

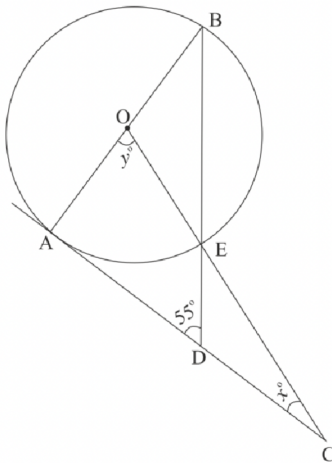
AI1103 Assignment-1

Class 10 ICSE-2019

AI21BTECH11026
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Question 7(a)

In the given figure AC is a tangent to the circle with centre O . If $\angle ADB = 55^\circ$, find x and y . Give reasons for your answers.



Solution:

Given,

$$\angle BDA = 55^\circ, \angle OCA = x^\circ, \angle AOC = y^\circ$$

As AC is a tangent to the given circle,
 $\angle OAC = \angle BAD = 90^\circ$

Angle Sum Property for $\triangle OAC$,

$$\angle OAC + \angle OCA + \angle AOC = 180^\circ \quad (1)$$

$$90^\circ + x^\circ + y^\circ = 180^\circ \quad (2)$$

$$x^\circ + y^\circ = 90^\circ \quad (3)$$

Angle Sum Property for $\triangle ABD$,

$$\angle ABD + \angle BAD + \angle BDA = 180^\circ \quad (4)$$

$$\angle ABD + 90^\circ + 55^\circ = 180^\circ \quad (5)$$

$$\angle ABD = 35^\circ \quad (6)$$

As AB is a straight line,

$$\angle BOE + y^\circ = 180^\circ \quad (7)$$

$$\angle BOE = 180 - y \quad (8)$$

Let the radius of the circle be r .

then,

$$\Rightarrow OB = OE = r$$

Then the length of the chord BE becomes $2r \cos 35^\circ$.

Applying Cosine rule for $\triangle BOE$,

$$BE^2 = OB^2 + OE^2 - 2(OB)(OE)\cos(\angle BOE) \quad (9)$$

$$(2r \cos 35^\circ)^2 = r^2 + r^2 - 2r^2 \cos(180 - y) \quad (10)$$

$$4r^2 \cos^2 35^\circ = 2r^2 - 2r^2 \cos(180 - y) \quad (11)$$

$$2 \cos^2 35^\circ = 1 - \cos(180 - y) \quad (12)$$

$$\cos(180 - y) = -\cos 70^\circ \quad (13)$$

$$(\because 1 - \cos^2 \theta = \cos 2\theta) \quad (14)$$

$$\cos(180 - y) = \cos(180 - 70) \quad (15)$$

$$\Rightarrow y = 70^\circ \quad (16)$$

$$\Rightarrow x = 20^\circ \quad (17)$$