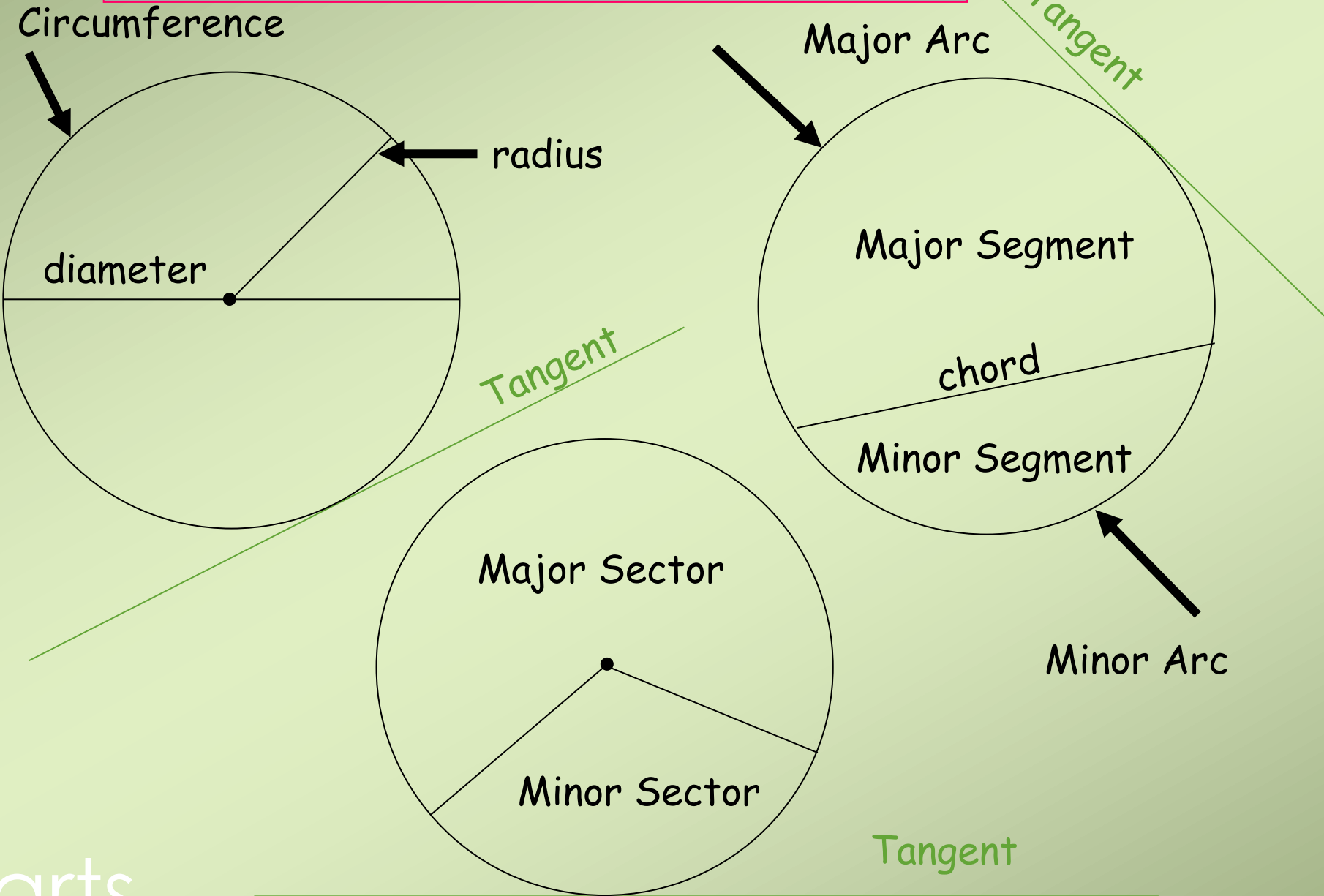




# GEOMETRY GR 11

THEOREMS FOR GRADE 11 and GRADE  
12 –PART 3  
THEOREM 6

# Parts of the Circle

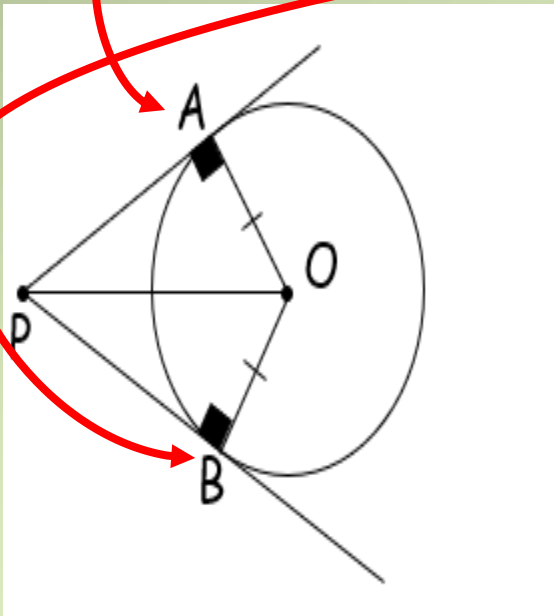


Parts

# Theorem 6 – Two Tangents drawn from a point outside a circle are equal in length

## **SOMETHING TO REMEMBER:**

The radius and a Tangent are  $\perp$  to each other at the point of contact (Tangent  $\perp$  Radius)



**Statement:** Two tangents drawn from a point outside a circle are equal in length

**Given:** Circle O with Tangent drawn from P to point of contacts with circle at A and B

**Proof:**

**Construction:** Draw OA and OB and OP.

$$P\hat{A}O = 90^\circ \quad (\text{Tangent } \perp \text{ Radius})$$

$$P\hat{B}O = 90^\circ \quad (\text{Tangent } \perp \text{ Radius})$$

In  $\triangle APO$  and  $\triangle BPO$

$$1. OP = OP \quad (\text{Common Side})$$

$$2. OA = OB \quad (\text{Radius})$$

$$3. P\hat{A}O = P\hat{B}O = 90^\circ \quad (\text{Proved above})$$

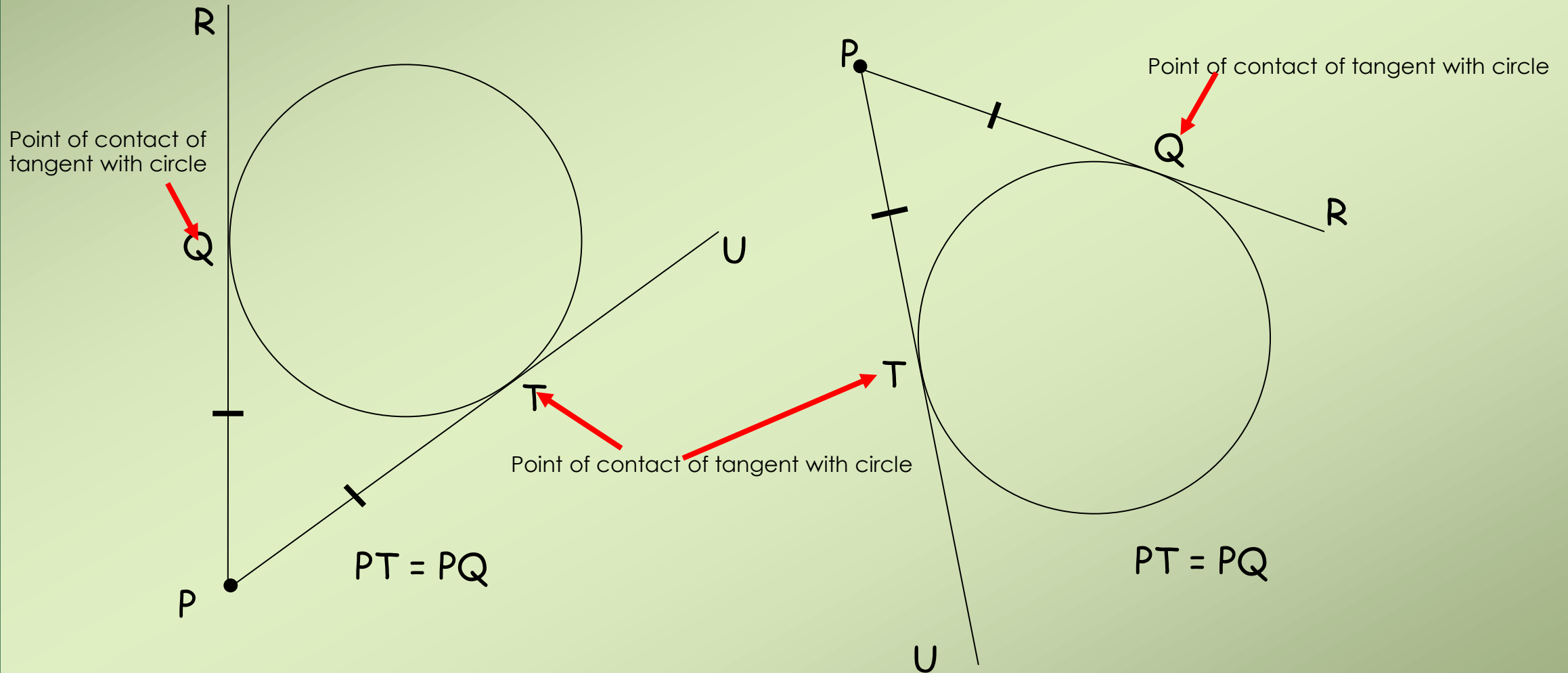
$$\therefore \triangle APO \equiv \triangle BPO \quad (\text{RHS})$$

$$\therefore AP \equiv PB$$

## Examples of Theorem 6

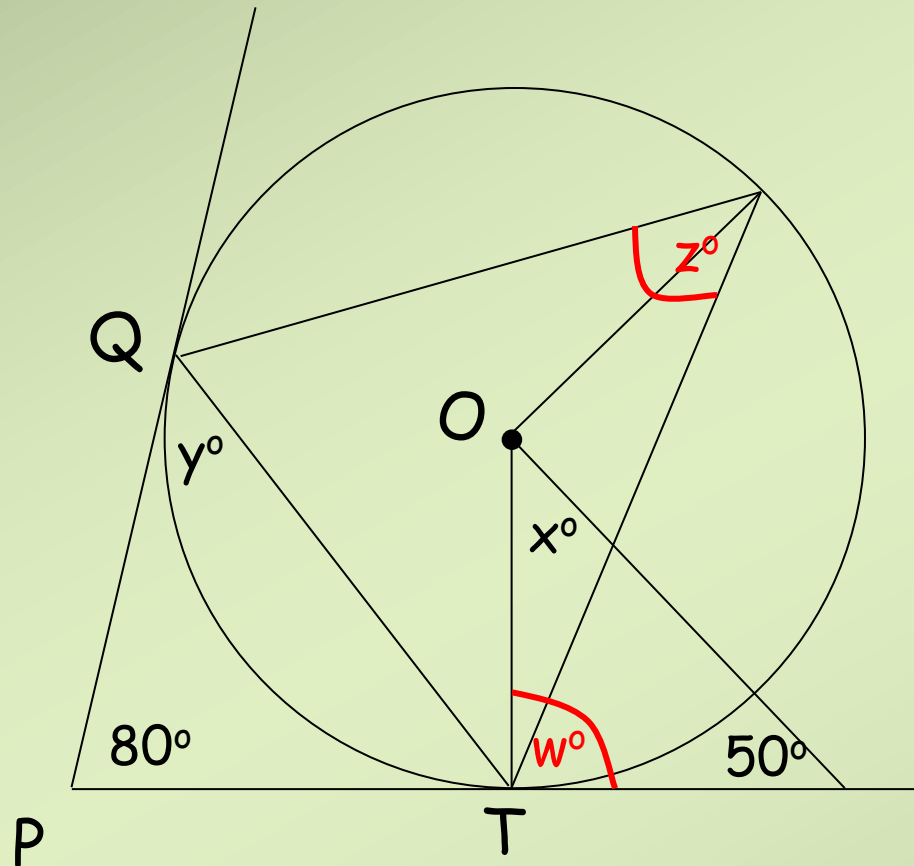
## Two Tangent Theorem.

If two tangents are drawn from the same point outside the circle, then they are equal in length.



## Examples

PQ and PT are tangents to a circle with centre O.  
Find the unknown angles giving reasons.



angle  $w =$

$90^\circ$  (tan  $\perp$  rad)

angle  $x =$

$180 - 140 = 40^\circ$  (angles of triangle)

angle  $y$

$QP = PT$  (Tangents from same point)

$\therefore \hat{P}TQ = \hat{P}QT = y$  (angles opp equal sides)

$\hat{P}TQ + \hat{P}QT + 80^\circ = 180^\circ$  (angles of triangle)

$y + y + 80^\circ = 180^\circ$

$2y = 180^\circ - 80^\circ$

$y = 50^\circ$