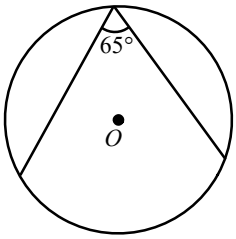
Chapter 11 Basic Properties of Circles (II)

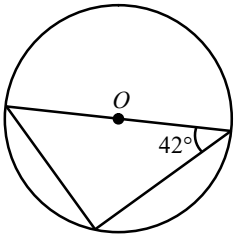
Warm-up Exercise

1. In each of the following, O is the centre of the circle. Draw two angles x and y of the given size without using a protractor.

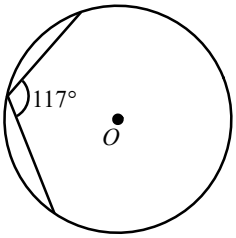
(a) $x = 65°$, $y = 130°$



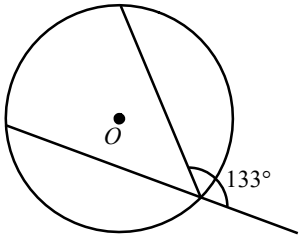
(b) $x = y = 48°$



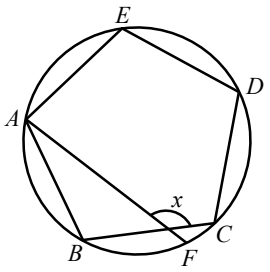
(c) $x = y = 63°$



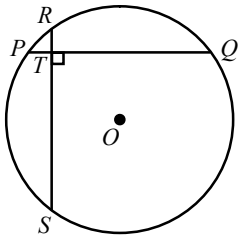
(d) $x = 133°$, $y = 94°$



2. In the figure, F is a point on the minor arc BC such that $\overset{\frown}{BF} : \overset{\frown}{FC} = 3 : 1$. If $\overset{\frown}{AB} = \overset{\frown}{BC} = \overset{\frown}{CD} = \overset{\frown}{DE} = \overset{\frown}{AE}$, find x.



3. In the figure, O is the centre of the circle. PQ and RS intersect at T. $RS \perp PQ$, $PQ = RS = 16$ cm and $PT = 2$ cm. Find the radius of the circle.

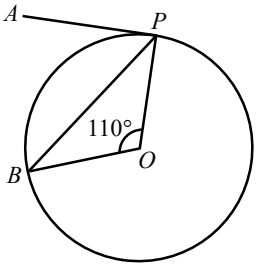


11.1 Tangents to a Circle

Level 1

Example 11.1

In the figure, O is the centre of the circle. AP is the tangent to the circle at P and $\angle BOP = 110°$. Find $\angle APB$.



Solution

In $\triangle BOP$,

$\because\ OB = OP$ (*radii*)

$\therefore\ \angle OBP = \angle OPB$ (*base ∠s, isos.* $\triangle$)

$\angle BOP + \angle OBP + \angle OPB = 180°$ ($\angle$ *sum of* $\triangle$)

$110° + \angle OPB + \angle OPB = 180°$

$2\angle OPB = 70°$

$\angle OPB = 35°$

$\angle OPA = 90°$ (*tangent* $\perp$ *radius*)

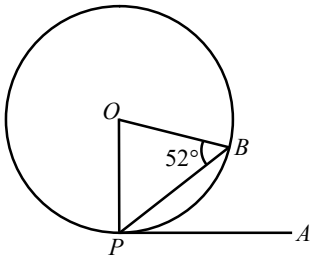
$\angle OPB + \angle APB = 90°$

$35° + \angle APB = 90°$

$\angle APB = \underline{\underline{55°}}$

Practice 11.1

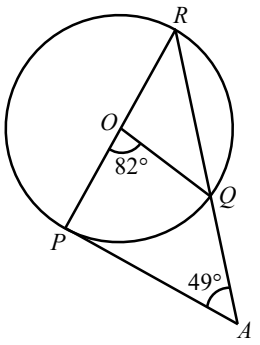
In the figure, O is the centre of the circle. AP is the tangent to the circle at P and $\angle OBP = 52°$. Find $\angle APB$.



Solution

Example 11.2

In the figure, O is the centre of the circle. POR and AQR are straight lines. $\angle POQ = 82°$ and $\angle PAR = 49°$. Determine whether AP is the tangent to the circle at P.

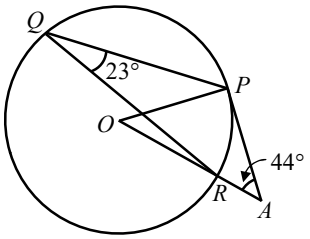


Solution

$\angle PRQ = \frac{1}{2}\angle POQ$	$\angle$ *at centre twice* $\angle$ *at* $\odot^{ce}$
$\angle PRA = \frac{1}{2} \times 82°$	
$= 41°$	
In $\triangle PRA$,	
$\angle PRA + \angle PAR + \angle APR = 180°$	$\angle$ *sum of* $\triangle$
$41° + 49° + \angle APO = 180°$	
$\angle APO = 90°$	
$\therefore$ AP is the tangent to the circle at P.	*converse of tangent* $\perp$ *radius*

Practice 11.2

In the figure, O is the centre of the circle. ARO is a straight line. $\angle PQR = 23°$ and $\angle PAO = 44°$. Determine whether AP is the tangent to the circle at P.



Solution