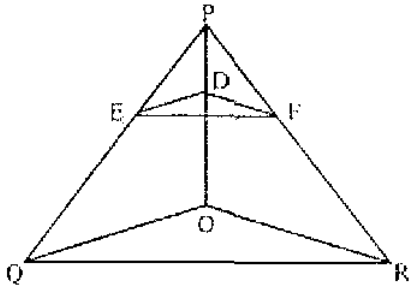
1. Find the length of altitude of an equilateral triangle of side  $2a$  cm.
2. If  $\sec 4A = \operatorname{cosec} (A - 20^\circ)$ , where  $4A$  is an acute angle, find the value of  $A$ .
2. If  $3 \tan 2\theta = \sqrt{3}$ , find  $\theta$ .
4. For a given data with 70 observations, the 'less than ogive' and 'more than ogive' intersect at  $(20.5, 35)$ . Find the median of the data.

**SECTION – B**

Question numbers 5 to 10 carry 2 marks each.

5. Using Euclids algorithm, find the HCF of 240 and 228.
6. Write the decimal expansion of  $\frac{1717}{2^2 \times 5^3}$  without actual division.
7. Given that  $\cos(A + B) = \cos A \cos B - \sin A \sin B$ . Find the value of  $\cos 105^\circ$ .

8. In Fig.  $DE \parallel OQ$  and  $DF \parallel OR$ . Show that  $EF \parallel QR$ .



9. If the lines given by  $3x + 2ky = 2$  and  $2x + 5y + 1 = 0$  are parallel, then find the value of  $k$ .
10. For the following frequency distribution, find the upper limit of the median class:

Classes	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	13	9	15	8	11

### **SECTION – C**

**Question numbers 11 to 20 carry 3 marks each.**

11. Solve  $2x + 3y = 11$  and  $2x - 4y = -24$  and hence find the value of 'm' for which  $y = mx + 3$ .
12. Show that  $3 + 2\sqrt{5}$  is an irrational number.
13. In a quadrilateral PQRS,  $\angle Q = 90^\circ$ . If  $PQ^2 + QR^2 + RS^2 = PS^2$ , then prove that  $\angle PRS = 90^\circ$ .
14. Prove that  $\sec A (1 - \sin A)(\sec A + \tan A) = 1$ .
15. If  $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$ , prove that  $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$ .
16. If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $3x^2 + 5x - 2$ , then form a quadratic polynomial whose zeroes are  $2\alpha$  and  $2\beta$ .
17. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.
18. Astha has to spend ₹ 1300 when she purchases 10 story books and 20 puzzles from a stationery shop for the children of an orphanage. However, if she purchases 15 story books and 15 puzzles, the amount spend is ₹ 1350. Find the cost of one story book and one puzzle. What values of Astha are depicted here.

19. Find the mean of the following frequency distribution:

classes	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
frequency	12	18	27	20	17	6

20. Find the missing frequency  $f$ , if the mode of the given data is 154.

Class interval	120– 130	130– 140	140– 150	150– 160	160– 170	170– 180
Frequency	2	8	12	$f$	8	7

### **SECTION – D**

**Question numbers 21 to 31 carry 4 marks each.**

21. Find all the zeroes of  $x^3 + 11x^2 + 23x - 35$ , if two of its zeros are 1 and -5.

22. Solve the following pair of equations by reducing them to a pair of linear equations :

$$\frac{1}{3x + y} + \frac{1}{3x - y} = \frac{3}{4} ; \quad \frac{1}{2(3x + y)} - \frac{1}{2(3x - y)} = -\frac{1}{8}$$

23. D is a point on the side BC of a triangle ABC, such that  $\angle ADC = \angle BAC$ . Show that  $CA^2 = CB \cdot CD$ .

24. Prove that  $\frac{\sin A - 2 \sin^3 A}{2 \cos^3 A - \cos A} = \tan A$

25. Use Euclid's division lemma to show that the square of any positive integer is either of the form  $3m$  or  $3m + 1$  for some integer  $m$ .

26. Solve the following pair of linear equations graphically:

$$2x + 3y = 12 \text{ and } x - y = 1.$$

Find the area of the region bounded by the two lines representing the above equations and y-axis.

27. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

28. If  $\theta$  is an acute angle and  $\operatorname{cosec} \theta = \sqrt{5}$ ,  
 (i) evaluate  $\cot \theta - \operatorname{cosec} \theta$ .  
 (ii) verify the identity  $\sin^2 \theta + \cos^2 \theta = 1$ .

29. Evaluate:  $\frac{2 \cos 58^\circ}{\sin 32^\circ} - \sqrt{3} \frac{\cos 38^\circ \operatorname{cosec} 52^\circ}{\tan 15^\circ \tan 60^\circ \tan 75^\circ}$

30. The median of the distribution given below is 14.4. Find the values of  $x$  and  $y$ , if the total frequency is 20.

Classes	0 – 6	6 – 12	12 – 18	18 – 24	24 – 30
frequency	4	$x$	5	$y$	1

31. Change the given distribution to more than type distribution and draw its ogive. Find the median from the graph.

Classes	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40
frequency	2	12	2	4	3	4	3

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