

1. **Assertion (A):** If the graph of a polynomial touches x-axis at only one point, then the polynomial cannot be a quadratic polynomial.  
**Reason (R):** A polynomial of degree  $n(n > 1)$  can have at most  $n$  zeroes.
2. solve the following system of linear equations  $7x - 2y = 5$  and verify your answer.
3. At in a pack of 52 playing cards one card is lost. From the remain cards, a card is drawn at random. Find the probability that the drawn card is queen of heart, if the lost card is a black card.
4. **Evaluate:**  $2\sqrt{2}\cos 45^\circ \sin 10^\circ + 2\sqrt{3}\cos 30^\circ$
5. If  $A = 60^\circ$  and  $B = 30^\circ$ , verify that :  $\sin(A + B) = \sin A \cos B + \cos A \sin B$

6. In the given figure,  $ABCD$  is a quadrilateral. diagonal  $BD$  bisects  $\angle B$  and  $\angle D$  both.

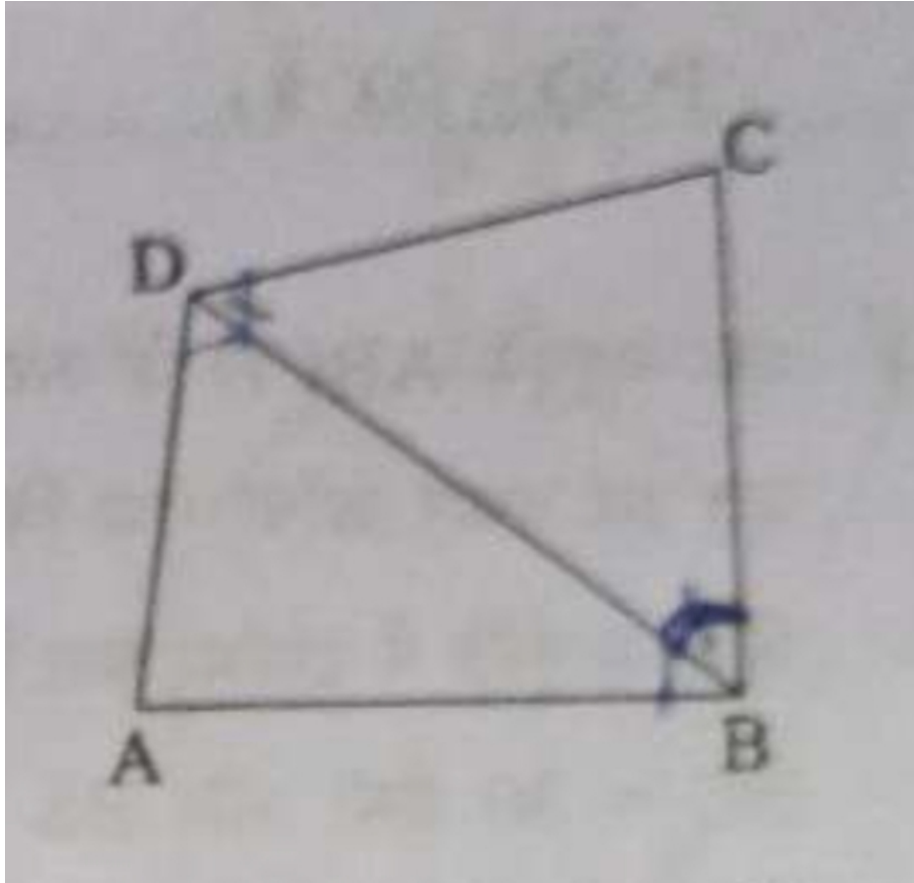


Figure 1: image 1

Prove that :

- (a)  $\triangle ABD \sim \triangle CBD$
  - (b)  $AB = BC$
7. Prove that  $5 - 2\sqrt{3}$  is an irrational number. It is given that  $\sqrt{3}$  is an irrational number.
8. show that the number  $5x11x17 + 3x11$  is a composite number.

9. Find the ratio in which the point  $(8, y)$  divides the line segment joining the points  $(1, 2)$  and  $(2, 3)$ . Also, find the value of  $y$ .
10. ABCD is a rectangle formed by the points  $A(-1, -1), B(-1, 6), C(3, 6)$  and  $D(3, 1)$ ,  $P, Q, R$  and  $S$  are mid-points of sides  $AB, BC, CD$  and  $DA$  respectively. Show that diagonals of the quadrilateral PQRS bisect each other.
11. In a teachers workshop, the number of teachers teaching French, Hindi and English are 48, 80 and 144 respectively. Find the minimum number of rooms required if in each room the same number of teachers are seated and all of them are of the same subject.
12. Prove that :  $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\csc\theta$
13. Three years ago, Rashmi was thrice as old as Nazma. Ten years later, Rashmi will be twice as old as Nazma. How old are Rashmi and Nazma now?
14. In the given figure,  $AB$  is a diameter of the circle  $O$ .  $AQ, BP$  and  $PQ$  are tangents to the circle. Prove that  $\angle POQ = 90^\circ$ .

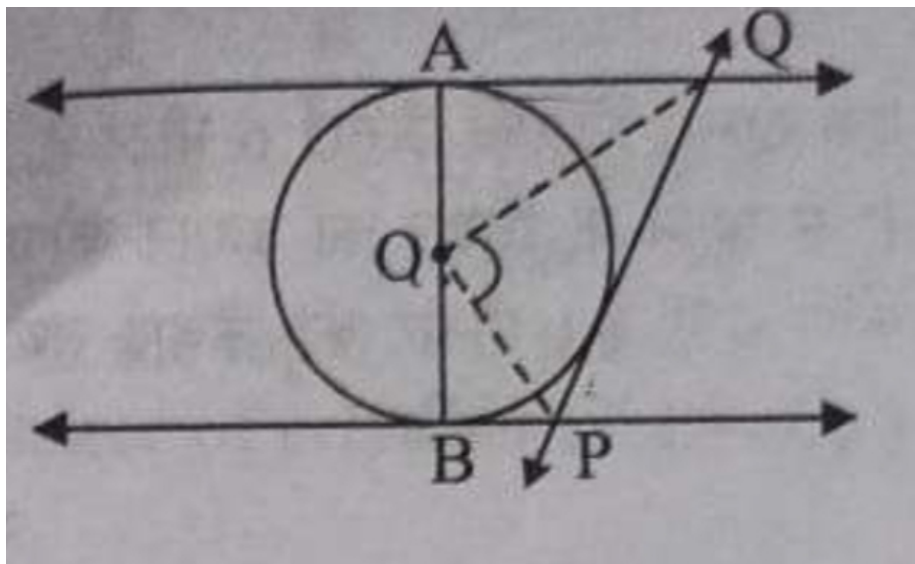


Figure 2: image 2

15. A circle with centre  $O$  and radius  $8\text{ cm}$  is inscribed in a quadrilateral  $ABCD$  in which  $P, Q, R, S$  are the points of contact as shown. If  $AD$  is perpendicular to  $DC$ ,  $BC = 30\text{ cm}$  and  $BS = 24\text{ cm}$ , then find the length  $DC$ .

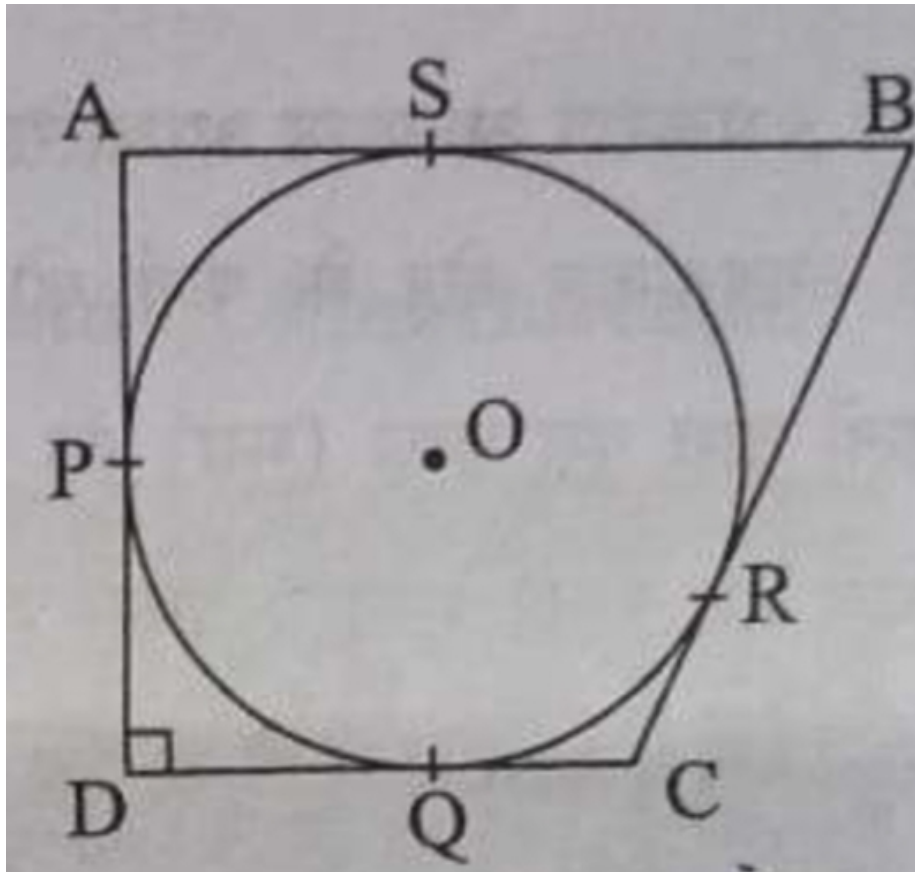


Figure 3: image 3

16. The difference between the outer and inner radii of a hollow right circular cylinder of length  $14\text{ cm}$  is  $1\text{ cm}$ . If the volume of the metal used in making the cylinder is  $176\text{ cm}^3$ , find the outer and inner radii of the cylinder.

17. An arc of a circle of radius  $21\text{cm}$  subtends an angle of  $60^\circ$  at the centre. Find:
- the length of the arc.
  - the area of the minor segment of the circle made by the corresponding chord.
18. The sum of first and eighth of an A.P. is 32 and their product is 60. Find the first term and common difference of the A.P. Hence, also find the sum of its first 20 terms.
19. In an A.P. of 40 terms, the sum of first 9 terms is 153 and the sum of last 6 terms is 687. Determine the first term and common difference of A.P. Also, find the sum of all the terms of the A.P.
20. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.
21. In the given figure  $PA, QB$  and  $RC$  are each perpendicular to  $AC$ . if  $AP = x, BQ = y$  and  $CR = z$ , then prove that  $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$

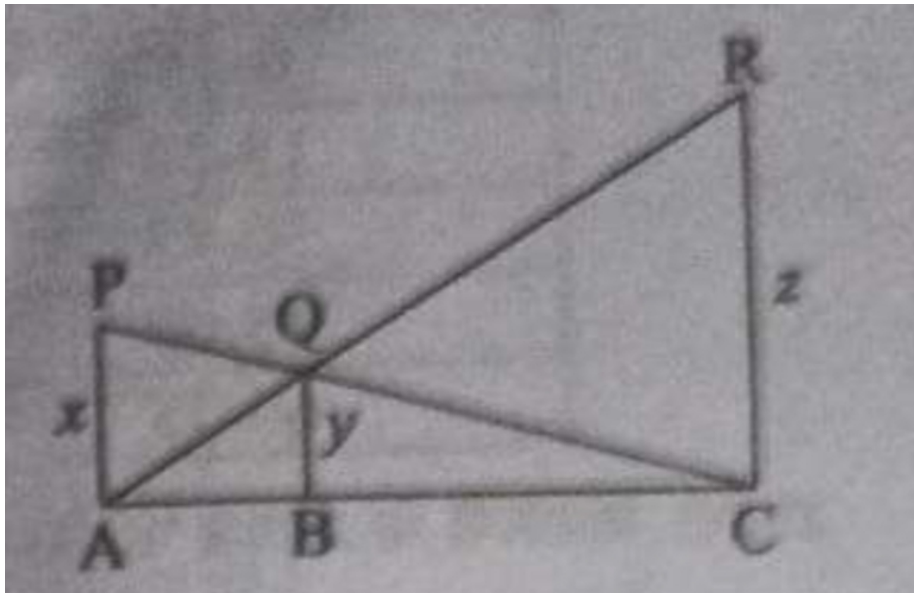


Figure 4: image 4

22. A pole  $6m$  high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point  $P$  on the ground is  $60^\circ$  and the angle of depression of the point  $P$  from the top of the tower is  $45^\circ$ . Find the height of the tower and the distance of point  $P$  from the foot of the tower.
23. A rectangular floor area can be completely tiled with  $200$  square tiles. If the side length of each tile is increased by  $1$  unit, it would take only  $128$  tiles to cover the floor.



Figure 5: image5

- (a) Assuming the original length of each side of a tile be  $x$  units, make a quadratic equation from the above information.
- (b) Write the corresponding quadratic equation in standard form.
- (c) Find the value of  $x$ , the length of side of a tile by factorisation.
24. solve the quadratic equation for  $x$ , using quadratic formula.

25. BINGO is game of chance. The host has 75 balls numbered 1 through 75. Each player has a BINGO card with some numbers written on it. The participant cancels the number on the card when called out a number written on the ball selected at random. Whosoever cancels all the numbers on his/her card, says BINGO and wins the game.



Figure 6: image 6

The table given below, shows the data of one game where 48 balls were used before Tara said "BINGO".

Numbers announced	Number of times
0-15	8
15-30	9
30-45	9
45-60	10
60-75	12

Based on the above information, answer the following:

- (a) Write the median class.
- (b) When first ball was picked up, what was the probability of calling out an even number?
- (c) Find median and mode of the given data.

26. A backyard is in the shape of a triangle  $ABC$  with right angle at  $B$ ,  $AB = 7m$  and  $BC = 15m$ . A circular pit was dug inside it such that it touches the walls  $AC$ ,  $BC$  and  $AB$  at  $P$ ,  $Q$  and  $R$  respectively such that  $AP = xm$ . Based on the above information, answer the following question:

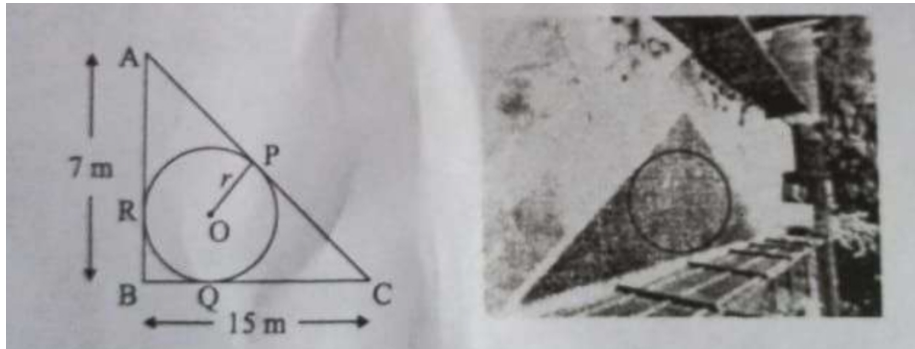


Figure 7: image 7

- find the length of  $AR$  in terms of  $x$ .
- write the type of quadrilateral of  $BQOR$ .
- Find the length  $C$  in terms of  $x$  and hence find the value of  $x$ .
- Find  $x$  and hence find the radius  $r$  of circle.