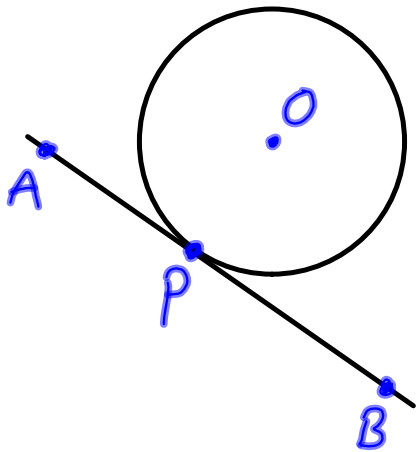


Chapter 8: Circle Geometry

8.1: Properties of Tangents to a Circle

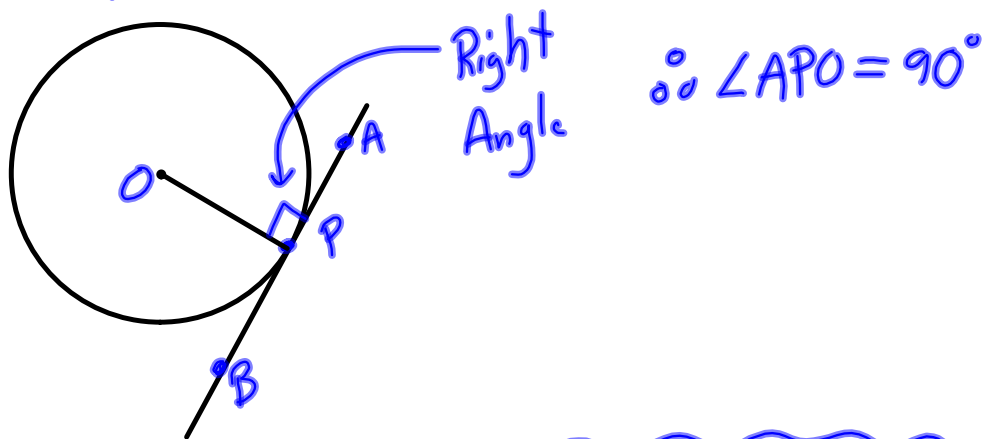


Note: If line AB touches the circle at only one point, the line is called a tangent line.

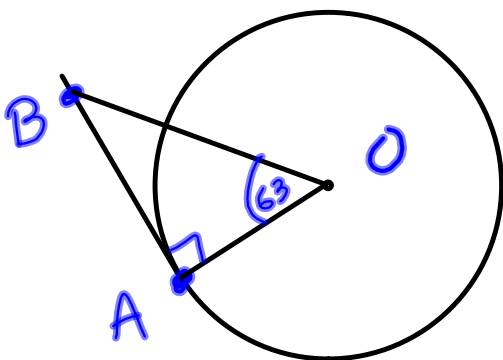
Note: The point where the tangent line touches the circle is called the Point of Tangency.

Property #1: Tangent-Radius Property

A tangent to a circle is perpendicular to the radius at the point of tangency.



Example #1: Point O is the center of a circle and AB is a tangent to the circle. In $\triangle AOB$, $\angle AOB = 63^\circ$. What is the measure of $\angle OBA$?



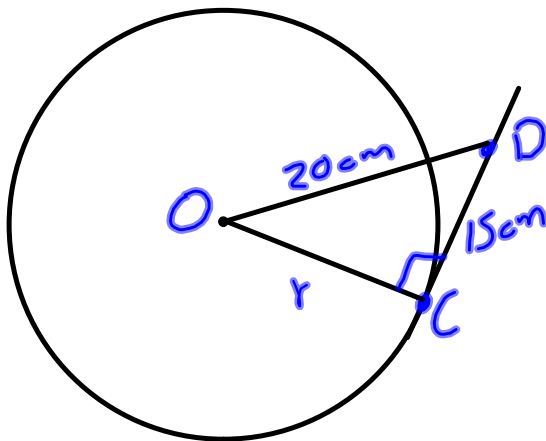
(Ans) Angles of $\triangle AOB$
 $= 180^\circ$

$$\therefore 90 + 63 = 153$$

$$\therefore \angle OBA = 180 - 153$$

$$= 27^\circ$$

Example #2: Point O is the center of a circle and CD is a tangent to the circle. $CD = 15\text{ cm}$ & $OD = 20\text{ cm}$. Determine the length of the radius OC .



$$\text{(Ans)} \quad r^2 = 20^2 - 15^2$$

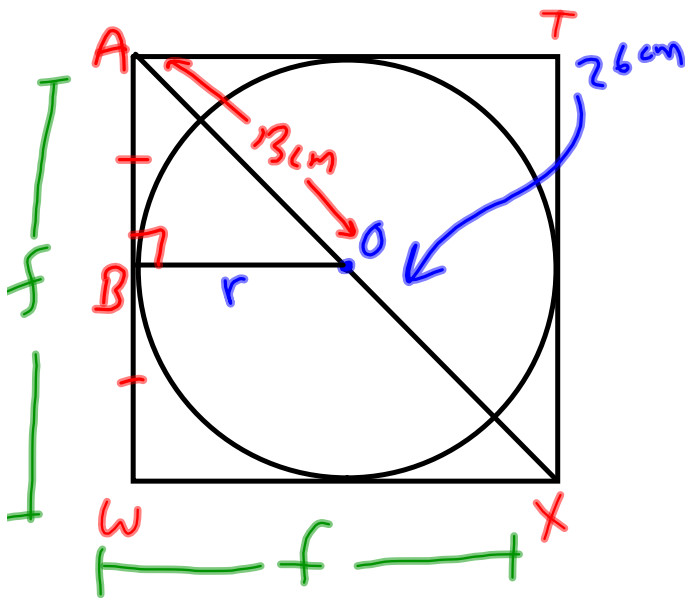
$$r^2 = 400 - 225$$

$$r^2 = 175$$

$$r = \sqrt{175}$$

$$\therefore r \approx 13.2\text{ cm}$$

Example #3: What is the radius of the largest circle that can be cut from a square piece of paper whose diagonal is 26cm long?



$$f^2 + f^2 = 26^2$$

$$2f^2 = 26^2$$

$$\frac{2f^2}{2} = \frac{676}{2}$$

$$f^2 = 338$$

$$\therefore f = \sqrt{338} \approx 18.4 \text{ cm}$$

$$\therefore AB = \frac{1}{2} (18.4) = 9.2 \text{ cm}$$

Pythagorean Theorem

$$a^2 = c^2 - b^2$$

$$a^2 = 13^2 - 9.2^2$$

$$a^2 = 169 - 84.64$$

$$a^2 = 84.36$$

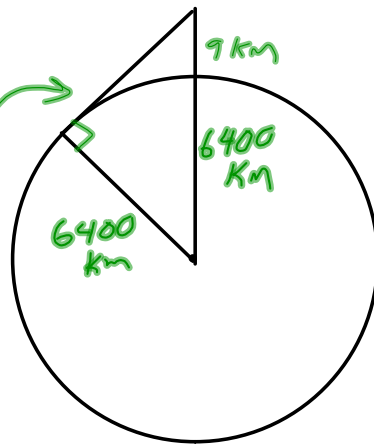
$$\therefore a = \sqrt{84.36}$$

$$a = 9.2 \text{ cm}$$

Example #4: An airplane is cruising at an altitude of 9000m. A cross section of Earth is a circle with radius approx 6400 km.

A passenger wonders how far she is from a point on the horizon she sees outside the window.

$$6400 + 9 = 6409 \text{ km}$$



$$9000\text{m} = 9\text{km}$$

pythagorean Thm'

$$\begin{aligned} a^2 &= c^2 - b^2 \\ a^2 &= 6409^2 - 6400^2 \\ a^2 &= 41075281 - 40960000 \\ a^2 &= 115281 \end{aligned}$$

$$\begin{aligned} \therefore a &= \sqrt{115281} \\ a &\approx 339.5 \text{ km} \end{aligned}$$

Questions:
p388-391
6,12,20