

Section - I

Directions (Q.Nos. 1-16) *Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.*

1. *A, B and C start at the same time in the same direction to run around a circular stadium. A completes a round in 252 s, B in 308 s and C in 198 s, all starting at the same point. After what time will they meet again at the starting point?*

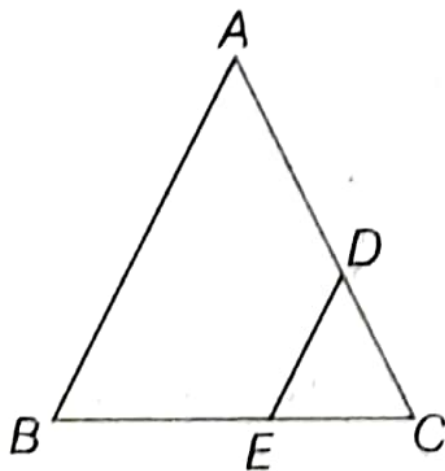
Sol. $LCM(252, 308, 198) = 2772$ s

2. If one of the zeroes of a quadratic polynomial $(k - 1)x^2 + kx + 1$ is -3 , then find the value of k .

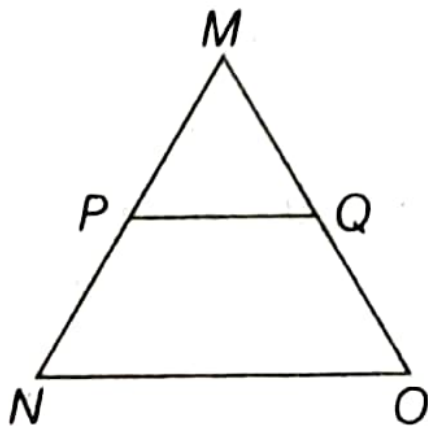
Or What is the sum of all natural numbers from 1 to 100?

3. Find the point in which the pair of equations $4^{x+y} = 256$ and $256^{x-y} = 4$ will intersect.

4. In the given figure, if $ED \parallel AB$, then prove that $1 + \frac{AD}{CD} = 1 + \frac{EB}{CE}$.

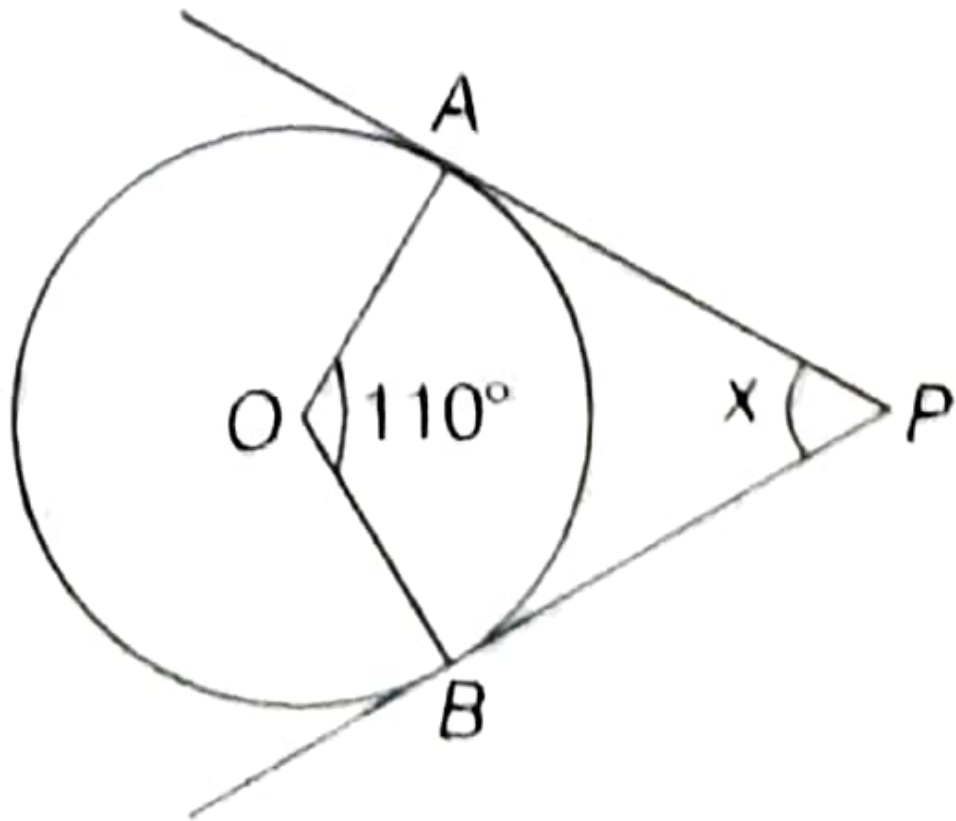


- Or In the given figure, $PQ \parallel NO$. If $\frac{MP}{PN} = \frac{4}{13}$ and $QO = 15.6$ cm, then find MQ .



5. If $3 \tan \theta = 5$, then find $\frac{3 \sin \theta - 5 \cos \theta}{3 \sin \theta + 5 \cos \theta}$.

6. In the given figure, find the angle x .



7. Find the area swept by a minute hand of the clock of length 15 cm in 10 min.

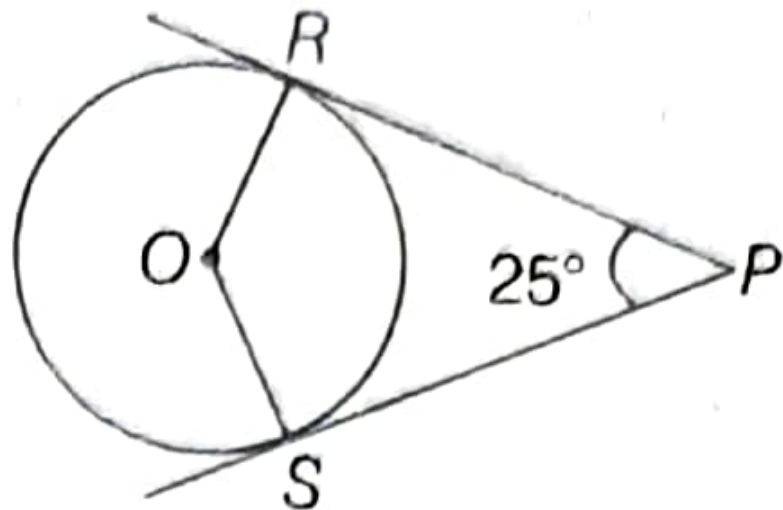
8. When two dice are thrown together, find the probability of getting a number always greater than 4 on the second die.

9. If $\sec A = \frac{17}{8}$, then find the value of $\frac{3 - 4\sin^2 A}{4\cos^2 A - 3}$.

Or

Evaluate the value of $\tan 30^\circ + \sin 60^\circ \sec 60^\circ$.

- 10.** In the given figure, if $\angle RPS = 25^\circ$, then find the value of $\angle ROS$.



11. Three metallic solid cubes whose edges are 4 cm, 5 cm and 6 cm are melted and formed into a single cube. Find the edge of the formed cube.

12. Two parallel tangents are drawn on a circle having radius 5 cm, find the distance between two tangents.

13. What is the nature of roots of the quadratic equation $5y^2 - 4y + 3 = 0$.

Or

If 2 is one of the root of the equation $kx^2 + 2x - 3 = 0$, then find the value of k .

14. Find the probability of throwing a sum 9 with two dice.

15. A wire is in the form of a circle of radius 28 cm. It is re-bent into a square form. Determine the length of the side of the square.

16. Is -5 a solution of quadratic equation
 $3x^2 + 14x - 5 = 0$?

Or Find the non-zero value of k for which the quadratic equation $3x^2 - kx + k = 0$ has equal roots.

Section - II

Directions (Q.Nos. 17-20) *Case study based questions are compulsory. Attempt any four sub parts of each question. Each sub part carries 1 mark.*

17. Case Study I

Efficiency of Machine

In the current scenario, government has policy to make a highway as soon as possible. So, the constructor used the heavy machine instead of using man labour.

A machine operator dug out a field in the shape of circular having radius 3 m and some depth 10 m.



- (a) When the machine operator dug out the field in the given dimension, the three dimensional shape of the digging area is
- | | |
|-----------------|----------------|
| (i) cylindrical | (ii) conical |
| (iii) cubical | (iv) spherical |
- (b) Find the volume of the soil.
- | | |
|---------------------------|------------------------|
| (i) 250 m^3 | (ii) 280 m^3 |
| (iii) 282.6 m^3 | (iv) 290 m^3 |
- (c) How much the cover area of the field dug out?
- | | |
|---------------------------|--------------------------|
| (i) 27 m^2 | (ii) 28.90 m^2 |
| (iii) 28.26 m^2 | (iv) 29.2 m^2 |

(d) Find the total inner surface area of the digging field.

(i) 216.66 m^2

(ii) 212.66 m^2

(iii) 210.66 m^2

(iv) 214.66 m^2

(e) If the cost of digging out of 1 cubic metre field is ₹ 50. Find the total cost of complete digging out field.

(i) ₹ 1420

(ii) ₹ 1413.0

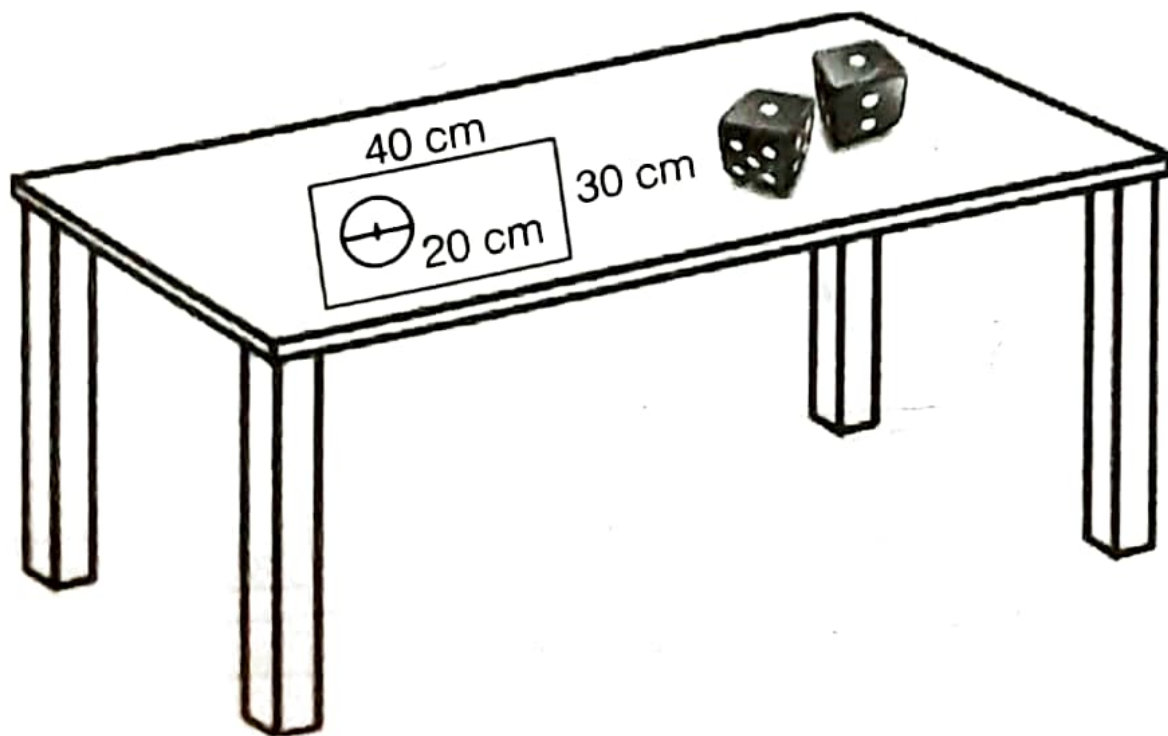
(iii) ₹ 1450

(iv) ₹ 1510

18. Case Study II

Probability of Space

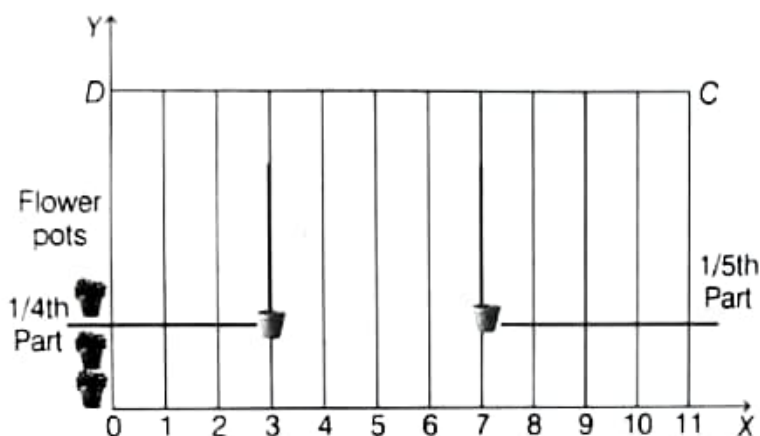
A circle with diameter 20 cm is drawn somewhere on a rectangular piece of paper with length 40 cm and width 30 cm. This paper is kept horizontal on table top and very small size of die, is dropped on the rectangular paper without seeing towards it.



19. Case Study III

Sports Day Activity in School

In sports day activities of Delhi Public School, the lines were drawn with chalk powder in rectangular shape $OBCD$. Each line is $1/2$ m distance from each other. 60 flower pots have been placed at a distance of $1/2$ m from each other along OD . Yamini runs $\frac{1}{4}$ th of the distance OD on the 3rd line and makes a red flower. Kamla runs $\frac{1}{5}$ th of the distance OD on the 7th line and makes a yellow flowers.

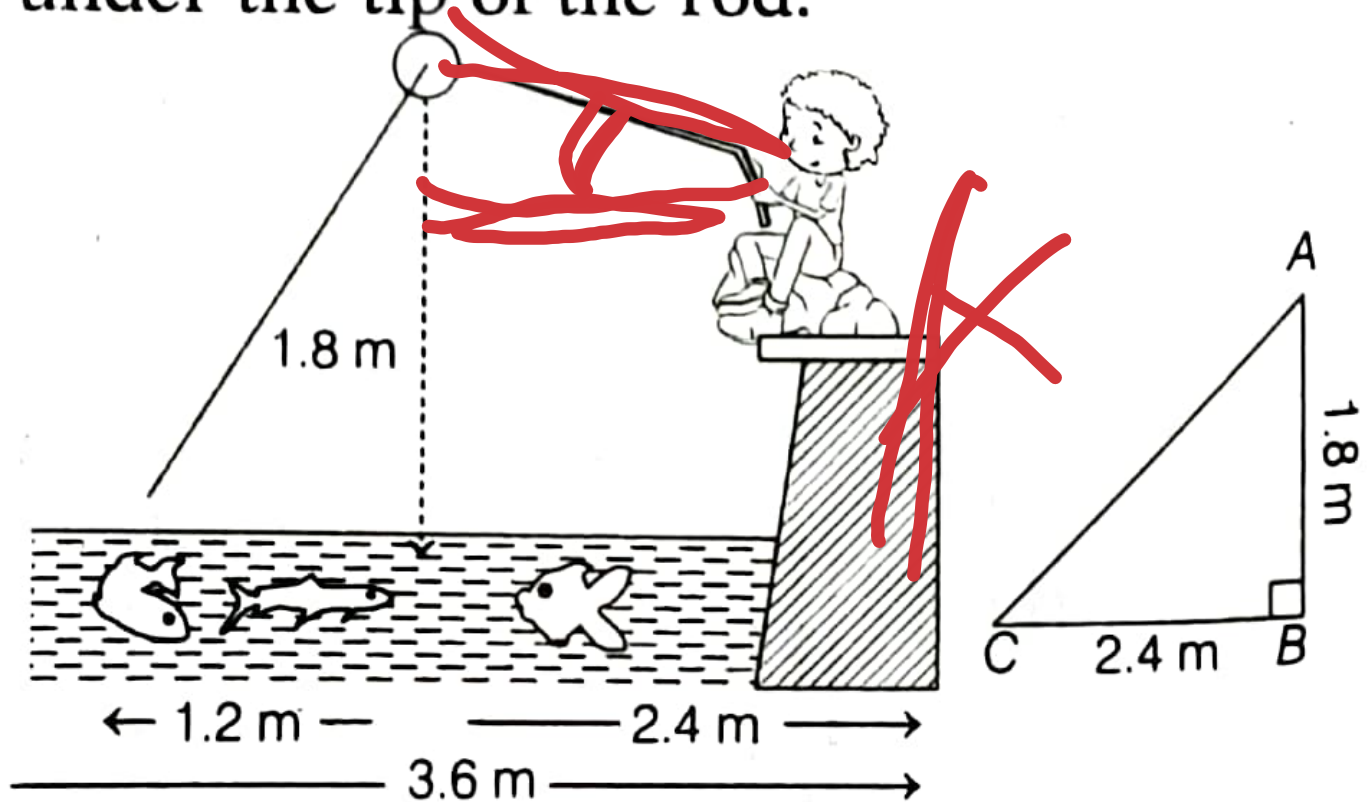


- (a) Find the position of red and yellow flowers.
- $(1.5, 15), (3.5, 12)$
 - $(15, 1.5), (12, 3.5)$
 - $(1.5, 12), (3.5, 9)$
 - None of the above
- (b) Find the distance between these flowers.
- $\sqrt{13}$
 - $\sqrt{11}$
 - 5
 - 4
- (c) What is the length of the rectangle field?
- 5.5
 - 5
 - 6.5
 - 7
- (d) Find the area of rectangular field.
- 160 m^2
 - 165 m^2
 - 155 m^2
 - 145 m^2
- (e) Find the length of the diagonal of rectangle.
- 29
 - 29.5
 - 30
 - 30.5

20. Case Study IV

Fishing

Reshma is fly fishing in a stream. The tip of her fishing rod is 1.8 m above the surface of the water and fly at the end of the string rests on the water 3.6 m away from the initial and 2.4 m from a point directly under the tip of the rod.



- (a) Assuming that her string (from the tip of her rod to the fly) is taut, how much string does she have out?
- (i) 2.8 m (ii) 2.4 m
(iii) 3.2 m (iv) 3 m
- (b) Find the angle subtend the rod to the horizontal in terms of $\tan \theta$.
- (i) 0.70 (ii) 0.75
(iii) 0.65 (iv) 5
- (c) Find the area of triangle formed in the question (a).
- (i) 2.16 m^2 (ii) 2.30 m^2
(iii) 2.90 m^2 (iv) 3.2 m^2
- (d) Write the shape, in which the Reshma is sitting.
- (i) Rectangle (ii) Parallelogram
(iii) Trapezium (iv) Rhombus
- (e) If we decrease the width of the triangle, then length of hypotenuse is
- (i) decrease
(ii) increase
(iii) do not say anything
(iv) None of the above

PART B

Directions (Q.Nos. 21-26) *These are Very Short Answer Type questions of 2 marks each.*

21. Find the LCM and HCF of 12, 15 and 21 by applying the prime factorisation method.

Or

The decimal expansion of the rational number $\frac{47}{2^5 \times 5^3}$ will terminate after how many places of decimal?

22. Determine the sum of first 35 terms of an AP, if its second term is 2 and seventh term is 22.

23. Compute the Arithmetic Mean by assumed mean method for the following data

Mark obtained	Number of students
0-10	14
10-20	8
20-30	15
30-40	21
40-50	9
50-60	8

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

Or Prove that $\cot A + \tan A = \sec A \operatorname{cosec} A$

25. If α and β are the zeroes of the quadratic polynomial $f(x) = px^2 + qx + r$, then find the value of $\frac{1}{p\alpha + q} + \frac{1}{p\beta + q}$.

26. Show that the points $(12, 8)$, $(-2, 6)$ and $(6, 0)$ are the vertices of a isosceles right angled triangle.

Directions (Q.Nos. 27-33) *These are Short Answer Type questions of 3 marks each.*

27. Prove that \sqrt{n} is not a rational number, if n is not a perfect square.

Or

The length, breadth and height of a room are 8 m 25 cm, 6 m 75 cm and 4 m 50 cm, respectively. Find the length of the longest rod that can measure the three dimensions of the room exactly.

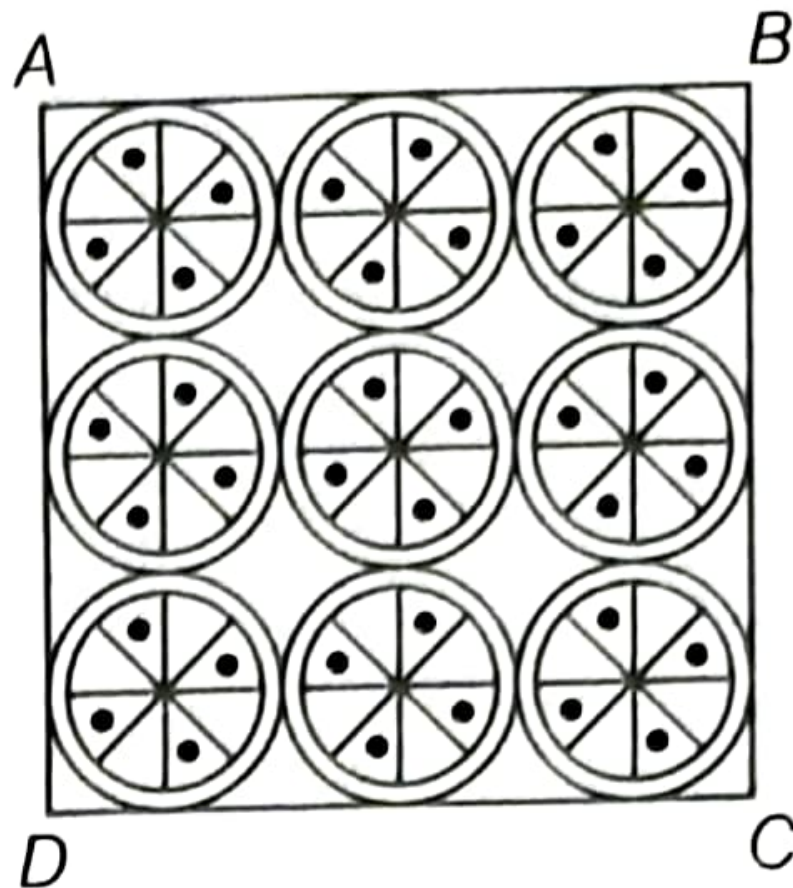
28. Three chairs and two tables cost ₹ 1850.
Five chairs and three tables cost ₹ 2850.
Find the cost of seven chairs and three tables.

Or

Solve the following equations for x and y .

$$x + 4y = 27xy, \quad x + 2y = 21xy$$

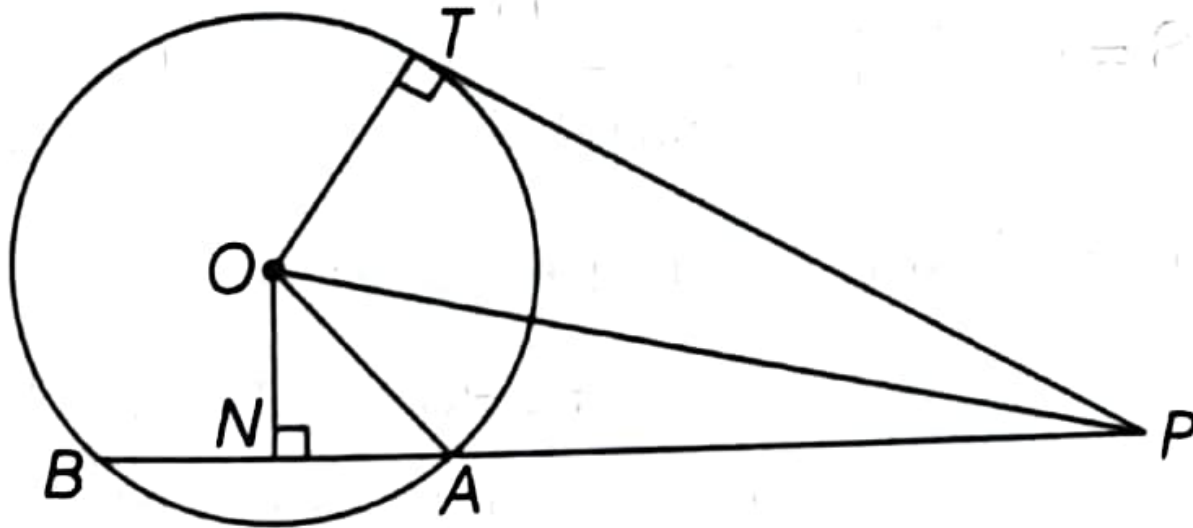
- 29.** On a square handkerchief, 9 circular designs each of radius 7 cm are made (see the figure). Find the area of the remaining portion of the handkerchief.



30. Find the median for the following data.

Class interval	Frequency
130-139	4
140-149	9
150-159	18
160-169	28
170-179	24
180-189	10
190-199	7

31. In the given figure, from an external point P , a tangent PT and a line segment PAB drawn to a circle with centre O . ON is perpendicular on the chord AB .



Prove that

- (i) $PA \cdot PB = PN^2 - AN^2$
- (ii) $PN^2 - AN^2 = OP^2 - OT^2$
- (iii) $PA \cdot PB = PT^2$

32. An army pilot is flying an aeroplane at an altitude of 1800 m observes some suspicious activity of two ships which are sailing towards it in the same directions and immediately report it to the navy chief. The angles of depression of the ships as observed from the aeroplane are 60° and 30° , respectively. Find the distance between two ships.

33. Express the following equation in the standard form and then find its roots by factorisation method

$$\frac{2x-3}{x-2} + \frac{2x-7}{x-4} = 5\frac{1}{3} \quad (x \neq 2, x \neq 4).$$

Directions (Q.Nos. 34-36) *These are Long Answer Type questions of 5 marks each.*

34. Draw a circle of radius 2 cm. Take two points A and B on one of its extended diameter each at a distance of 5 cm from its centre. Draw tangent to the circle from these two points A and B .

35. Prove that

$$\cot^2 A \left(\frac{\sec A - 1}{1 + \sin A} \right) + \sec^2 A \left(\frac{\sin A - 1}{1 + \sec A} \right) = 0.$$

Or Prove that

$$\sqrt{\frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}} + \sqrt{\frac{\operatorname{cosec} A + 1}{\operatorname{cosec} A - 1}} = 2 \sec A.$$

36. Suppose the 8th term of an AP is 31 and the 15th term is 16 more than the 11th term.

- (i) Find the AP series.
- (ii) Find the sum of first 15 terms of a series.