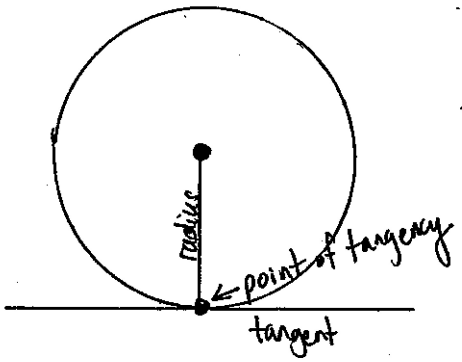
8.1 – Properties of Tangents to a Circle

Focus: Discover the relationship between a tangent and a radius, then solve related problems.

Main Ideas:

Warmup:
Look at the picture at the top of p.384 and read the statements and question below the picture. Draw a diagram of the bike wheel and label the tangent, radius and point of tangency. Answer the question from the text as well.

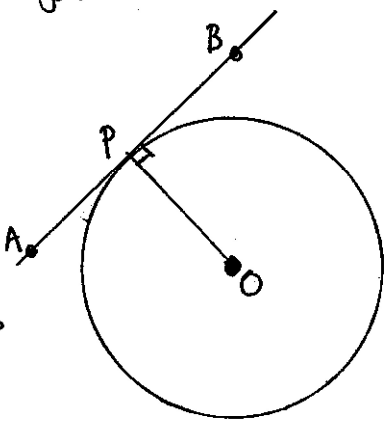


The red spoke appears to make a 90° angle with the ground.

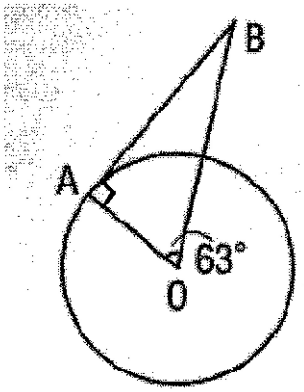
Read over 'Connect' on p.385 and note anything of importance.

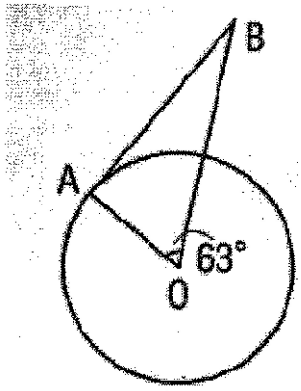
What is the Tangent-Radius Property?

A tangent to a circle is perpendicular to the radius at the point of tangency.
That is, $\angle APO = \angle BPO = 90°$



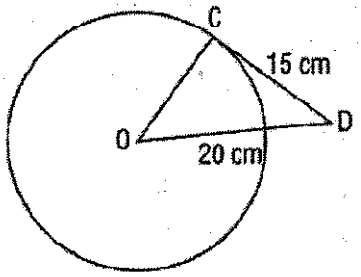
Ex1
Point O is the centre of a circle and AB is a tangent to the circle.
In ΔOAB, $\angle AOB = 63°$
Determine the measure of $\angle OBA$.

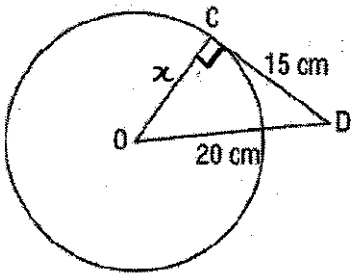




$\angle OAB = 90°$
as it's a point of tangency
So $\angle OBA = 180 - 90 - 63$
$= 27°$

Ex2
Point O is the centre of a circle and CD is a tangent to the circle.
CD = 15cm and
OD = 20cm
Determine the length of the radius OC. Give the answer to the nearest tenth.





$\angle OCD = 90°$ as it's a point of tangency

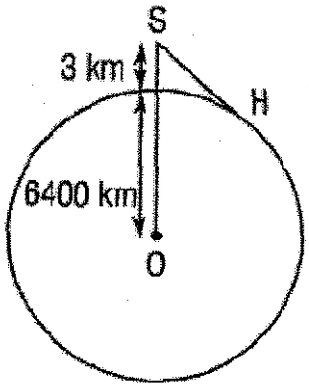
use Pythag. $x^2 + 15^2 = 20^2$

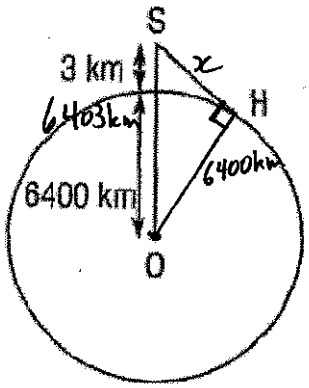
$x^2 + 225 = 400$

$x^2 = 175$

$x = \sqrt{175} = 13.2\text{cm}$

Ex3
A skydiver, S, jumps from a plane at an altitude of 3km. The radius of Earth is approx. 6400km. How far is the horizon, H, from the skydiver when she leaves the plane? Calculate this distance to the nearest kilometre.





Use Pythag: $x^2 + 6400^2 = 6403^2$

$x^2 + 40\,960\,000 = 40\,998\,409$

$x^2 = 38\,409$

$x = \sqrt{38\,409} = 196\text{ km}$

The skydiver is 196 km from the horizon.

Reflection: The Pythagorean Theorem was used in examples 2 & 3. When is the Pythagorean Theorem useful for solving problems involving tangents?