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CLASS – 10

MATHEMATICS

Chapter – 10

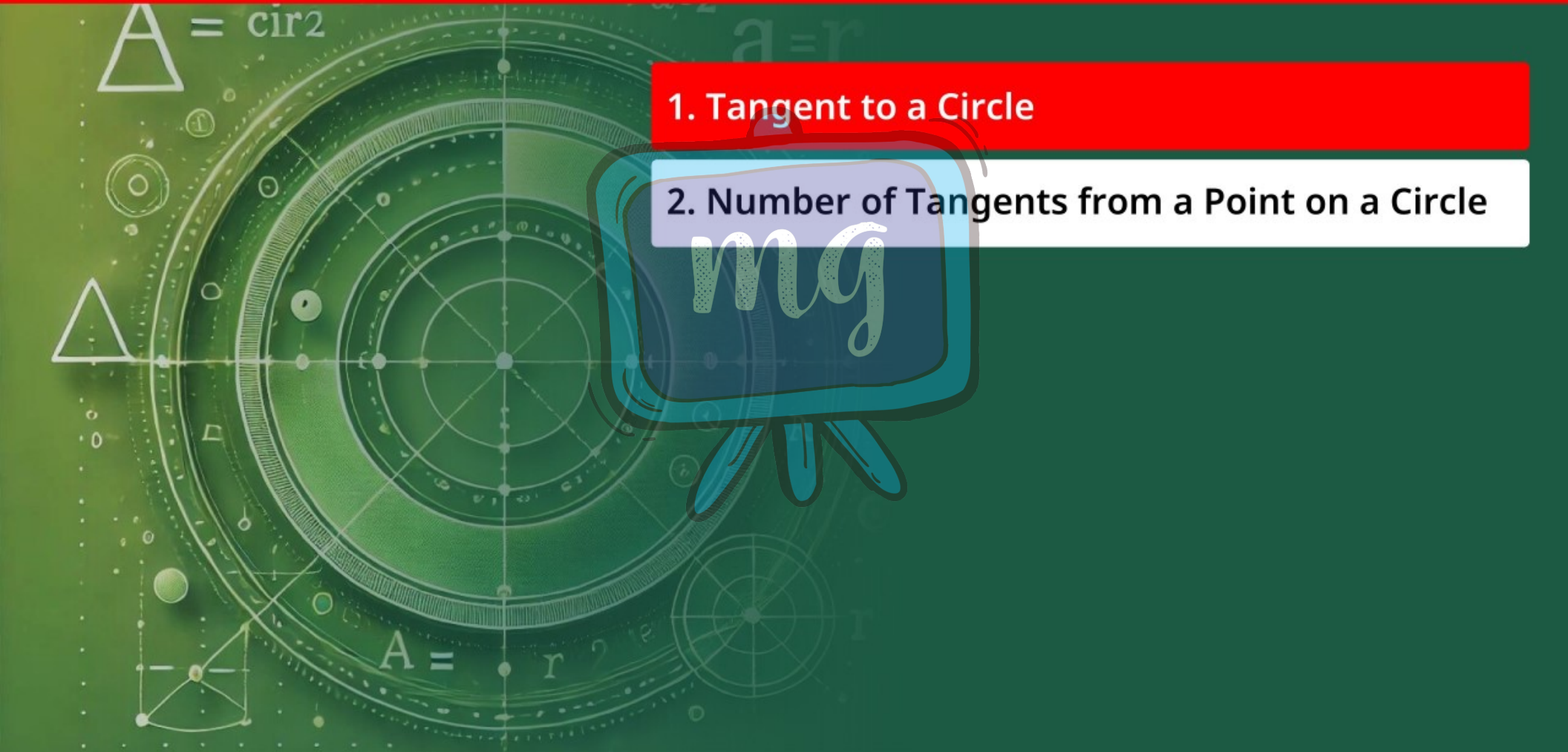
CIRCLES

Part – 1

Tangent to a Circle

Shubham Tiwari

OVERVIEW



1. Tangent to a Circle
2. Number of Tangents from a Point on a Circle

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COMPETENCY BASED LEARNING

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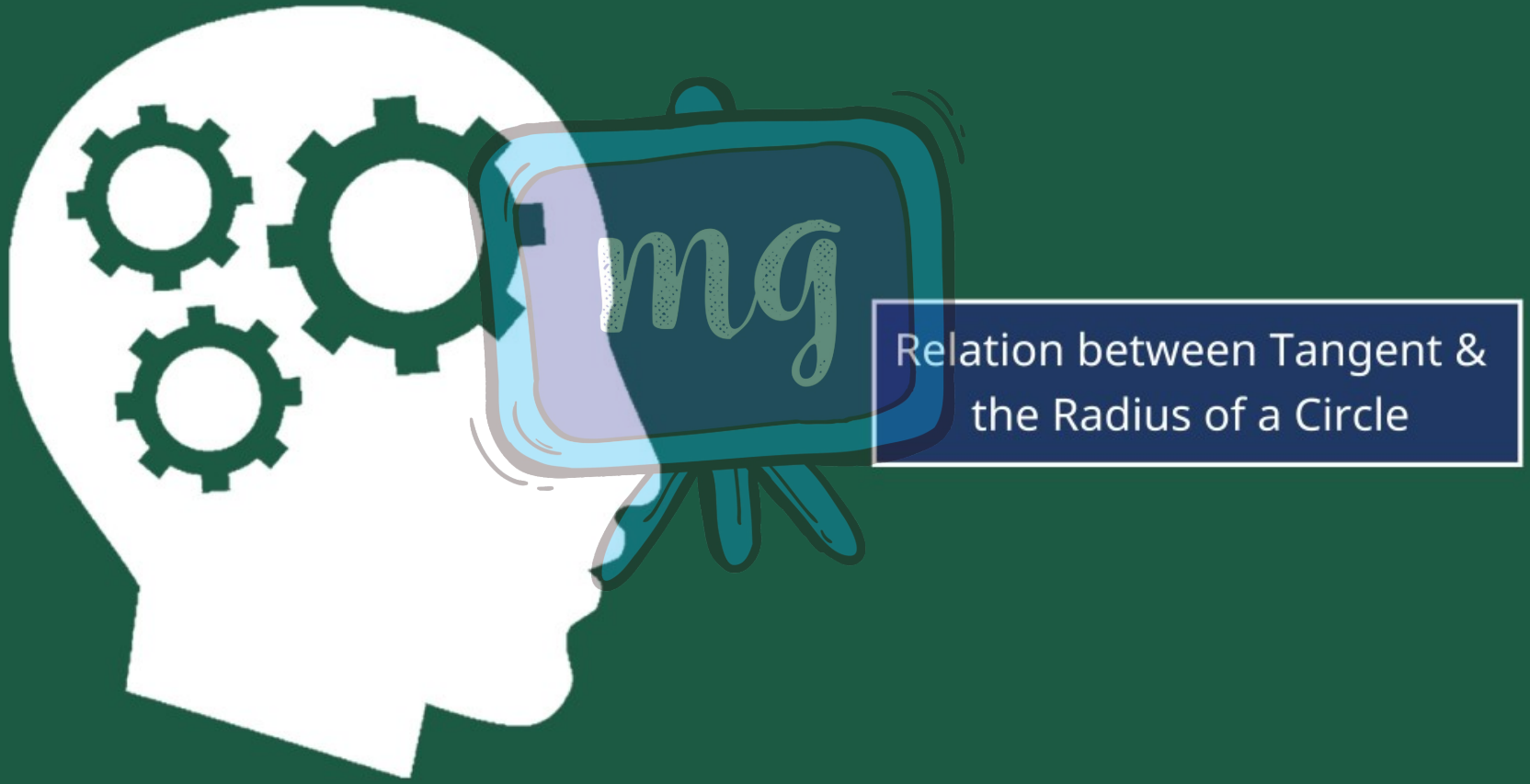
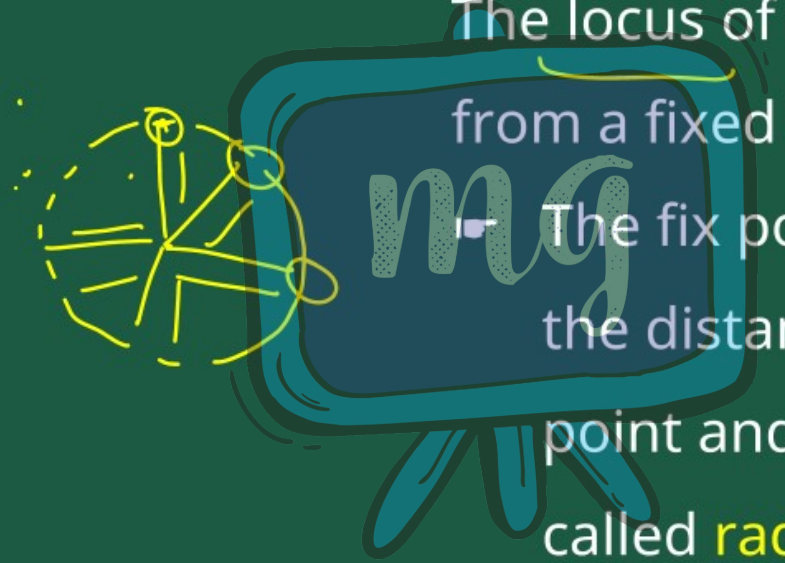
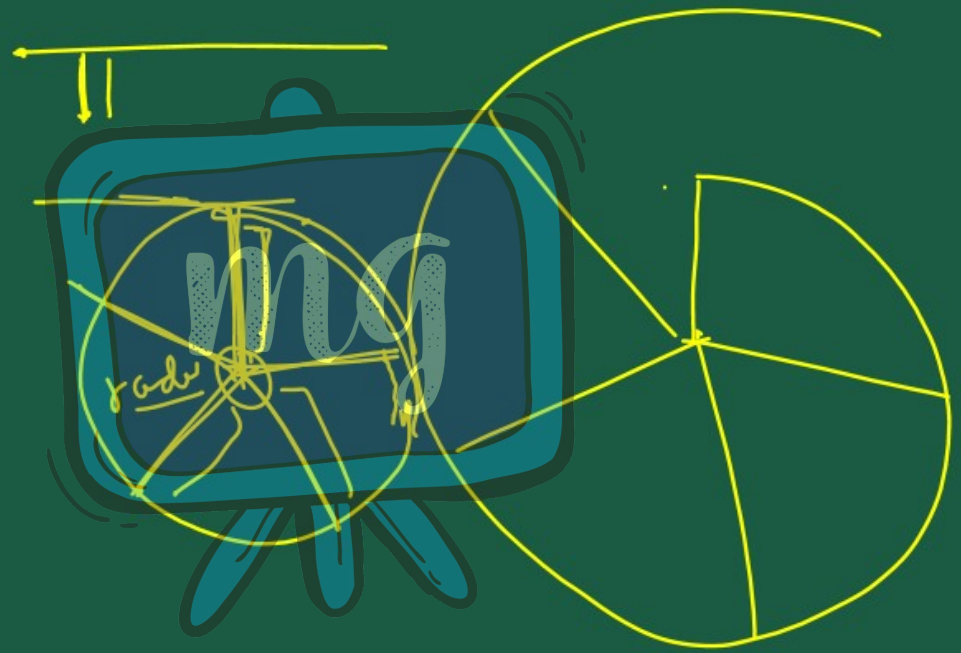


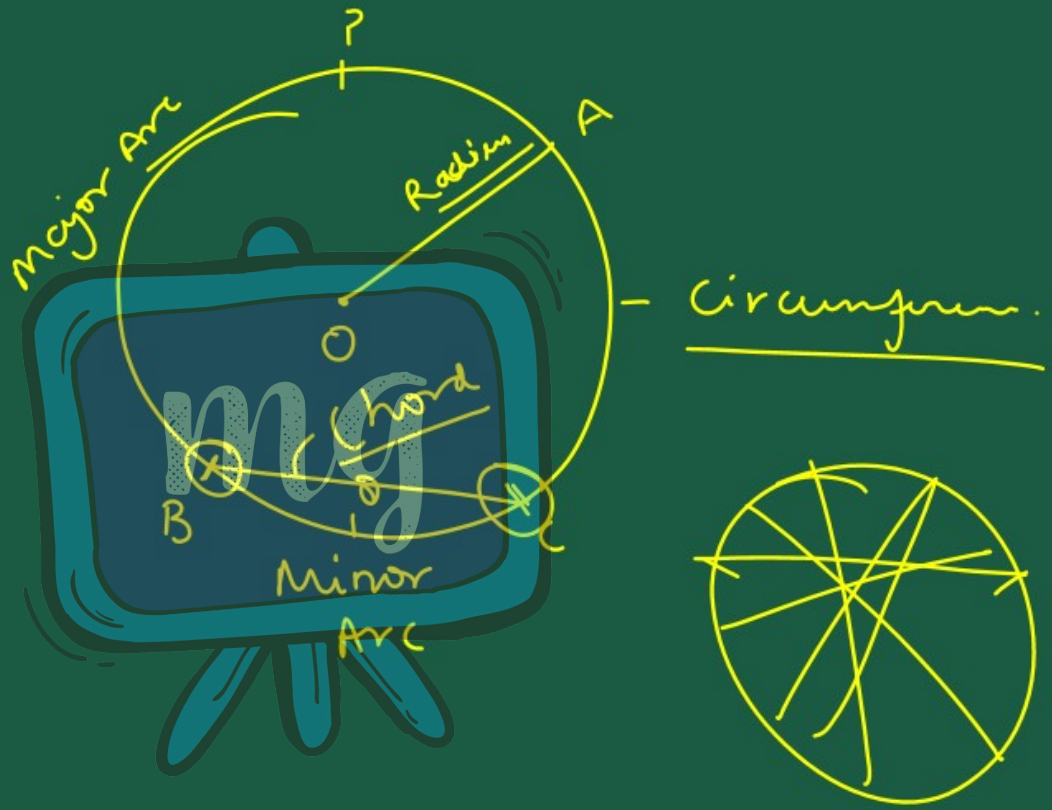
CIRCLE

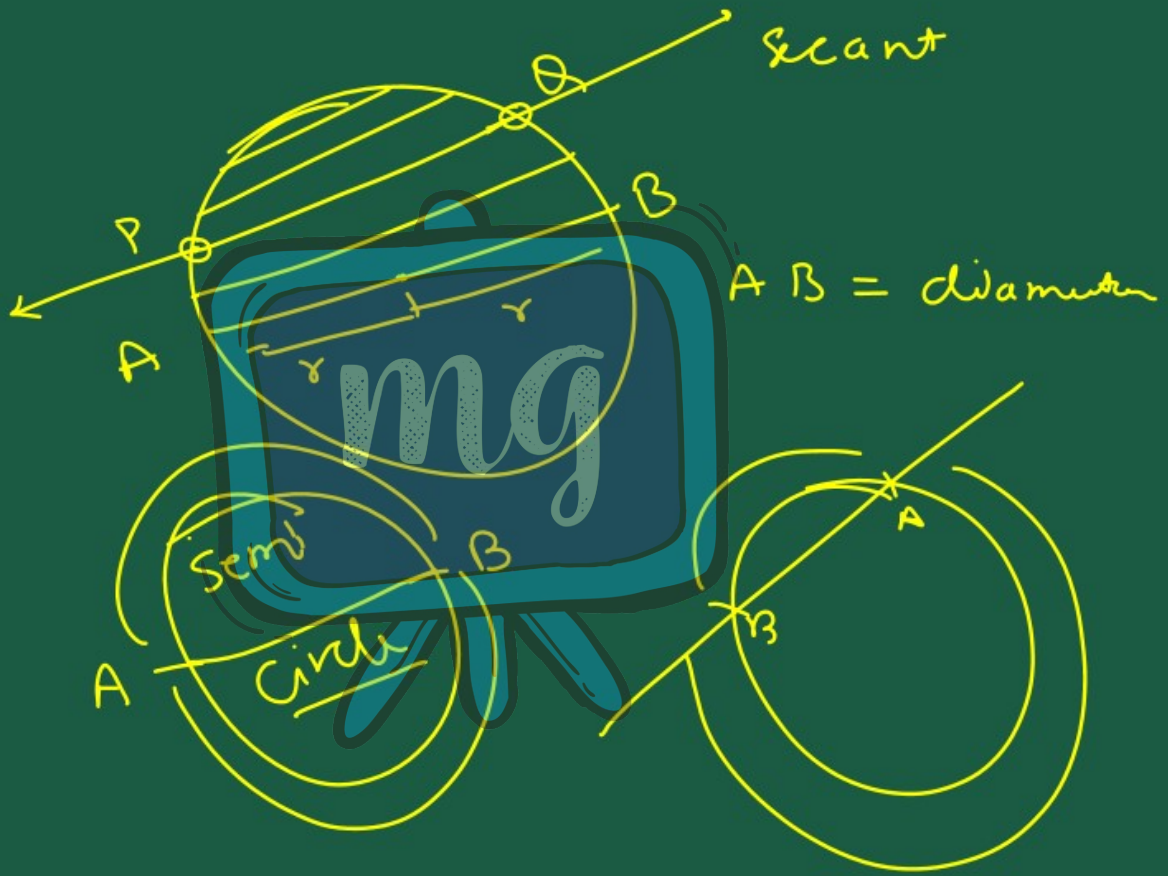


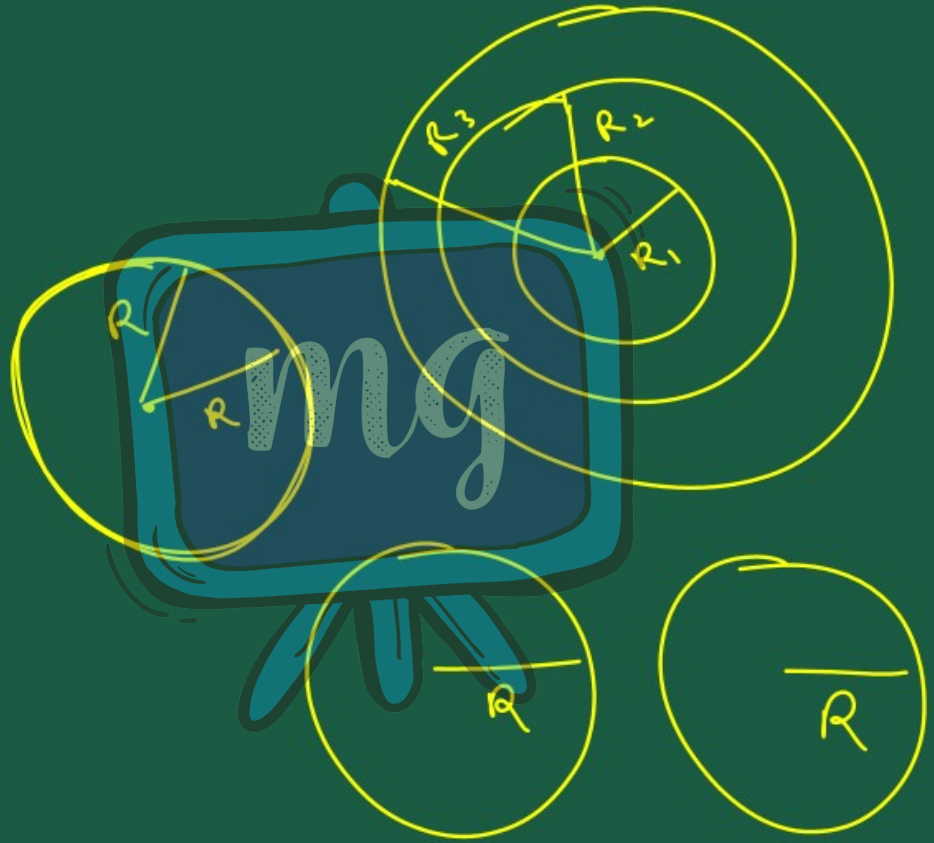
The locus of a point that is equidistant from a fixed point is known as a circle.

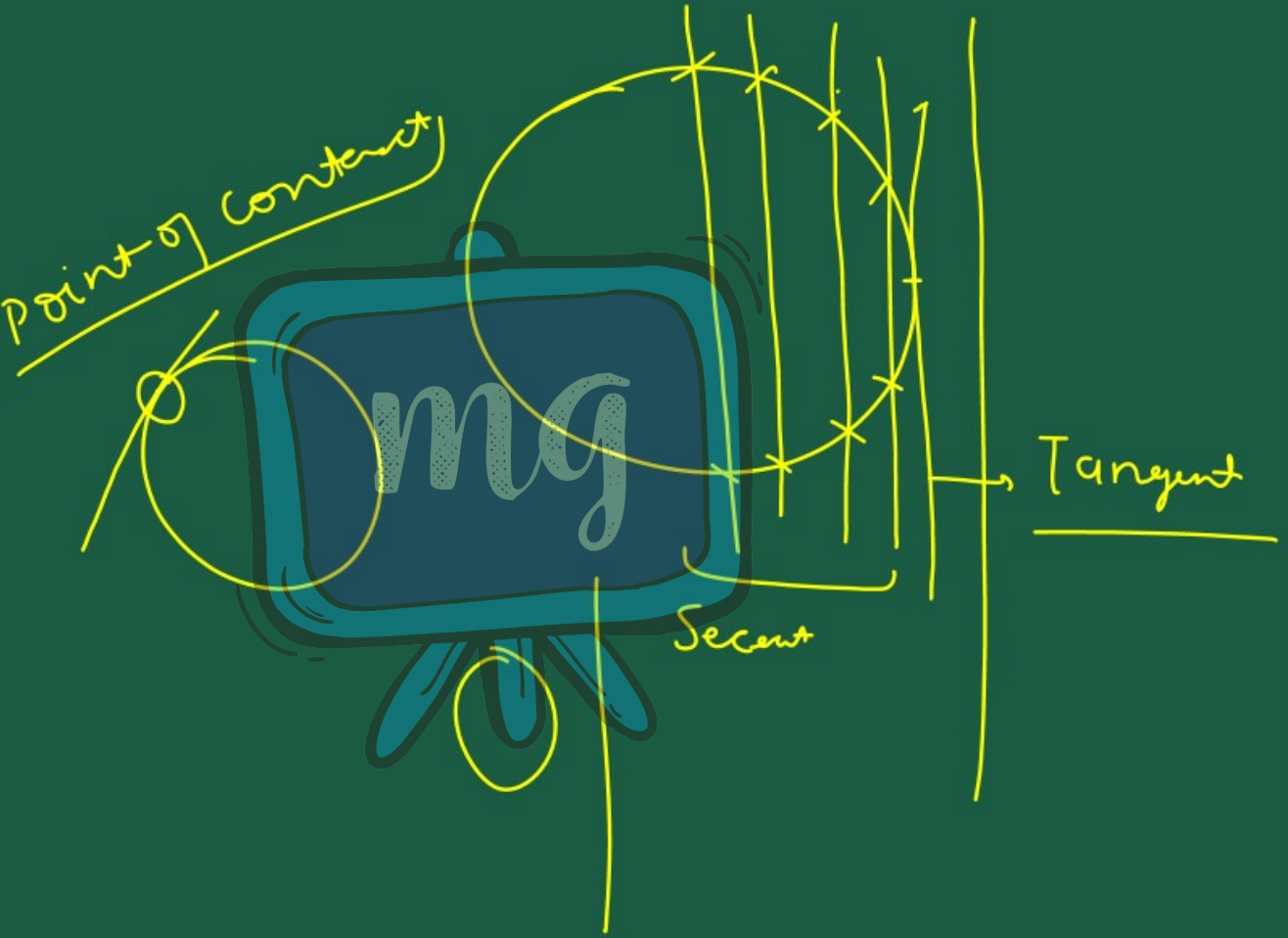
- The fix point is called centre and the distant between the fixed point and the point on the circle is called radius.



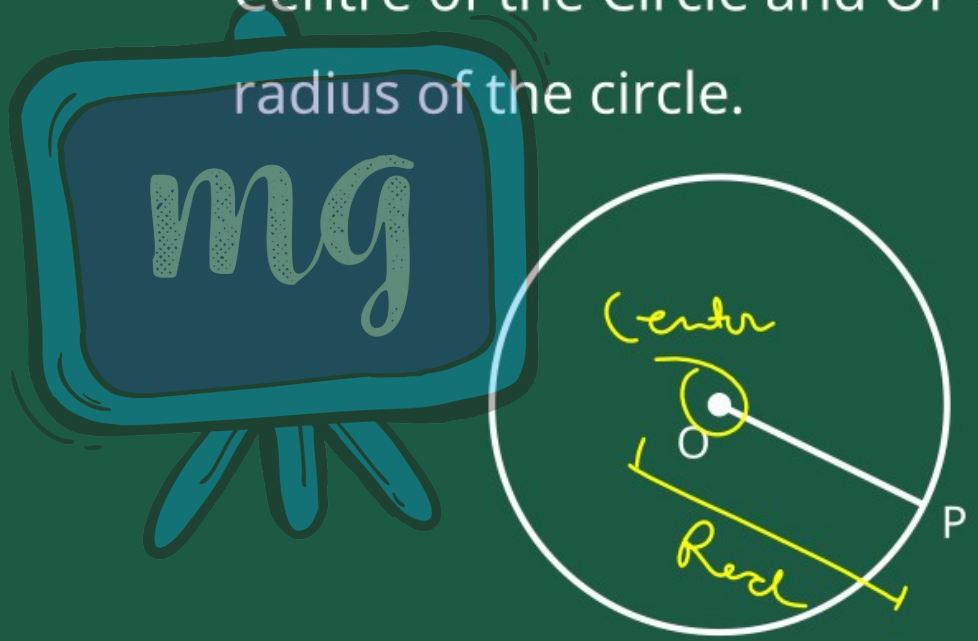




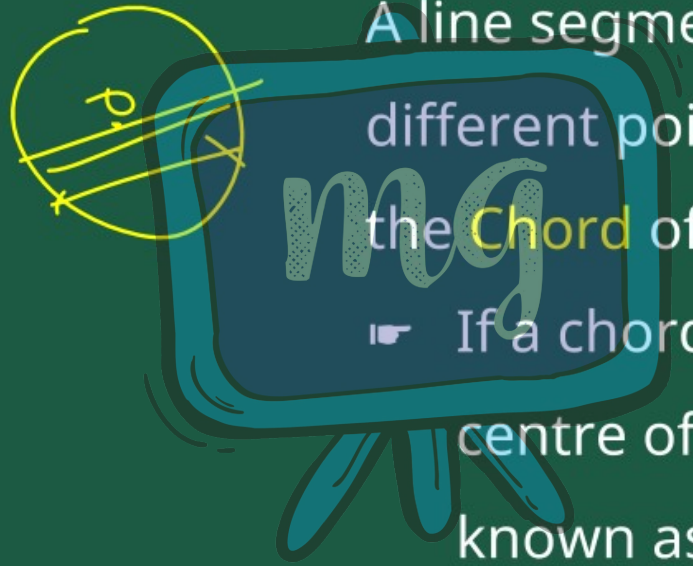




Here, O is the fixed point or the Centre of the Circle and OP is the radius of the circle.



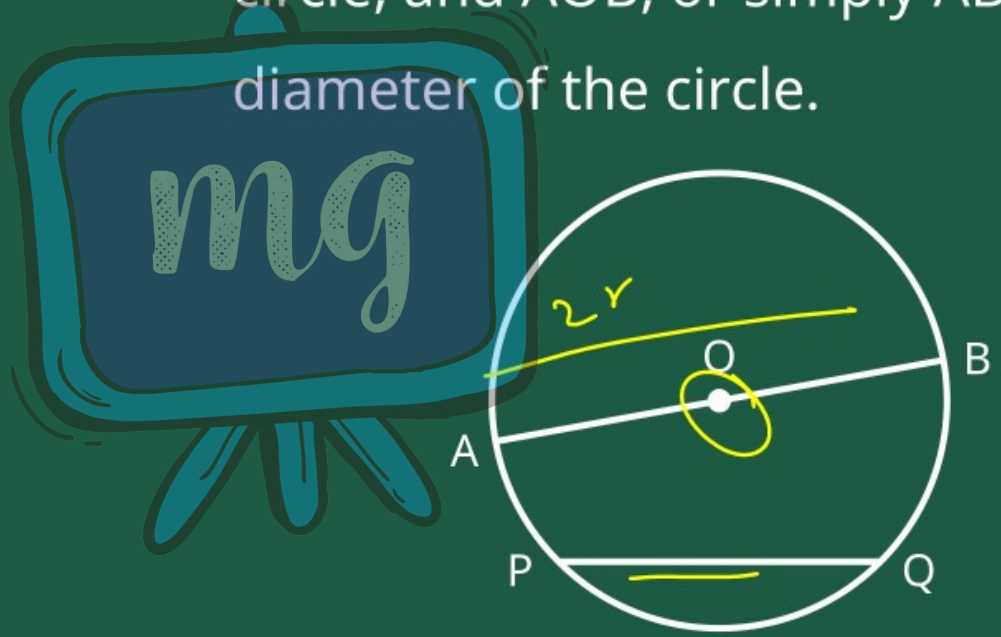
CHORD



A line segment joining any two different points on a circle is called the Chord of the circle.

- If a chord passes through the centre of a circle then the chord is known as the Diameter of the circle.

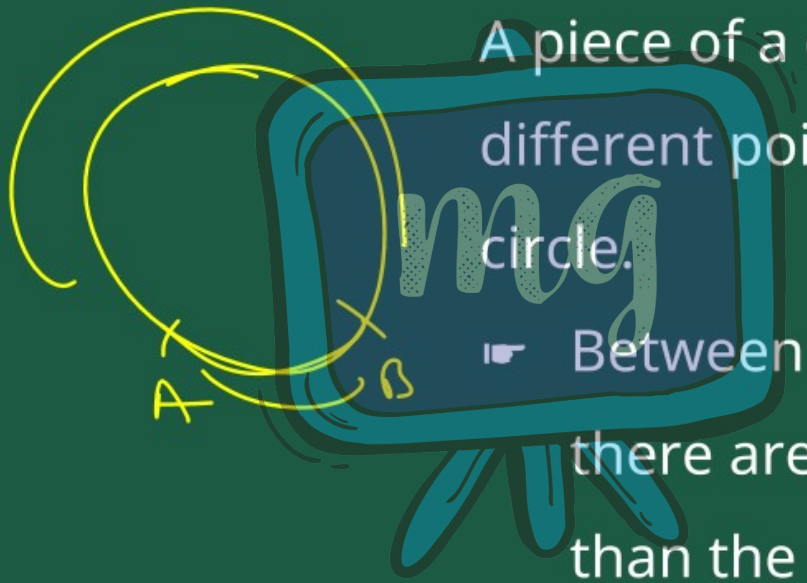
In the figure, PQ is a chord of the circle, and AOB, or simply AB is the diameter of the circle.



SEMI–CIRCLE

A diameter of a circle divides a circle into two equal parts, each part known as a semi circle.

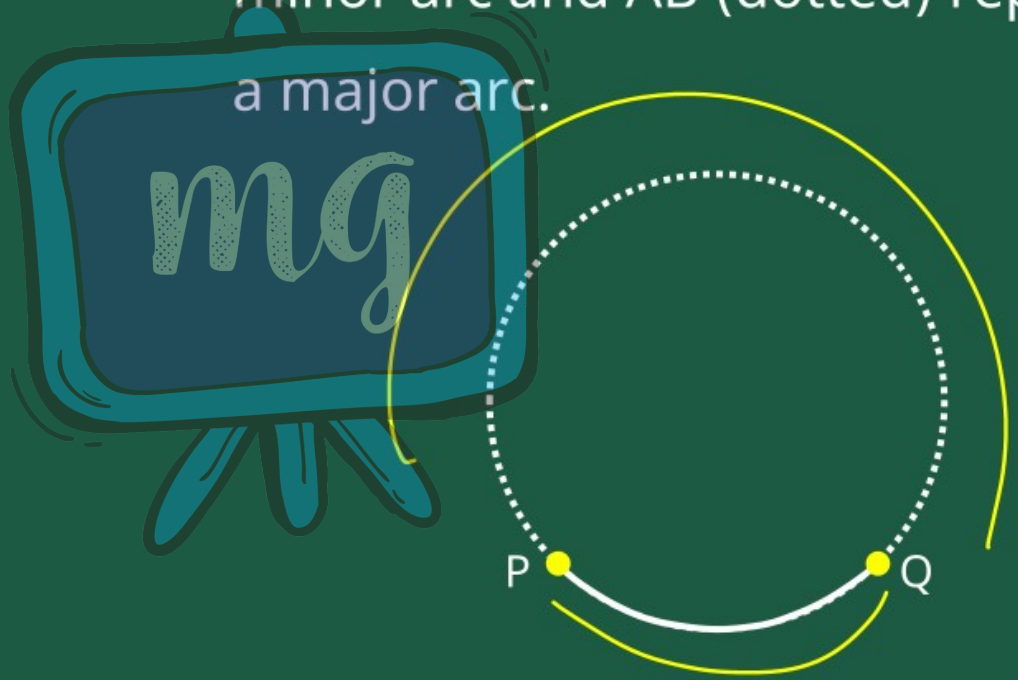
ARC



A piece of a circle between any two different points is called an Arc of that circle.

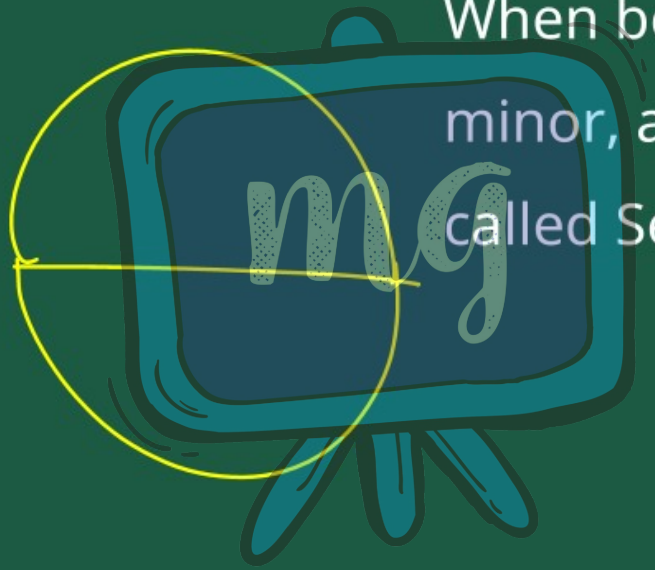
- Between any two points on a circle, there are two arcs. One is smaller than the other. The smaller arc is known as Minor arc and the larger is called Major Arc.

In the figure, AB (solid) represents a minor arc and AB (dotted) represents a major arc.



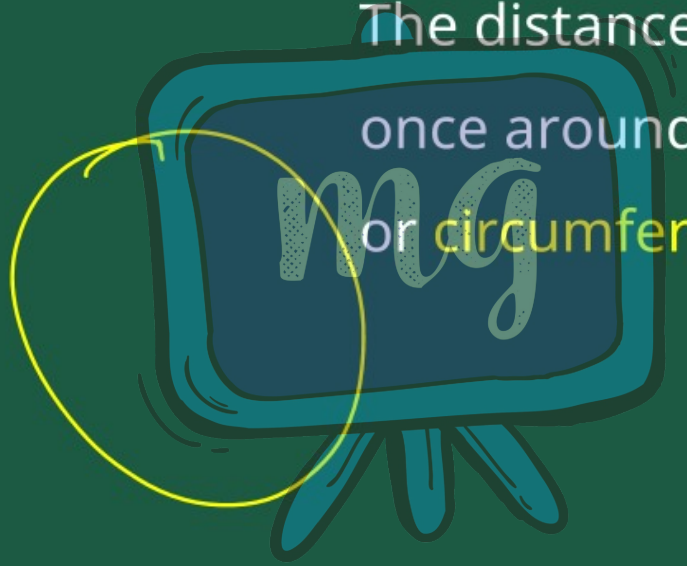
Note

When both the arcs, major and minor, are equal then each is called Semicircle.



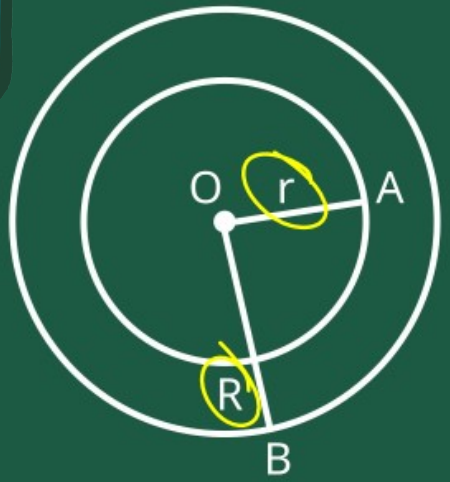
CIRCUMFERENCE

The distance covered by traveling once around a circle is its perimeter or circumference.



CONCENTRIC CIRCLES

Circles having the same centre but different radii are known as concentric circles.

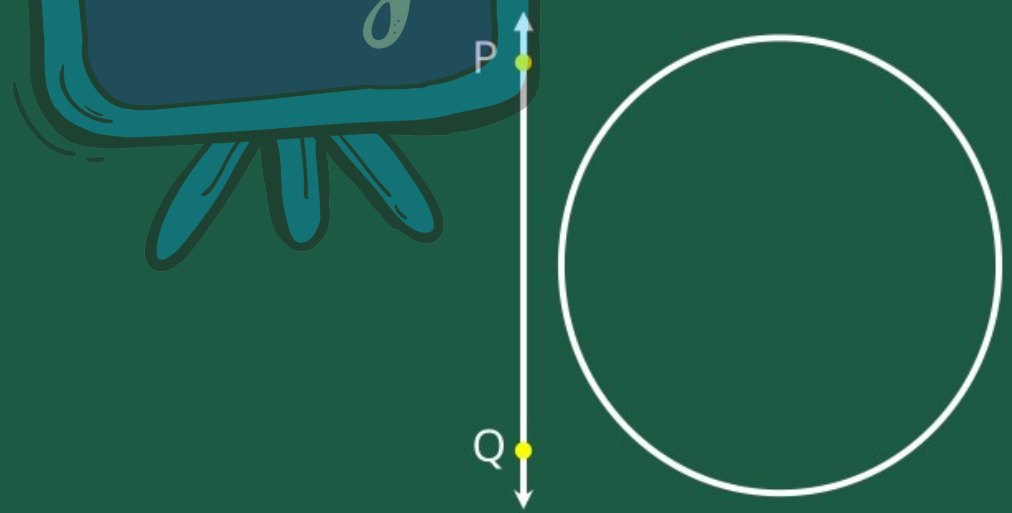


CIRCLE AND LINE IN A PLANE

For a circle and a line on a plane,

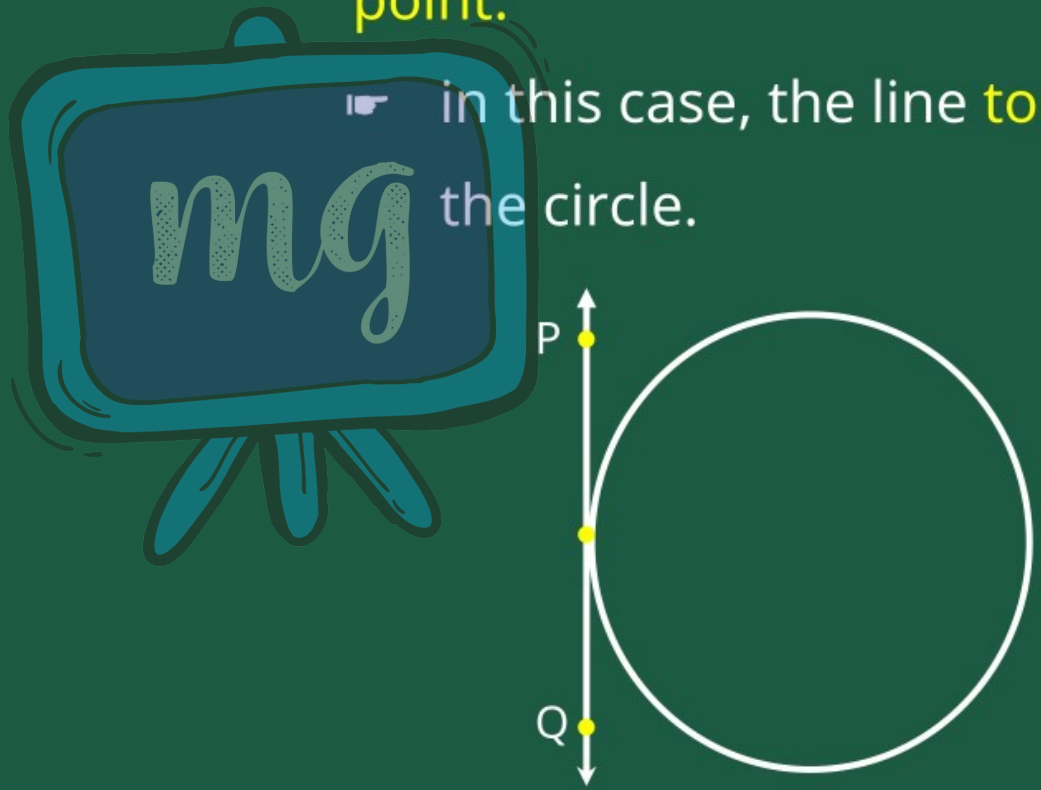
there can be three possibilities.

(I) They can be non-intersecting.



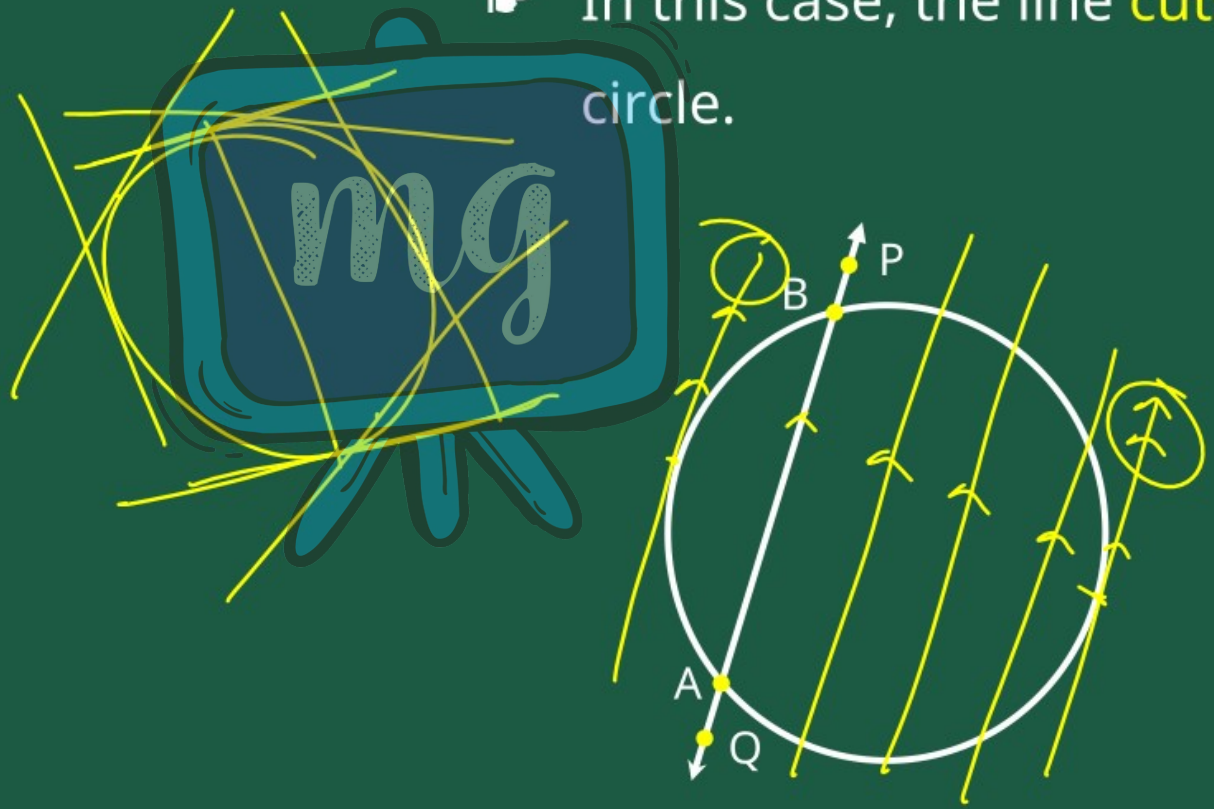
(II) They can have a single common point:

☛ in this case, the line touches the circle.



(III) They can have two common points:

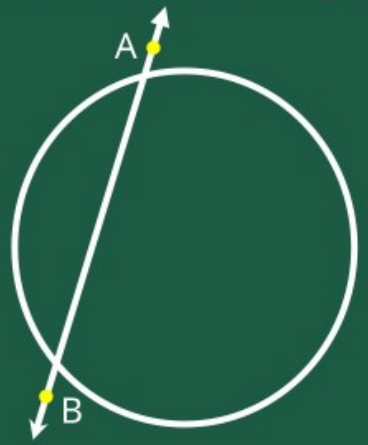
☛ In this case, the line cuts the circle.



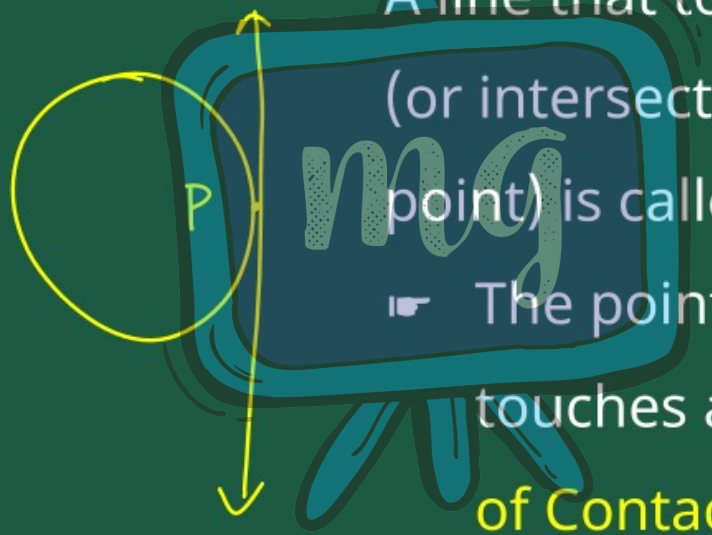
SECANT

A line that intersects a circle at two different points is called a Secant of that circle.

In the figure, AB is secant to the circle.



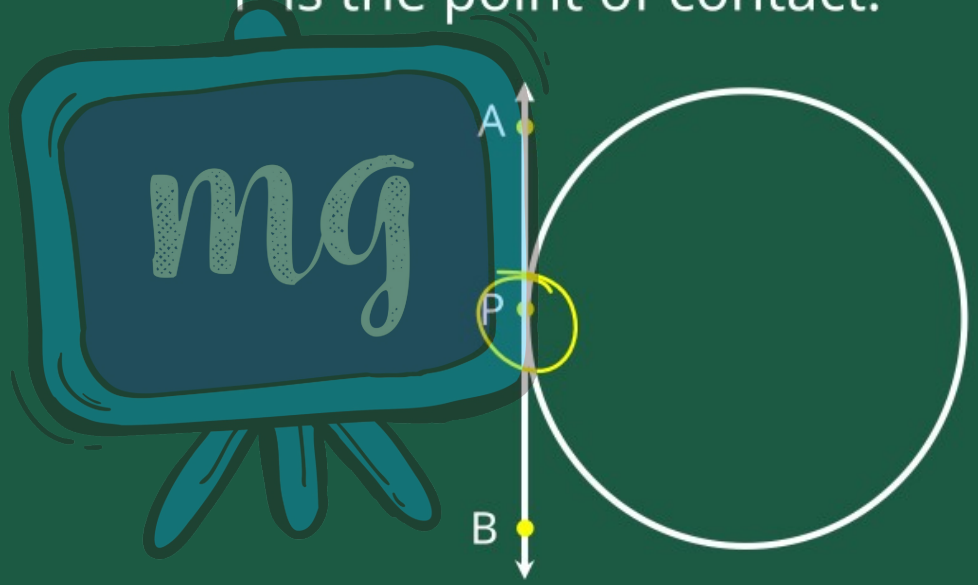
TANGENT



A line that touches the circle at a point (or intersects the circle at only one point) is called a Tangent to the circle.

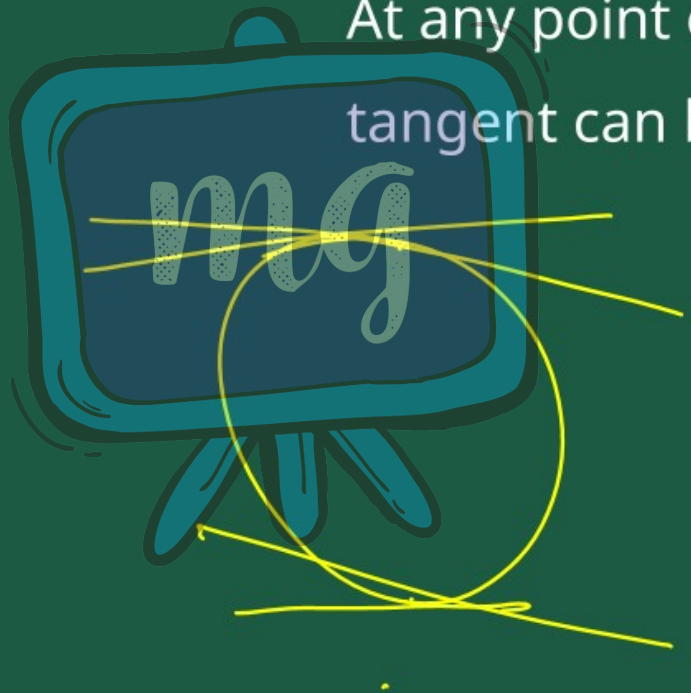
- The point at which the tangent touches a circle is called the Point of Contact.

Here, APB is tangent to the circle and P is the point of contact.

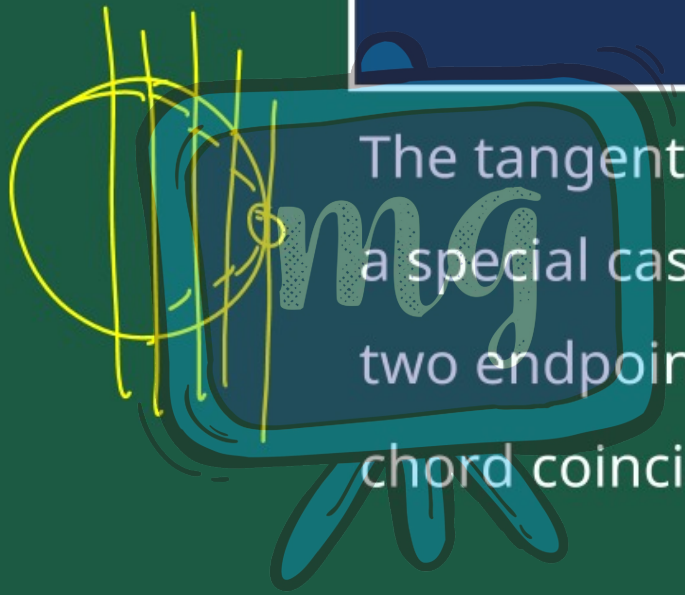


Note

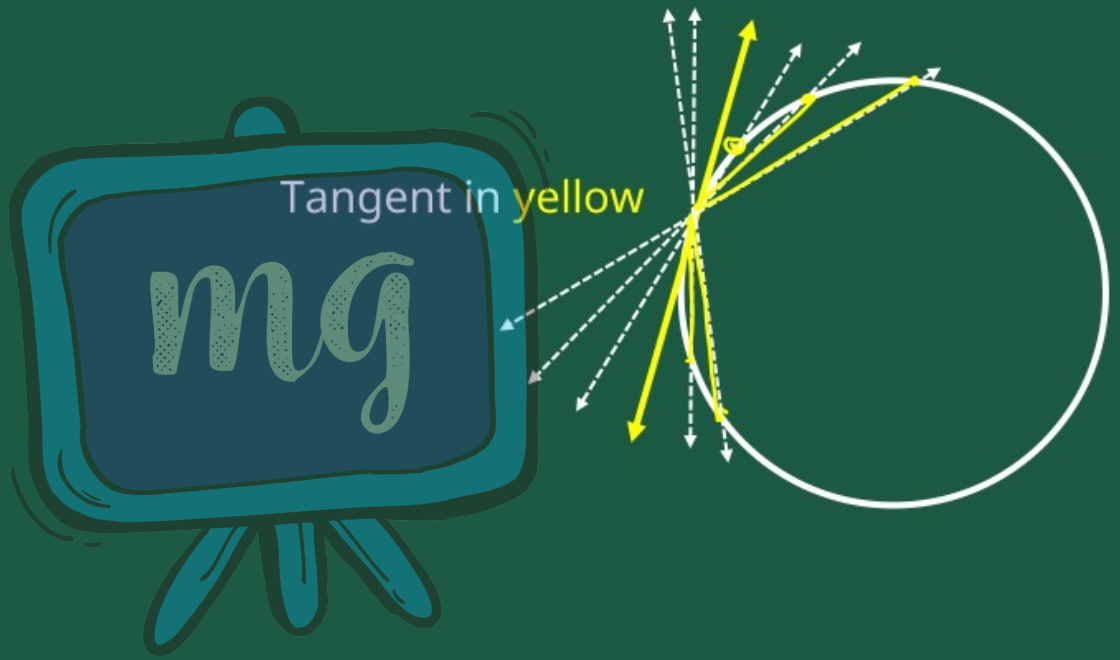
At any point on a circle, only one tangent can be drawn.



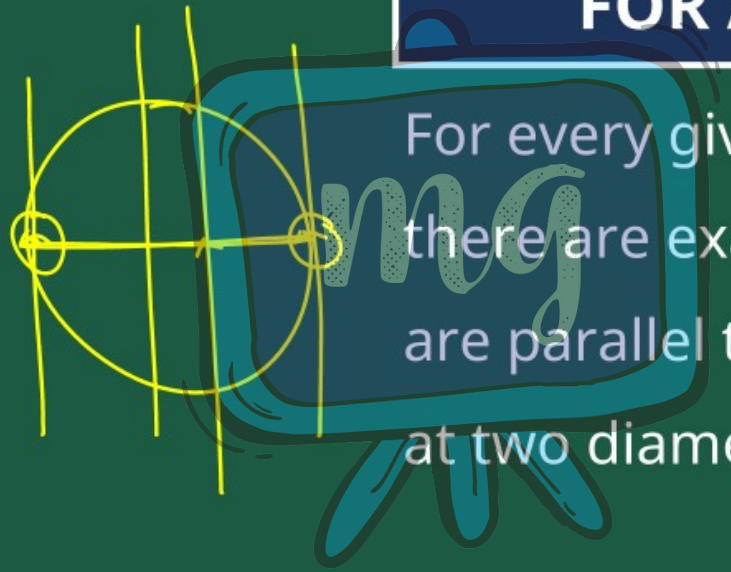
TANGENT AS A SPECIAL CASE OF SECANT



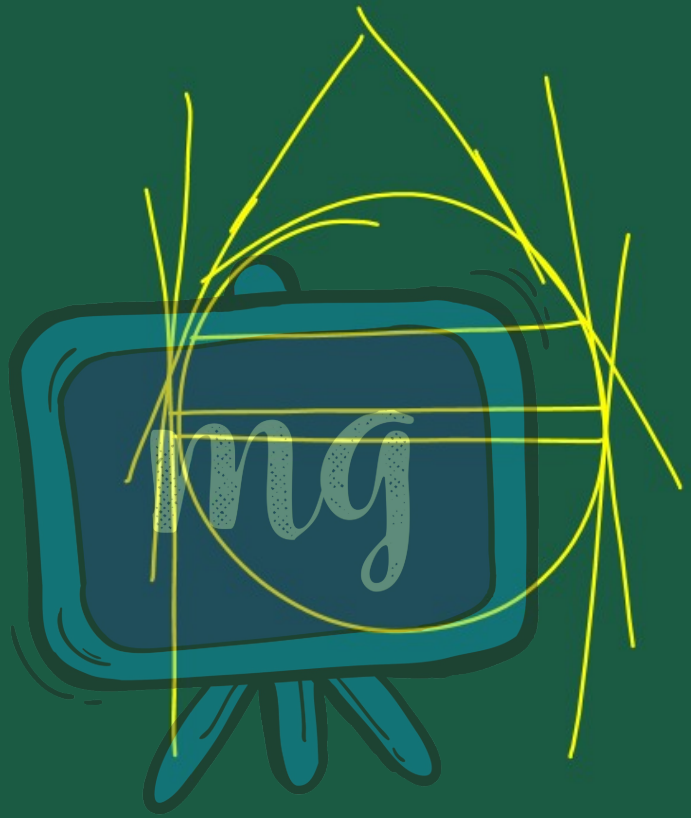
The tangent to a circle can be seen as a special case of the secant when the two endpoints of its corresponding chord coincide.

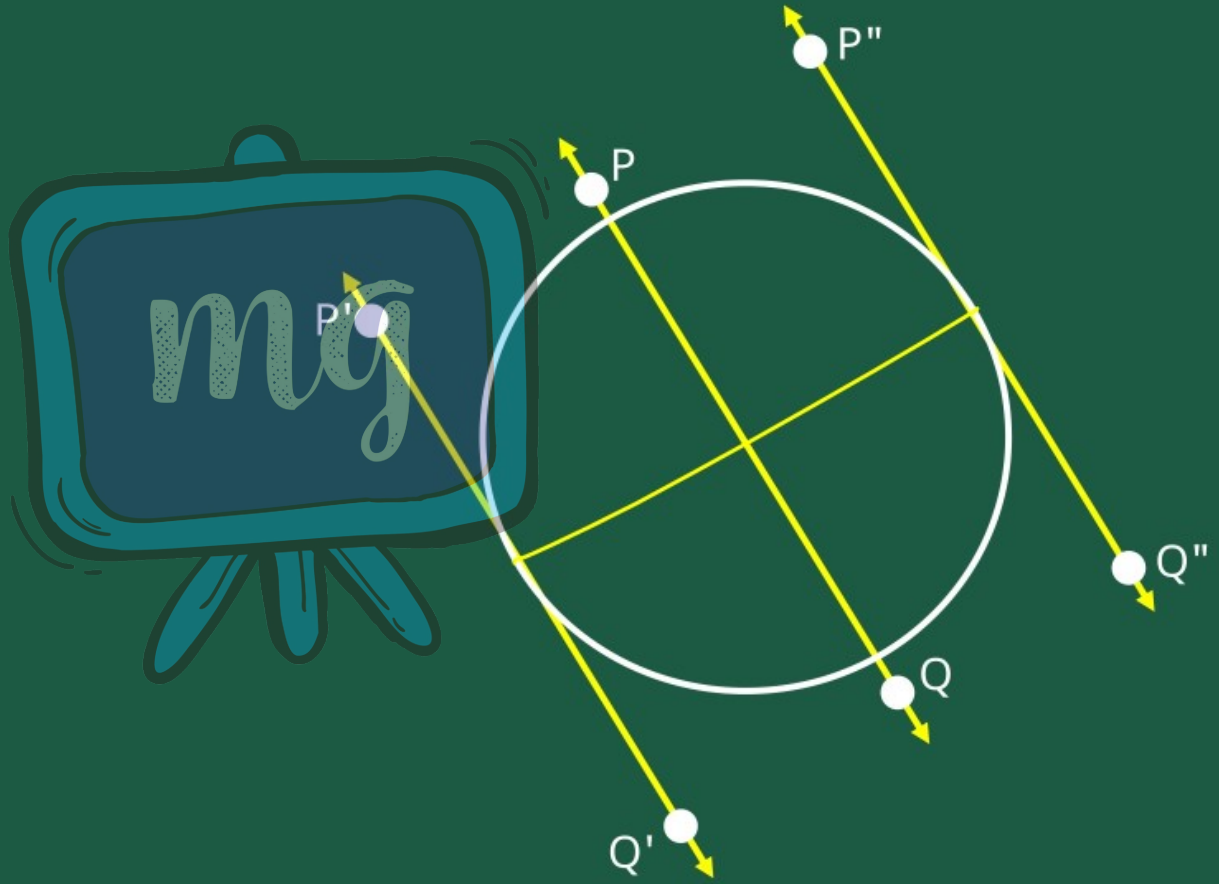


TWO PARALLEL TANGENTS FOR A GIVEN SECANT



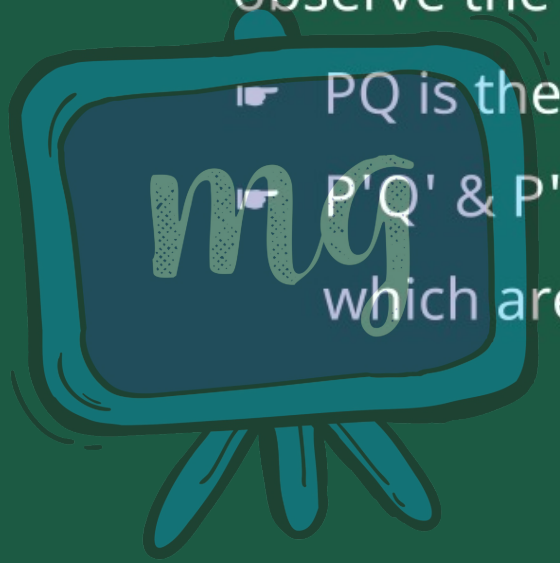
For every given secant of a circle, there are exactly two tangents which are parallel to it and touches the circle at two diametrically opposite points.





From the given diagram, we can observe the following points :

- PQ is the secant of a circle.
- P'Q' & P"Q" are two tangents which are parallel to PQ.



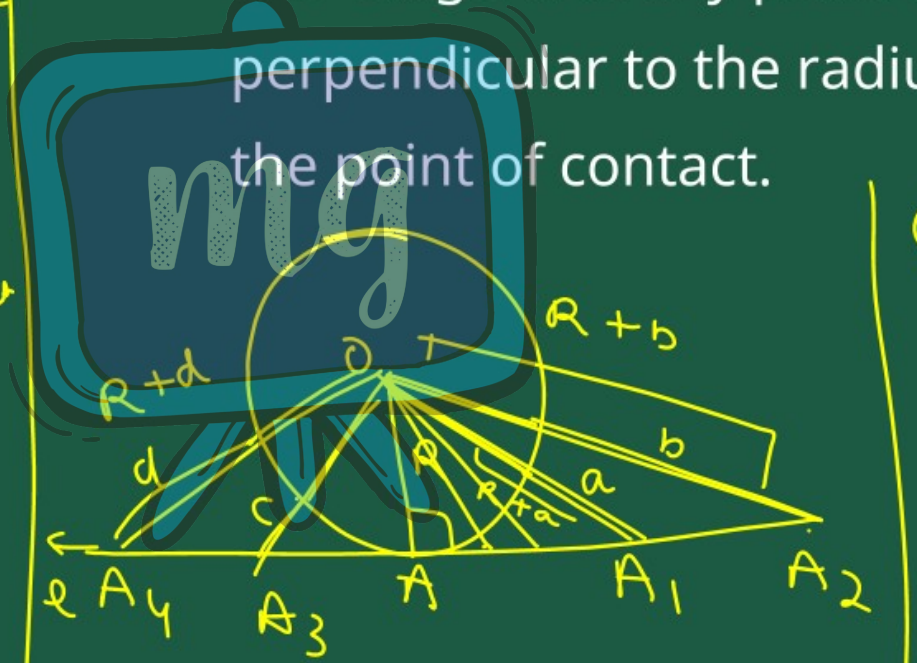
THEOREM 10.1

The tangent at any point of a circle is perpendicular to the radius through the point of contact.

$OA_4 > OA_3 > OA < OA_1 < OA_2$

The shortest Distance from O to A is Perpendicular to the tangent

$OA \perp l$



Given:-

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LEARNING OUTCOMES

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1. Circle
2. Tangent to a Circle
3. Circle and line in a plane

ASSESSMENT

1 | A circle has a number of tangents equal to

A 0

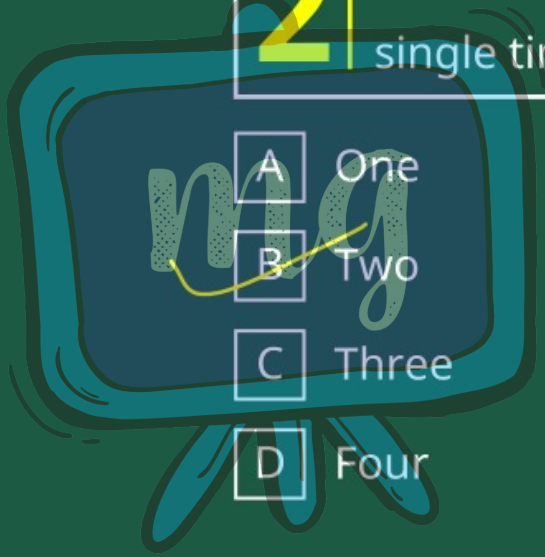
B 1

C 2

D Infinite

ASSESSMENT

2 | A circle can have ..... parallel tangents at a single time.



A One

B Two

C Three

D Four

3. Amit, standing on a horizontal plane, finds a bird flying at a distance of 200 m from him at an elevation of 30°. Deepak standing on the roof of a 50 m high building, finds the angle of elevation of the same bird to be 45°. Amit and Deepak are on opposite sides of the bird. Find the distance of the bird from Deepak.

4. The angle of elevation of a cloud from a point 60 m above the surface of the water of a lake is 30° and the angle of depression of its shadow in water of lake is 60°. Find the height of the cloud from the surface of water.

5. An aeroplane is flying at a height of 300 m above the ground. Flying at this height, the angles of depression from the aeroplane of two points on both banks of a river in opposite directions are 45° and 60° respectively. Find the width of the river. (Use $\sqrt{3} = 1.73$)

6. At a point A, 20 metres above the level of water in a lake, the angle of elevation of a cloud is 30°. The angle of depression of the reflection of the cloud in the lake, at A is 60°. Find the distance of the cloud from A.