

# 22 Tangents



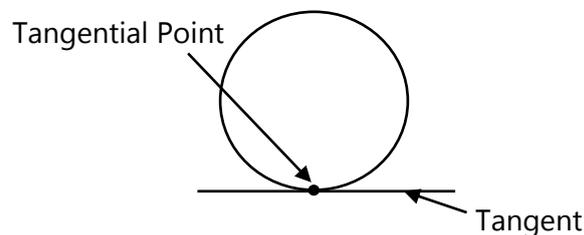
By Studying this lesson you will be able to,

- Identify the tangent which is drawn through a point on a circle and its characteristics.
- Identify the tangents drawn to a circle from an external point and their characteristics.
- Identify the angles in the alternate segment and solve related Problems.

## INTRODUCTION

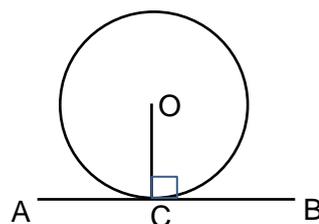
**Tangent** \_\_\_\_\_ : If a line meets a circle at a point which is the only point common to that line and the circle, then that line is called as a tangent to the circle.

**Tangential Point**: The point which is common to the tangent and the circle is called as the tangential point.



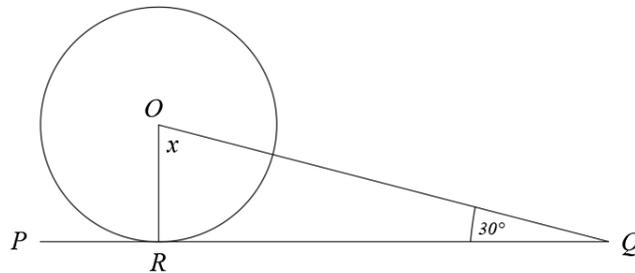
**Theorem** : The straight line drawn through a point on a circle and perpendicular to the radius through the point of contact (Tangential Point) is a tangent to the circle.

**Converse of the theorem** : The tangent through a point on a circle is perpendicular to the radius drawn to the point of contact.



Exercise 01

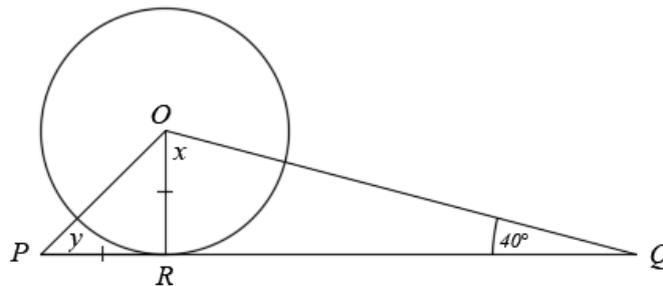
01). In the following figure, the tangent drawn to the circle with centre O through R is PQ



According to the data,

- i. Write a relationship in Between PQ and OR
- ii. Find the value of X

02 . The tangent drawn to the circle with centre O through C is AB

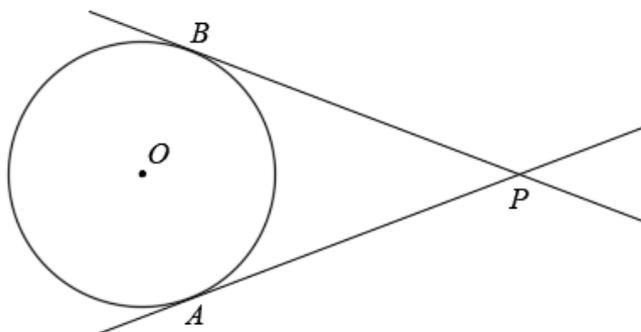


According to the data, find the value of X and Y

Tangents drawn to a circle from an external point

Introduction

Two tangents can be drawn to a circle from an External Point.

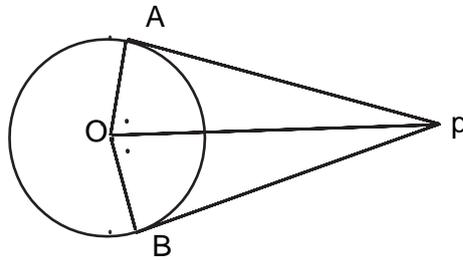


P - The External Point  
AP, BP - Tangents

**Theorem**

If two tangents are drawn to a circle from an external point, then,

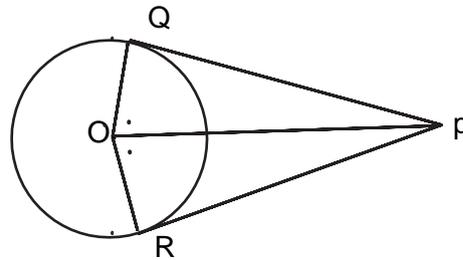
- i. The two tangents are equal in length.
- ii. The angle between the tangents is bisected by the straight line joining the external point to the centre.
- iii. The tangents subtend equal angles at the centre.



- i.  $AP = BP$
- ii.  $\angle APO = \angle BPO$
- iii.  $\angle POA = \angle POB$

**Exercise - 02**

01 The tangents through the points Q and R on the circle with centre O in the figure, meet at P



Fill in the following blanks to prove that the two triangles PQO and PRO are congruent.

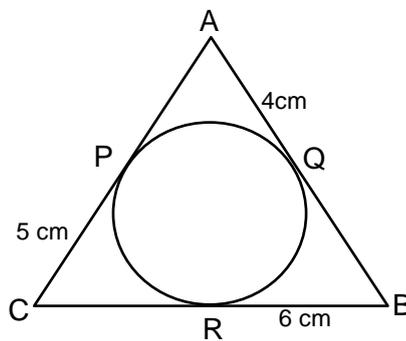
$OQ = OR$  (.....)

..... = ..... (Common Side)

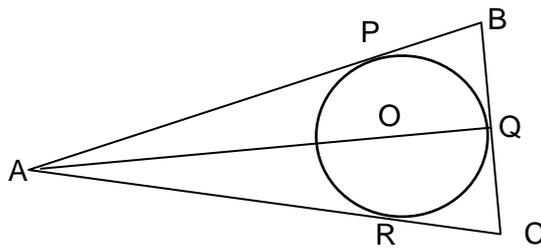
$\triangle PQO \cong \triangle PRO$  (Hyp.s)

Write the Perimeter of the triangle ABC

02 . Find the perimeter of the triangle ABC



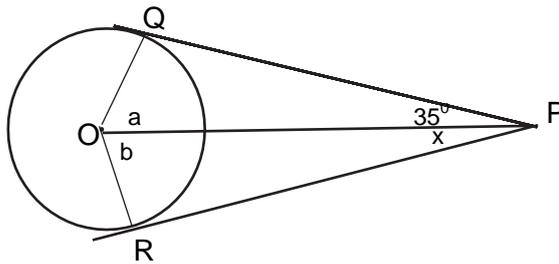
03. The Straight line AB,BC,and AC touch the Circle with centre O at P,Q and R respectively.



AQ = 12 cm හා BQ = 5 cm නම්,

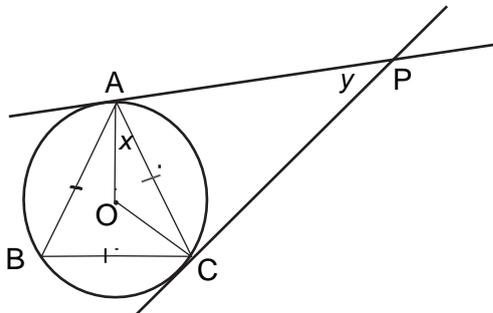
- i. AB Find the Length of AB
- ii. Find the Length of AR

04. The Straight line AB,BC,and AC touch the Circle with centre O at PQ,and PR



Find the values of X,a, and b

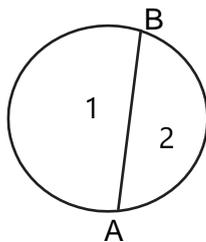
05. The tangents drawn from the external point P to The Circle with Centre O are AP and PC find the Value of X and Y



### Angles in the allernate Segment

Introduction

The Segments of a Cricle :- A circle is divided into two Segments by a chord.

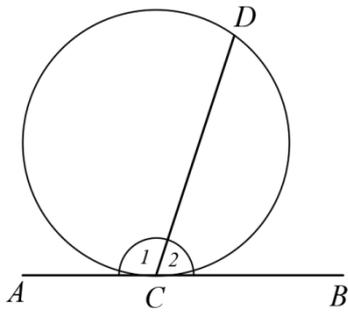


AB - The chord

1 - Major Segment

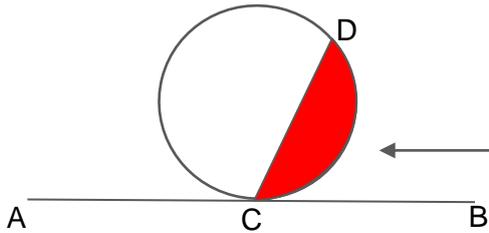
2 - Minor Segment

There are two angles formed formed by a about meeting a tangent



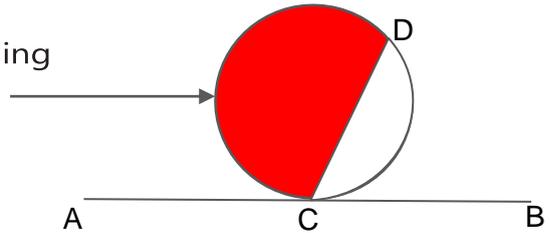
- AB - The tangent
- C - Tangential Point
- CD - The chord
- 1 , 2 - The angles made by the chord and the tangent

The alternate segment

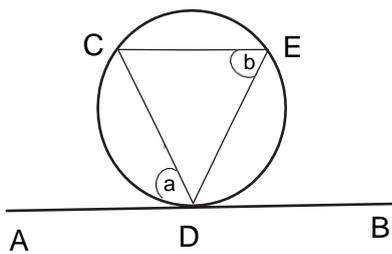


The Alternate segment corresponding to  $\hat{ACD}$

The alternate segment Corresponding to  $\hat{BCD}$



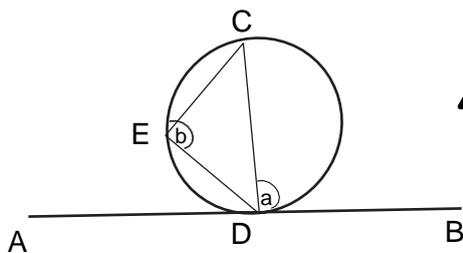
Theorem:- The nglees wich a tangent to a circle makes with a chord drawn form the point of contact are respectively equal to the angles in the alternate segments of the circle.



a - The angle which the tangent to the circle makes with the chord .

b- a The angle in the alternate segment of the circle.

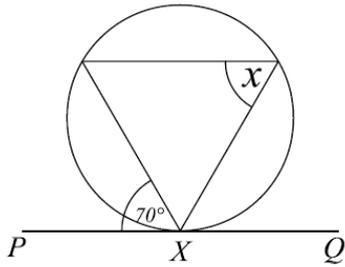
$\Delta a = b.$



Exercise - 03

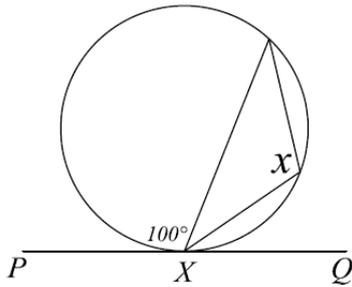
PQ is a tangent to the circle through the point X

01.



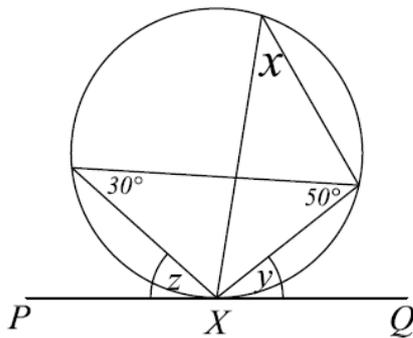
find the value of  $x$

02.

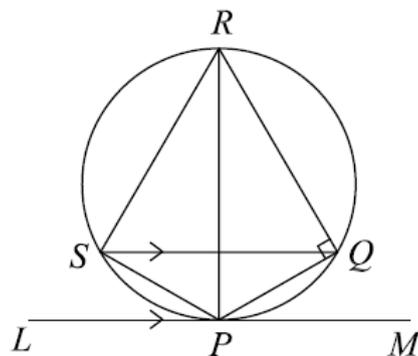


Find the Value of  $x$

03. Find the values of  $x, y$  and  $z$



04. LM is a tangent to the circle through the point P the Points P, Q, R, and S lie on the Circle



- i. Write down an angle which is equal to  $\angle QPM$  Give reasons
- ii. Show that PR is the Angle bisector of  $\angle QRS$
- iii. Show that  $PQ=PS$ .

Written by - IGJ Ihalagedara, ISA, Ganewaththa Education Division

Translated By - MSM Manawadu, Ibbagamuwa Central College

Prepared by - MVDPTK Dewapriya, Deputy Director of Education, Department Of Education(NWP)

JDD Senavirathna- Assistant Director of Education, ZEO, Ibbagamuwa