

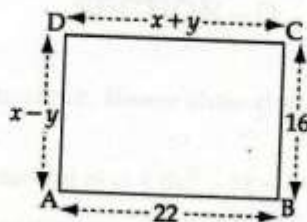
**SECTION – A**

1. Find the HCF of the smallest composite number and the smallest prime number.
2. If  $x = a, y = b$  is the solution of the pair of equations  $x - y = 2$  and  $x + y = 4$ , then find the respective values of  $a$  and  $b$ .
3. If the ratio of the perimeter of two similar triangles is  $4 : 25$ , then find the ratio of the areas of the similar triangles.
4. Find the modal class in the following frequency distribution :

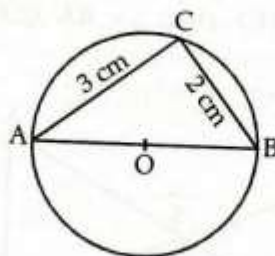
Class	Frequency
0 – 10	3
10 – 20	9
20 – 30	15
30 – 40	30
40 – 50	18
50 – 60	5

**SECTION – B**

5. Form a quadratic polynomial  $p(x)$  with  $3$  and  $-\frac{2}{5}$  as sum and product of its zeroes respectively.
6. In the figure given below, ABCD is a rectangle. Find the values of  $x$  and  $y$ .



7. In an equilateral triangle ABC, AD is drawn perpendicular to BC meeting BC in D. Prove that  $AD^2 = 3BD^2$ .
8. In the given figure, AOB is a diameter of circle with centre O. Find  $\tan A \cdot \tan B$ .



9. Evaluate :  $\frac{\cos 45^\circ}{\sec 30^\circ} + \frac{1}{\sec 60^\circ}$

10. Convert the following cumulative distribution to a frequency distribution :

<b>Height (in cm)</b>	less than 140	less than 145	less than 150	less than 155	less than 160	less than 165
<b>Number of students</b>	4	11	29	40	46	51

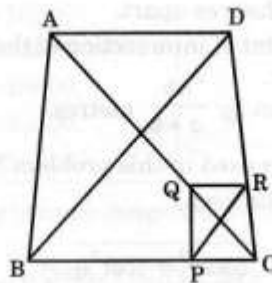
### SECTION – C

11. Prove that  $\sqrt{2}$  is irrational.  
 12. Find the HCF by Euclid's division algorithm of the numbers 1305, 1365, 1530.  
 13. If one zero of a polynomial  $3x^2 - 8x + 2k + 1$  is seven times the other, find the value of  $k$ .  
 14. Solve the following pair of equations for  $x$  and  $y$  :

$$4x + \frac{6}{y} = 15, 6x - \frac{8}{y} = 14$$

and also find the value of  $p$  such that  $y = px - 2$ .

15. In the given figure two triangles ABC and DBC lie on same side of BC such that  $PQ \parallel BA$  and  $PR \parallel BD$ . Prove that  $QR \parallel AD$ .



16. The perpendicular AD on the base BC of a  $\Delta ABC$  intersects BC at D so that  $DB = 3CD$ . Prove that  $2(AB)^2 = 2(AC)^2 + BC^2$ .

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

18. Evaluate :  $\frac{\cos^2 (45^\circ + \theta) + \cos^2 (45^\circ - \theta)}{\tan (60^\circ + \theta) \tan (30^\circ - \theta)} + \operatorname{cosec} (75^\circ + \theta) - \sec (15^\circ - \theta)$ .

19. The mean of the following distribution is 53. Find the missing frequency  $p$  :

<b>Classes</b>	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
<b>Frequency</b>	12	15	32	$p$	13

20. The frequency distribution of agricultural holdings in a village is given below :

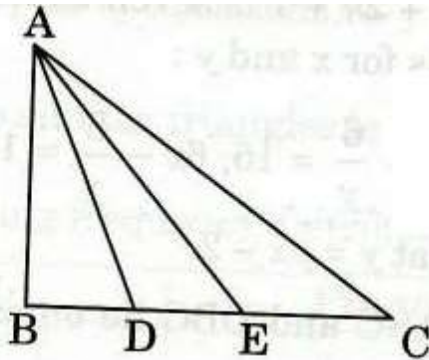
<b>Area of land (in hectares)</b>	1 – 3	3 – 5	5 – 7	7 – 9	9 – 11	11 – 13
<b>Number of families</b>	20	45	80	55	40	12

Find the modal agricultural holdings of the village.

### SECTION – D

21. 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  $m$ .

22. If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $p(x) = 2x^2 + 5x + k$  satisfying the relation,  $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$ , then find the value of  $k$ .
23. Amit bought two pencils and three chocolates for ₹ 11 and Sumeet bought one pencil and two chocolates for ₹ 7. Represent this situation in the form of a pair of linear equations. Find the price of one pencil and that of one chocolate graphically.
24. Out of a distance of 360 km if 240 km is covered by bus and rest by train, it takes 8 hours to complete the journey. However if 120 km is travelled by the bus and rest by train, it takes one hour less. What is the speed of the bus and the train.
25. In the given figure, D and E trisect BC. Prove that  $8AE^2 = 3AC^2 + 5AD^2$ .



26. Two trees of heights  $a$  and  $b$  are  $p$  metres apart.
- Prove that the height of the point of intersection of the lines joining the top of each tree to the foot of the opposite tree is given by  $\frac{ab}{a+b}$  metres.
  - Which mathematical concept is used in this problem?
  - What is the value of trees in our lives?
27. If  $4 \sin \theta = 3$ , find the value of  $x$ , if  $\sqrt{\frac{\operatorname{cosec}^2 \theta - \cot^2 \theta}{\sec^2 \theta - 1}} + 2 \cot \theta = \frac{\sqrt{7}}{x} + \cos \theta$ .
28. In an acute angled triangle ABC, if  $\sin(A + B - C) = \frac{1}{2}$  and  $\cos(B + C - A) = \frac{1}{\sqrt{2}}$ , find  $\angle A$ ,  $\angle B$  and  $\angle C$ .
29. Evaluate:  $\frac{\operatorname{cosec}^2(90^\circ - \theta) - \tan^2 \theta}{4(\cos^2 40^\circ + \cos^2 50^\circ)} - \frac{2 \tan^2 30^\circ \cdot \sec^2 52^\circ \cdot \sin^2 38^\circ}{3(\operatorname{cosec}^2 70^\circ - \tan^2 20^\circ)}$ .

30. Calculate the average daily income (in ₹) of the following data about men working in a company:

Daily Income (in ₹)	< 100	< 200	< 300	< 400	< 500
Number of men	12	28	34	41	50

31. If the mean of the following frequency distribution is 91 and the total frequencies is 150. find the missing frequencies  $x$  and  $y$ :

Classes	0 - 30	30 - 60	60 - 90	90 - 120	120 - 150	150 - 180
Frequency	12	21	$x$	52	$y$	11