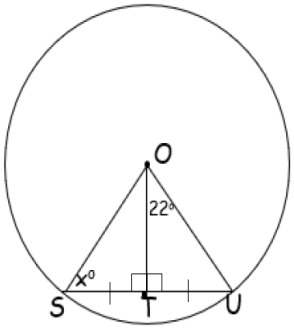
Grade 11
Geometry Applications 1

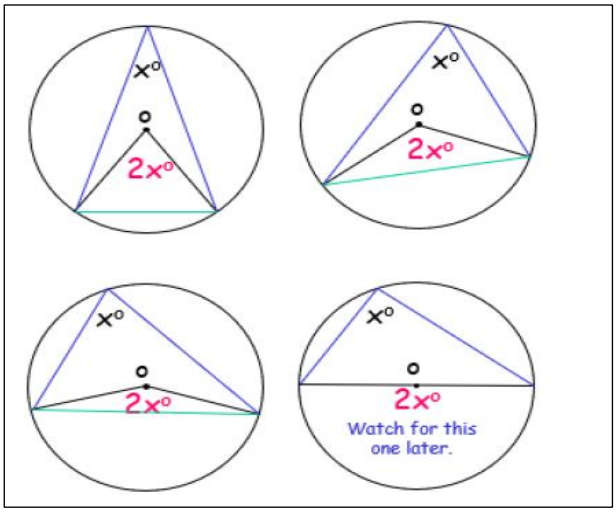
Example 1

1. Is O the centre of circle below?
2. Determine angle x.



1.
In $\triangle SOT$ and $\triangle UOT$
1. OT = OT (Given)
2. $S\hat{T}O = U\hat{T}O$ (Given)
3. TS = TU (Given)
$\therefore \triangle SOT \equiv \triangle UOT$ (SAS)
SO = UO (Congruency)
$\therefore$ O is the centre of the circle.

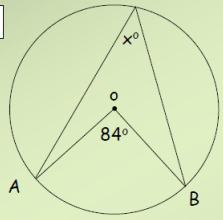
2.
$S\hat{O}T = 22^0$ ($\triangle SOT \equiv \triangle UOT$)
$90^0 + 22^0 + x = 180^0$ (Angles of $\triangle$ SOT supplementary)
$\therefore x = 68^0$



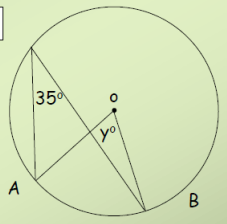
Example 2

Find the unknown angles giving reasons for your answers.

1



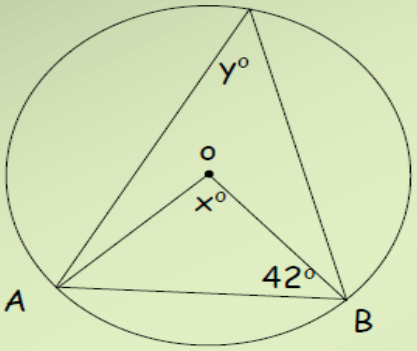
2



angle x =	42° (Angle at the centre = 2 x angle at circum).
angle y =	70° (Angle at the centre = 2 x angle at circum).

Example 3

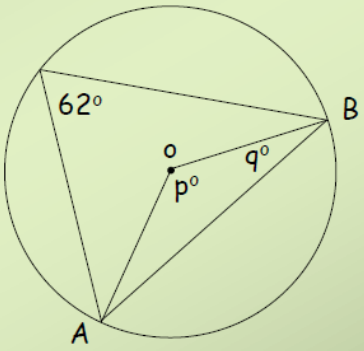
3



3.
$O\hat{A}B = 42^0$ (OA = OB RADIUS – ANGLES OPP EQUAL SIDES)
$x + O\hat{A}B + O\hat{B}A = 180^0$ (ANGLES OF TRIANGLE SUPPLEMENTARY
$x + 42^0 + 42^0 = 180^0$
$x = 96^0$
$y = 48^0$ (Angle at the centre = 2 x angle at circum).

Example 4

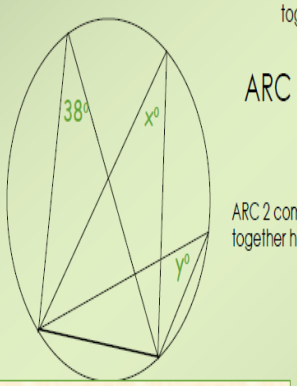
4



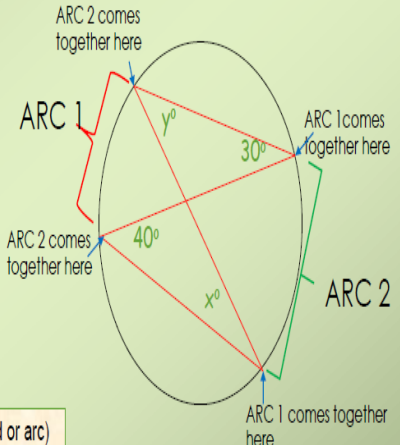
4.
$p = 124^0$ (Angle at the centre = 2 x angle at circum).

$O\hat{A}B = q = O\hat{B}A$ (OA = OB RADIUS – ANGLES OPP EQUAL SIDES)
$124^0 + q + q = 180^0$ (ANGLES OF TRIANGLE SUPPLEMENTARY
$124^0 + 2q = 180^0$
$q = (180 - 124) \div 2$
$\therefore q = 28^0$

Example 5



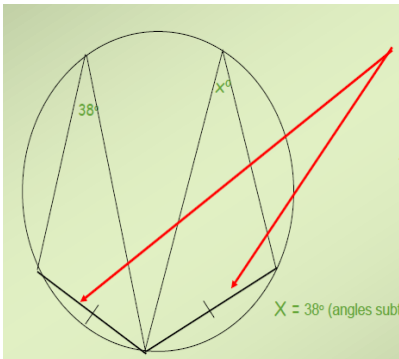
Angle x = angle y = 38° (angle subtended by same chord or arc)



Angle x = 30° (angle subtended by same chord or arc)

Angle y = 40° (angle subtended by same chord or arc)

Example 6



If the chords are equal in length and subtend angles at the circumference, those angles are equal.

IT IS A SPECIAL CASE OF THE THEOREM 4.

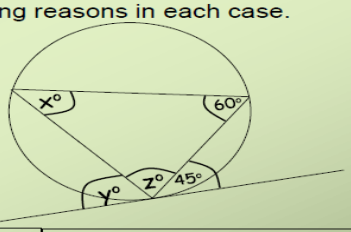
Angle subtended by same chord or arc.

IMPORTANT TO REMEMBER THIS SPECIAL CASE

X = 38° (angles subtended by equal chords)

Example 8

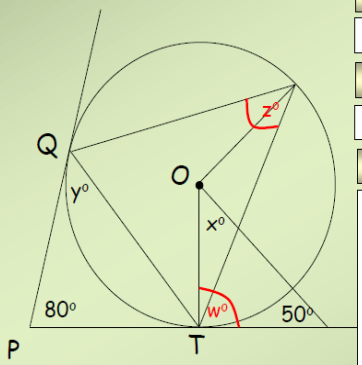
Find the missing angles below giving reasons in each case.



angle x =	45° (Tan Chord Theorem)
angle y =	60° (Tan Chord Theorem)
angle z =	75° (Angles of Triangle)

Example 7

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



angle w =

90° (tan ⊥rad)

angle x =

180 - 140 = 40° (angles of *triangle*)

angle y

QP = PT (Tangents from same point)

$\therefore P\hat{T}Q = P\hat{Q}T = y$ (*angles opp equal sides*)

$P\hat{T}Q + P\hat{Q}T + 80° = 180°$ (angles of triangle)

$y + y + 80° = 180°$

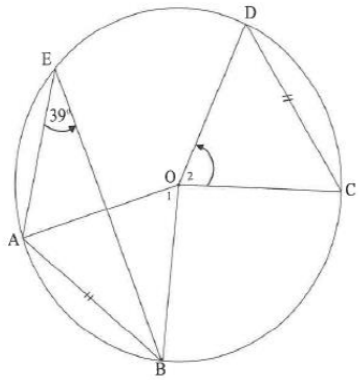
$2y = 180° - 80°$

$y = 50°$

Example 9

QUESTION 9

9.1 In the figure, O is the centre of the circle. A, B, C, D and E lie on the circle such that chord AB and chord DC are equal in length and $A\hat{E}B = 39°$.



NOTE:
DC = AB which means that $\hat{O}_1 = \hat{O}_2$ BECAUSE OF **EQUAL CHORDS SUBTENDS EQUAL ANGLES.**

DO NOT USE VERTICALLY OPPOSITE ANGLES BECAUSE DOB and AOC ARE NOT STRAIGHT LINES

9.1.1 Determine the size of $\hat{O}_1$. (2)

9.1.2 Determine the size of $\hat{O}_2$. (2)

9.1.1	$\hat{O}_1 = 78°$ [angle at centre = 2 × ∠ at circumference] [*middelpuntshoek = 2 × omtrekshoek*]	✓ S ✓ R (2)
9.1.2	$\hat{O}_2 = 78°$ [equal chords; equal ∠^{s} / *gelyke koorde; gelyke hoeke*]	✓ S ✓ R (2)