CIRCLES

INTRODUCTION

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 10
CHAPTER NAME : CIRCLES

Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: 1800 120 2316
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

LEARNING OUTCOME

1.Students will be able to know about tangents.
2.Students will be able to identify whether a given line is a tangent or secant to a circle.
3. Students will be able to prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.
4. Students will be able to apply the knowledge of above theorem in solving questions. .

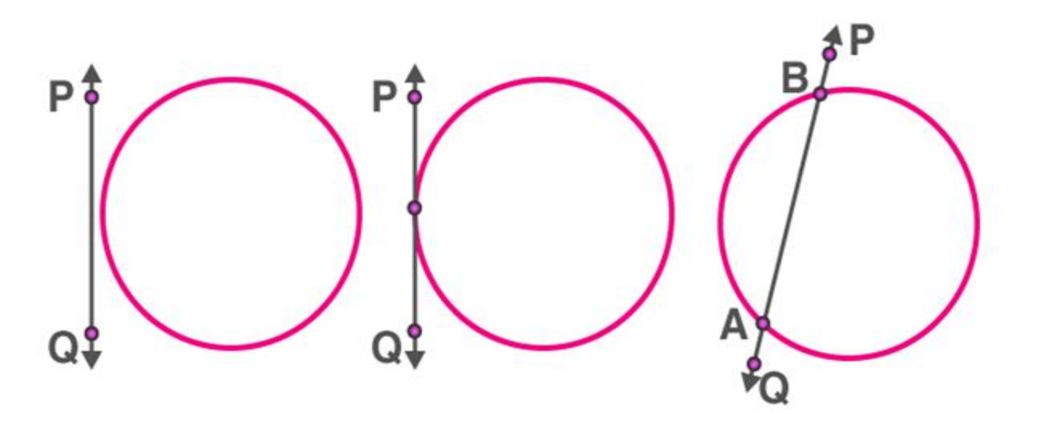
Circle and line in a plane

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.

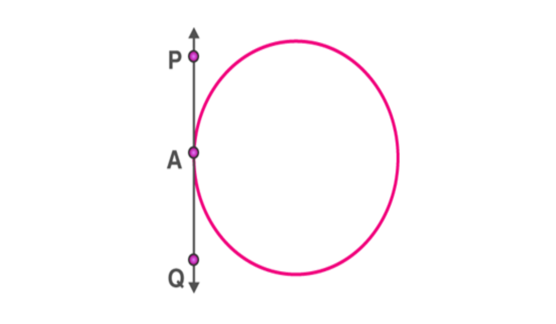
ii) they can have **two common points:** in this case, the line cuts the circle.



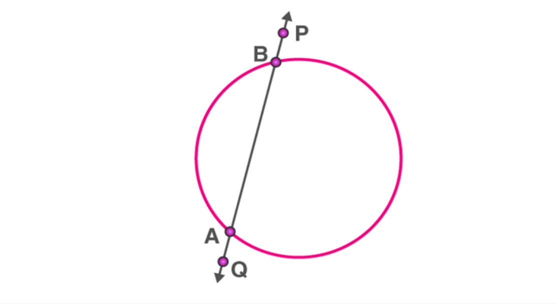
Tangent

A **tangent to a circle** is a line which touches the circle at exactly one point. For every point on the circle, there is a unique tangent passing through it.

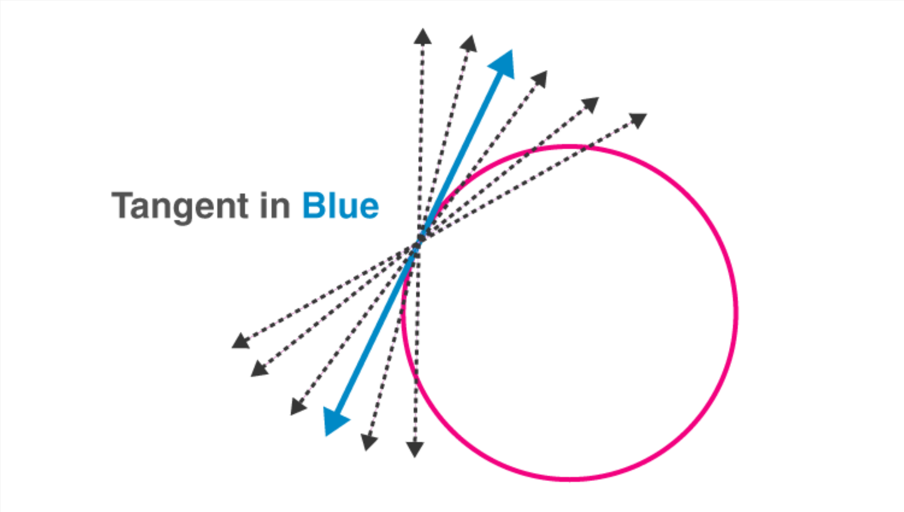
.



A secant to a circle is a line which has two points in common with the circle. It cuts the circle at two points, forming a chord of the circle.



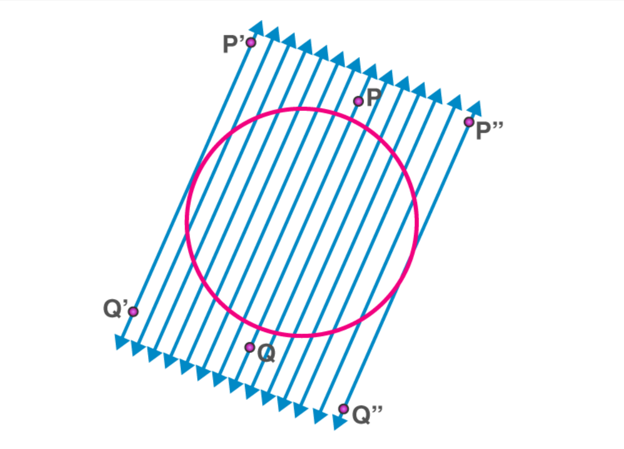
Tangent as a special case of Secant



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 at most 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.**



Introduction, Tangents to a circle

https://youtu.be/gl6p3UynrIQ(9.25)

Theorem 10.1 : The tangent at any point of a circle is perpendicular to the radius through the point of contact

Given. A circle with centre O and radius OP. AB is line through P such that $OP \perp AB$.

To Prove. AB is a tangent to the circle at the point P.

Construction. Take a point Q on AB other than P and join OQ.

Proof. The perpendicular distance of a point from a line is the shortest distance between them, and

$$OP \perp AB$$

$\Rightarrow$ OP is the shortest distance among all the line segment joining O to any point on AB.

$\Rightarrow$ $OP < OQ$

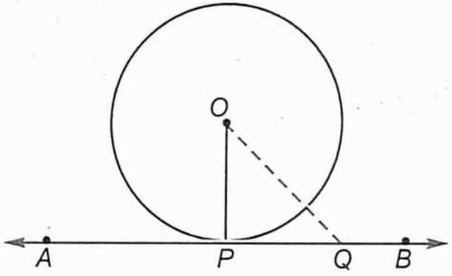
$\Rightarrow$ $OQ >$ radius OP

$\Rightarrow$ Q lies outside the circle

$\Rightarrow$ Every point on AB, other than P, lies outside the circle.

Thus, the line AB meets the circle at the point P only.

Hence, AB is a tangent to the circle at the point P.



1.How many tangents can a circle have?

2. Fill in the blanks :

(i) A tangent to a circle intersects it in………………… point (s).

(ii) A line intersecting a circle in two points is called…………………………. .

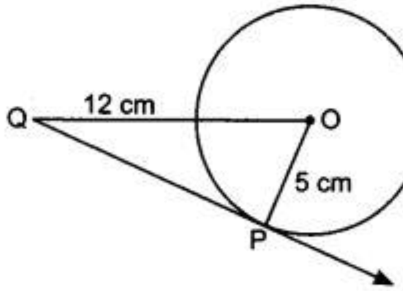
(iii) A circle can have ……………………… parallel tangents at the most for a given secant.

(iv) The common point of a tangent to a circle and the circle is called……………………

. There can be infinitely many tangents to a circle.

(i) One
(ii) Secant
(iii) Two
(iv) Point of contact.

3. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Length PQ is : (A) 12 cm (B) 13 cm (C) 8.5 cm (D) $\sqrt{119}$ cm.



Radius of the circle = 5 cm

OQ = 12 cm

$\angle OPQ = 90°$

[The tangent to a circle is perpendicular to the radius through the point of contact]

$PQ^2 = OQ^2 - OP^2$ [By Pythagoras theorem]

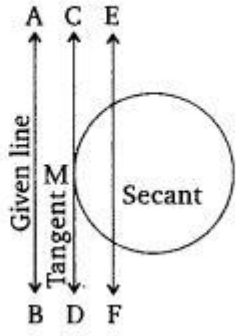
$PQ^2 = 12^2 - 5^2 = 144 - 25 = 199$

$PQ = \sqrt{199}$ cm.

Hence correct option is (d).

4 . Draw a circle and two lines parallel to a given line such that one is a tangent and the other, a secant to the circle.

Here, AB is the given line. CD is tangent to the given circle at the point M and parallel to AB, and EF is a secant parallel to AB.



HOME ASSIGNMENT Ex. 10.1 Q. 1 to Q 4

AHA

1. The length of a tangent from a point A at distance 5 cm from the centre of the circle is 4 cm. Find the radius of the circle. 7. Two concentric circles are of radii.

THANKING YOU

ODM EDUCATIONAL GROUP