

CLASSROOM PROGRAMME

CLASS 10 MATHS SHORT NOTE

Arithmetic sequence

- ✓ A sequence starting with a number and proceeding by adding one number again and again, is called an arithmetic sequence
- ✓ A number subtracting from previous term is called the **common difference (d)** of the arithmetic sequence
- ✓ In an arithmetic sequence, the sum of the two terms, at the same distance behind and ahead a term, is twice this term
- ✓ In an arithmetic sequence, the sum of a term and the consecutive terms at the same distance behind and ahead, is the product of this term and the number of terms
- ✓ The sum of an odd number of consecutive terms of an arithmetic sequence is the product of the middle term and the number of terms
- ✓ In an arithmetic sequence, if one position is increased and another position is decreased by the same amount, the sum of the terms at these positions do not change
- ✓ In an arithmetic sequence, if the sum of two positions is equal to the sum of other two positions, then the sum of the terms at each pair is the same

Questions

- 1) Write down the sequence of natural numbers.
 - a. Leaving remainder 1 on division by 4
 - b. Leaving remainder 3 on division by 6

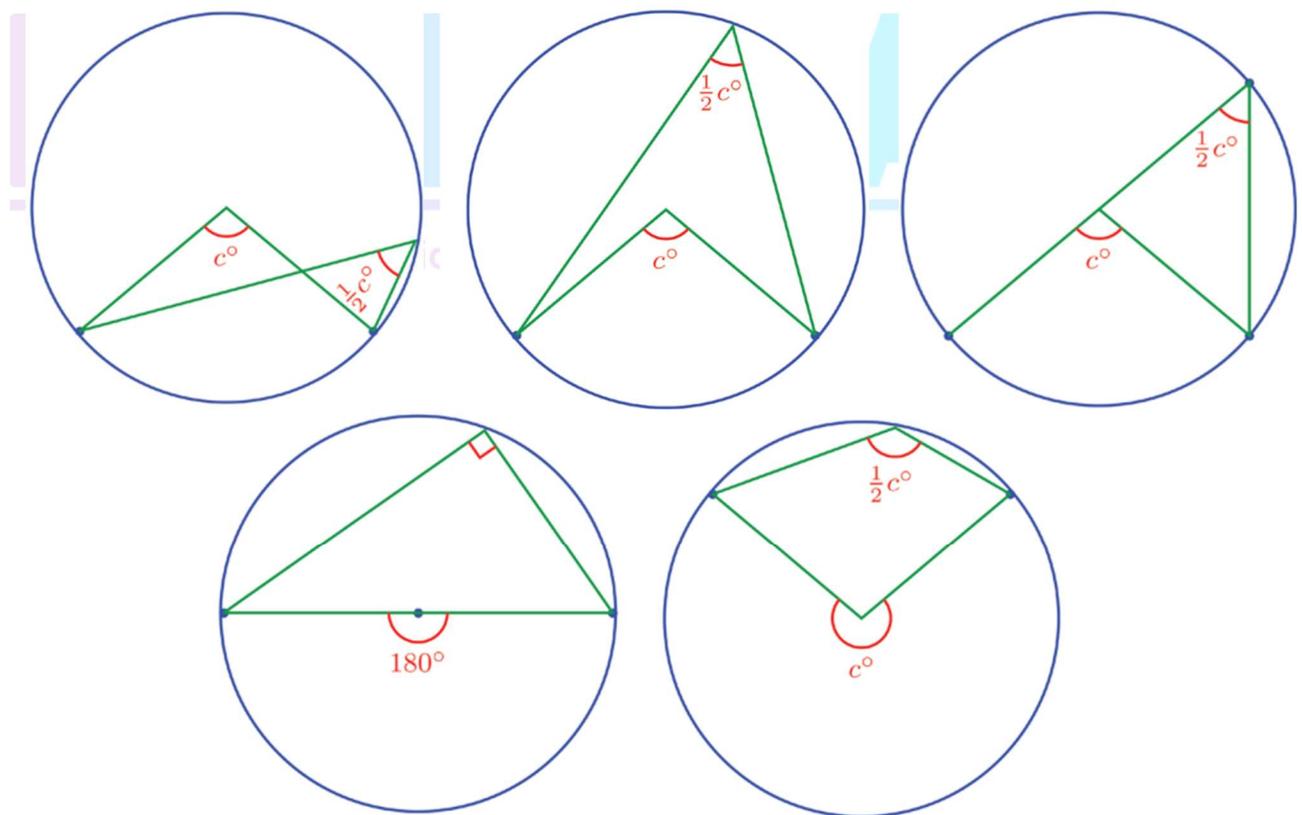
- 2) The difference between 12th and 8th term of an arithmetic sequence is 20. Find the common difference?
- 3) Find 20th term of an arithmetic sequence, if its 6th term is 14 and 14th term is 6
- 4) Consider the arithmetic sequence whose 7th term is 34 and 5th term is 66. Find the common difference
- 5) The 15th term of an arithmetic sequence is 20 and its 20th term is 15.
 - a. What is its common difference?
 - b. Find its 35th term.
 - c. Which is the first negative term?

INTERVAL

Individual Tuition Concept

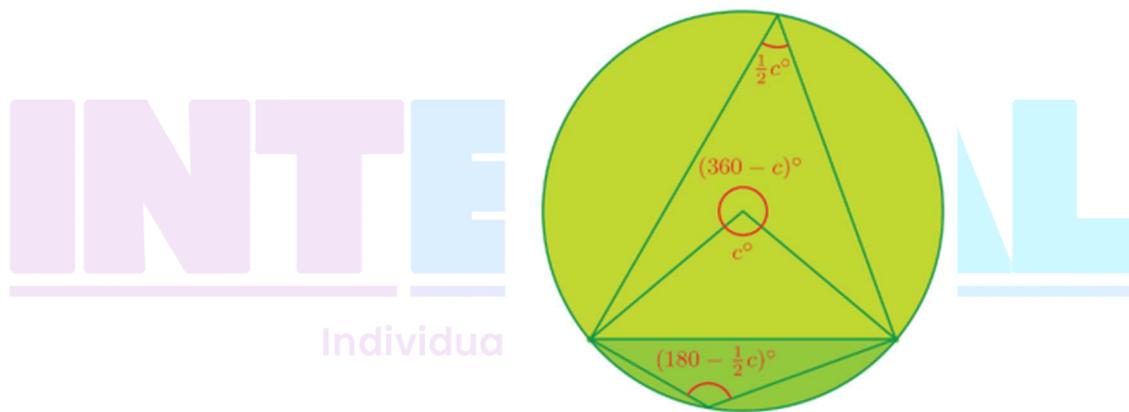
Circles and angles

- ✓ If the ends of an arc of a circle are joined to a point on the circle, which is not a point on the arc itself, then the angle so made is half the central angle of the arc
- ✓ If the ends of a semicircle are joined to another point on the circle, the angle made is a right angle
- ✓ The angle in a semicircle is a right angle
- ✓ Relations between the central angle of an arc of a circle and the angle which the ends of the arc make with a point on the circle



- ✓ The angle made by joining the ends of an arc of a circle to any point on the alternate arc is half the central angle of the arc

- ✓ In a circle, angles in the same segment are equal; the sum of the angles in alternate segments is 180°



- ✓ If all the vertices of a quadrilateral are on a circle, then the sum of its opposite angles is 180°
- ✓ If in a quadrilateral, the sum of opposite angles is 180° , then a circle can be drawn passing through all four of its vertices

Questions

- 1) In a triangle ABC, $AB=8\text{cm}$, $BC=6\text{cm}$, $AC=10\text{cm}$

- a. What kind of triangle is this?
- b. What is the position of B based on the circle with AC as the diameter? Why?
- c. What is the position of A based on the circle with BC as the diameter AB? Why?
- d. What is the position of the point C based on the circle with diameter AB?

2) A, B, C and D are points on a circle with centre 'O'. $\angle D = 40^\circ$.

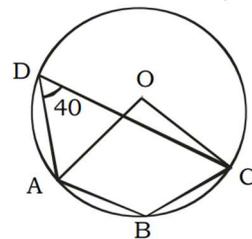
(a) What is the measure of $\angle AOC$?

(b) What is the measure of $\angle ABC$?

3) O' Is the Centre of the circle. If $\angle BOC = 130^\circ$, $\angle AOB = 110^\circ$. What is

$\angle AOC$? Find all angles of triangle ABC

4) Prove that opposite angles of a cyclic quadrilateral are supplementary



Individual Tuition Concept

Arithmetic Sequences and Algebra

- ✓ The sequence 2, 4, 6, ... of even numbers: $x_n = 2n$
- ✓ The sequence 1, 3, 5, ... of odd numbers: $y_n = 2n - 1$
- ✓ the n th term is

$$f + (n - 1)d = dn + (f - d)$$

- ✓ The algebraic form of any arithmetic sequence is

$$x_n = an + b$$

- ✓ The sum of any number of consecutive natural numbers starting from one is the half the product of the last number and the next
- ✓ the sum of the first n terms is

$$x_1 + x_2 + \dots + x_n = \frac{1}{2} an(n + 1) + nb$$

- ✓ The sum of consecutive terms of an arithmetic sequence is half the product of the sum of the first and last terms by the number of terms

$$x_1 + x_2 + \dots + x_n = \frac{1}{2} n(x_1 + x_n)$$

- ✓ The algebraic form of the sum of the first n terms of an arithmetic sequence is

$$pn^2 + qn$$

Questions

- 1)
 - a. Write an arithmetic sequence with common difference 6.
 - b. Find its algebraic form.
- 2) The algebraic form of an arithmetic sequence is $5n + 3$.

- a. What is its common difference?
- b. Is 100, a term in this sequence? Why?
- 3) The first term of an arithmetic sequence is 10. 20th term is 60. Calculate the sum of first 20 terms.
- 4) The sum of 'n' terms of an arithmetic sequence is $5n^2 + 2n$.
- a. Find the first term of the sequence.
- b. What is the common difference?
- c. Write down the sequence?
- 5) The sum of first 9 terms of an arithmetic sequence is 45 and the sum of first 18 terms is 171.
- a. Find its 5th term?
- b. What is its 14th term?
- c. Find the sum of first and 18th terms?

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Mathematics of chance

- ✓ Probability is a concept which numerically measures the degree of certainty of the occurrence of events.
- ✓ The collection of all or some of the possible outcomes is called an event.

- A dice is thrown once

$$S = \{1,2,3,4,5,6\}, n(s) = 6$$

- A dice is thrown twice

$$S = \{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6)$$

$$(2,1), (2,2), (2,3), (2,4), (2,5), (2,6)$$

$$(3,1), (3,2), (3,3), (3,4), (3,5), (3,6)$$

$$(4,1), (4,2), (4,3), (4,4), (4,5), (4,6)$$

$$(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)$$

$$(6,1), (6,2), (6,3), (6,4), (6,5), (6,6)\}, n(s) = 36$$

- A coin is tossed once

$$S = \{H, T\}, n(s) = 2$$

- Two coins are tossed simultaneously

$$S = \{HH, HT, TH, TT\}, n(s) = 4$$

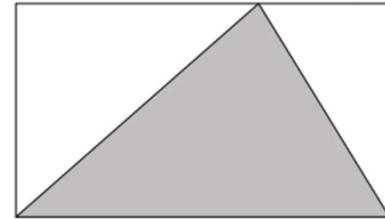
- Three coins are tossed simultaneously

$$S = \{HHH, HHT, HTH, THH$$

$$TTT, TTH, THT, HTT\}, n(s) = 8$$

Questions

- 1) In a class 10A there are 40 boys and 20 girls. In 10B there are 20 boys and 30 girls. One student is to be selected from each class
 - a. What is the probability of both being girls?
 - b. What is the probability of both being boys?
 - c. What is the probability of one boy and one girl?
 - d. What is the probability of at least one boy?
- 2) The area of the rectangle in the figure is 30cm^2 .
 - a. What is the area of the shaded triangle?
 - b. What is the probability of putting a dot inside the rectangle without looking to be within the triangle?
- 3) A bag contains 12 Red balls and 10 Blue balls. Another bag contains 7 Red balls and 15 Blue balls.
 - a) What is the probability of getting red ball from the first bag?
 - b) What is the probability of getting red ball from the second bag?
 - c) If all balls are put in a single bag, what is the probability of getting a blue ball?
- 5) A box contains 30 beads, some are black and some are white. The probability of drawing a white bead is known to be $\frac{1}{2}$.
 - a) How many white beads are in the box?
 - b) If one white bead is removed, what would be the probability of drawing a white bead from the remaining beads?



Second degree equations

- ✓ Quadratic equation: An equation on the form $ax^2 + bx + c = 0$, $a \neq 0$ is called a quadratic equation in one variable x , where a , b , c are constants. A quadratic equation has two roots
- ✓ Method of solving quadratic equations
 - By completing the square
 - By quadratic formula
- ✓ Quadratic equation: to find roots of $ax^2 + bx + c = 0$, is given by

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}, \quad x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

- ✓ Discriminant: for the quadratic equation $ax^2 + bx + c = 0$ the expression $b^2 - 4ac$ is called the discriminant and it is denoted by D . then the roots of the quadratic

$$x = \frac{-b \pm \sqrt{D}}{2a} \quad \text{equation are given by}$$

Nature of roots

If $b^2 - 4ac < 0$, it has no solution

If $b^2 - 4ac = 0$, it has one solution

If $b^2 - 4ac > 0$, it has two solutions

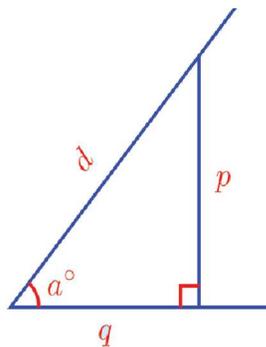
Questions

- 1) The difference of two positive number is 6. Their product is 216, find the numbers?
- 2) The sum of square of two consecutive odd integer is 290. Find the numbers?
- 3) The square of a number subtracted from 4 times the number gives 45.then,
 - a. Find the numbers
 - b. To get a single solution which number will be taken instead of 45?
Find the solution?
- 4) Sum of the squares of three consecutive natural number is 194.find the numbers?
- 5) The product of Raees's age before 3 years and his age after 5 year is 153. Find his present age?

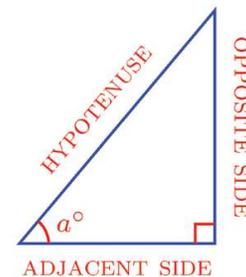
Individual Tuition Concept

Trigonometry

- ✓ In any triangle with angles $45^\circ, 45^\circ, 90^\circ$ both the shorter sides have the same length and the length of the longest side is $\sqrt{2}$ times this length
- ✓ In any triangle with angles $30^\circ, 60^\circ, 90^\circ$, the length of the longest side is 2 times the length of the shortest side; and the length of the side of medium size is $\sqrt{3}$ times the length of the shortest
- ✓ Consider a point on one side of an angle of a° , at distance d from the vertex, and the perpendicular from this point to the other side; if the height of the perpendicular is p and the distance of the foot of the perpendicular from the vertex is q , then

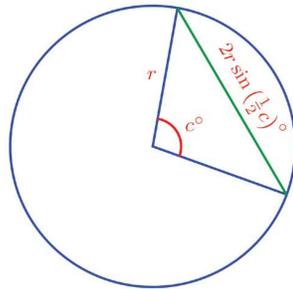


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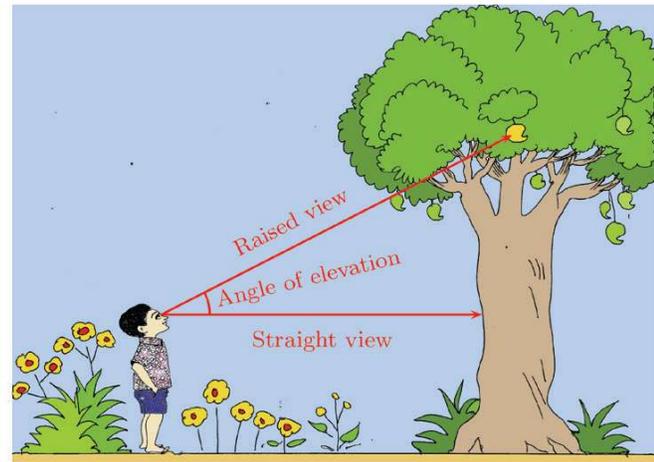
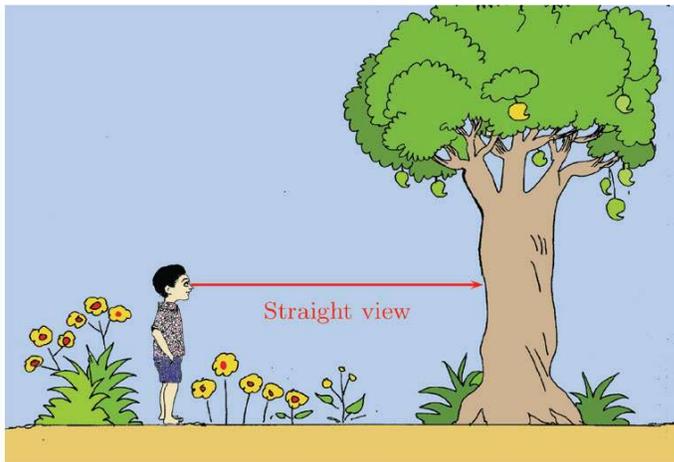
- ✓ $\sin a^\circ = \text{Opposite side} / \text{Hypotenuse}$
- ✓ $\cos a^\circ = \text{Adjacent side} / \text{Hypotenuse}$
- ✓ $\tan a^\circ = \text{Opposite side} / \text{Adjacent side}$

- ✓ The length of any chord of a circle is twice the product of the radius and the sine of half the central angle



Heights and distances

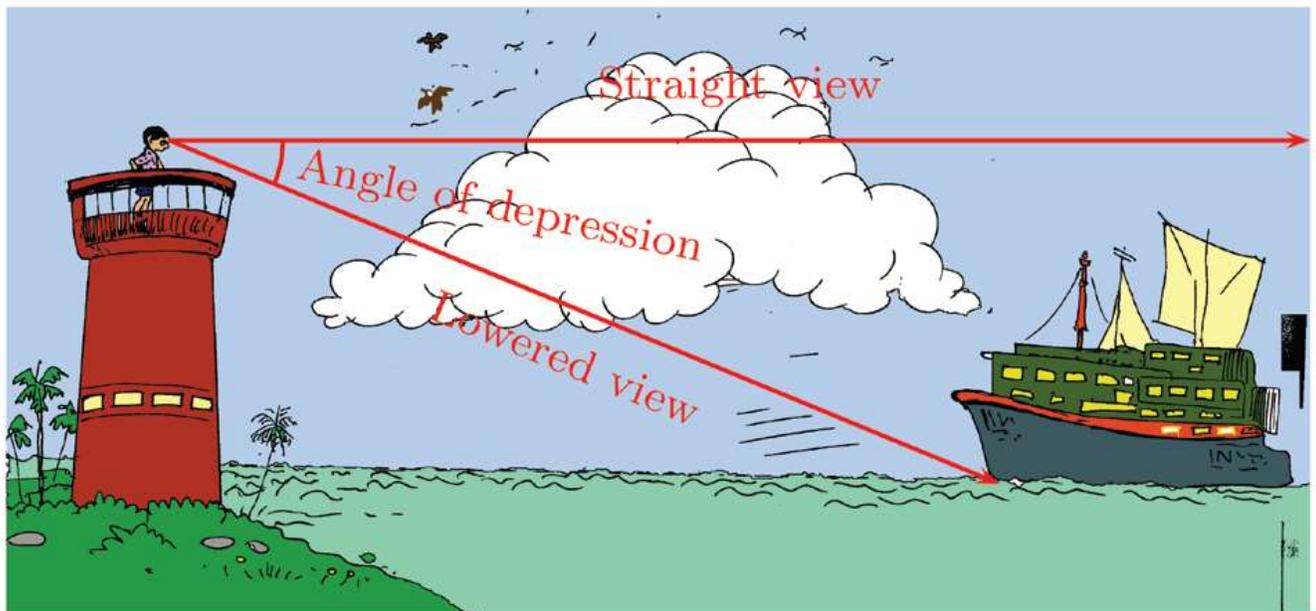
INTE-DVAI



Our line of vision is parallel to the ground. To see things above, we have to raise (elevate) the line of vision. The angle between these two lines is called angle of elevation

Similarly when we stand at a high place, to see things below, we have to lower our line

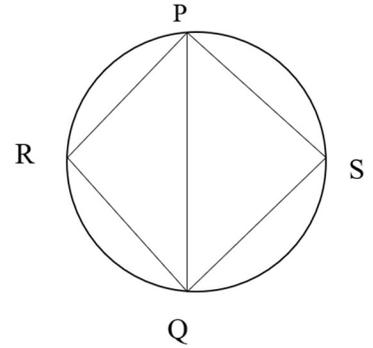
of vision: The angle produced thus is called the angle of depression. Such angles are measured using an instrument called clinometer.



Questions

- 1) Find out the value of
 - a. $\sin 0^\circ$, $\cos 0^\circ$
 - b. $\sin 30^\circ$, $\cos 60^\circ$
 - c. $\sin 60^\circ$, $\cos 30^\circ$
 - d. $\sin 45^\circ$, $\tan 45^\circ$
- 2) In figure PQ is the diameter of the circle. if $\angle PQR = 45^\circ$ and $QR = 3\text{cm}$

- a. Find $\angle PRQ$?
- b. What is the radius of the circle?



- 3) In triangle ABC $\angle A = 30^\circ$, $BC = 6\text{cm}$, find the circum diameter of the triangle?
- 4) Anu and Minu are flying kites. The length of their thread is 35 m each.
The moment they used the maximum length of their thread, the angle made by Anu's thread with the ground is 60° and that of Minu's is 30° whose kite is flying high? How much?
- 5) Two buildings in a plane ground are 20 metres apart. From the top of the smaller building, one sees the base of the building at a depression of 50° and its top at elevation of 25° .
 - a. Draw a rough figure and mark the measurements.
 - b. Find the height of the smaller building.
 - c. Find the height of the bigger building.

($\tan 50 = 1.2$, $\tan 25 = 0.47$)

Coordinates

- ✓ X - axis: Horizontal number line is called x - axis
- ✓ Y - axis: Vertical number line is called y - axis.
- ✓ Origin: intersecting point of x - axis and y - axis is called origin. Coordinates of origin is (0,0).
- ✓ If a point in a plain is denoted by (p, q), p stands for x coordinate and q stands for y coordinate
- ✓ Coordinate of any point on x -axis is (x, 0) and coordinate of any point in y - axis is (0, y)
- ✓ The axes divide the cartesian plane in to four parts. These four parts are called the quadrants.

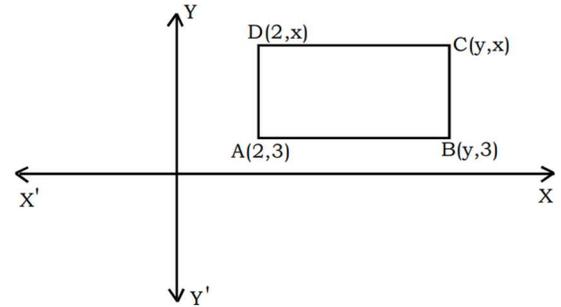
Quadrant	X - coordinate	Y - coordinate
1 st Quadrant	+	+
2 nd Quadrant	-	+
3 rd Quadrant	-	-
4 th Quadrant	+	-

- ✓ Y coordinates of all lines parallel to x - axis are equal.
- ✓ X coordinates of all lines parallel to y - axis are equal
- ✓ Distance between the two points A (x₁, y₁) and B (x₂, y₂) is
$$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$
- ✓ The distance between the point with coordinates (x, y) and the origin is
$$\sqrt{x^2 + y^2}$$

Questions

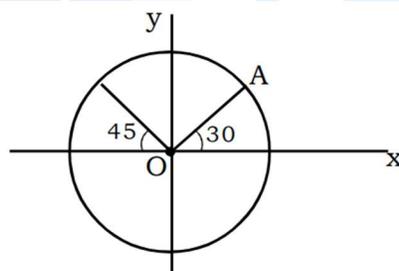
1) In the figure ABCD is a rectangle in which $AB = 5$ cm, $AD = 2$ cm.

- Find the values of x, y, z ?
- Find the coordinates of B, C and D?
- Find the length of AC and BD



2) Prove that $A(2, 5)$, $B(10, 5)$ and $C(10, 11)$ are the vertices of a right angled triangle.

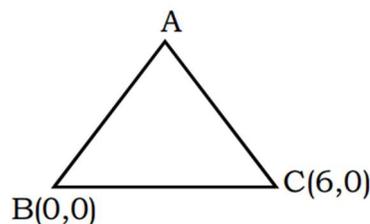
3) O is the centre of the circle with radius 6 cm in the figure. Find the coordinates of A and B



4) $P(-2, -3)$, $Q(2, 5)$ are the end points of the diameter of a circle.

- Find the coordinates of the centre.
- Find the radius

5) In the figure, ABC is an equilateral triangle. Find the coordinate of A?



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