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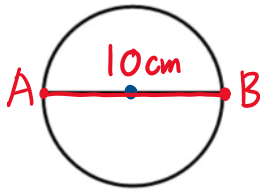
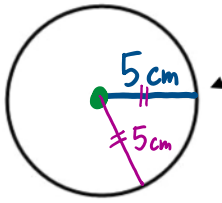
Unit 8: Circle Geometry **Grade 9 Math**
Introduction: Definitions



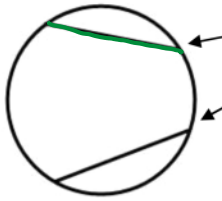
Diameter

the distance across a circle, measured through its center; or the line segment that joins two points on the circle and passes through the center.



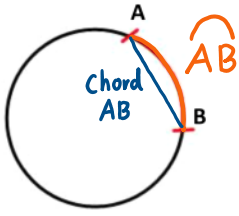
Radius

the distance or line segment from the Center of a circle to any point on the circle.



Chord (s)

a line segment that joins two points on a circle.

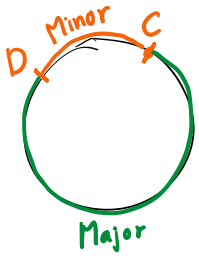


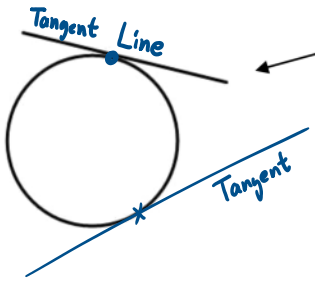
Arc

A segment of the circumference of a circle.

Minor Arc

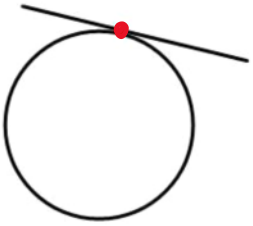
The shorter of two arcs between two points on a circle. For example: AB





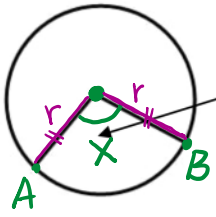
Tangent

a line that intersect a circle at only one point.



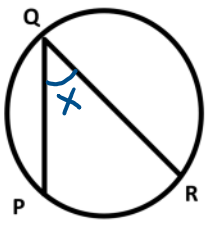
Point of Tangency

the point where a tangent intersects a circle



Central Angle

An angle whose arms are radii of a circle.

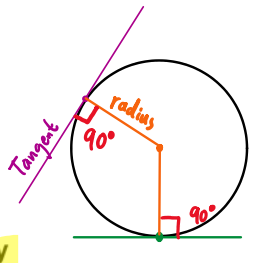


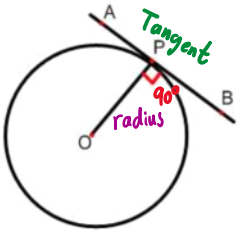
Inscribed Angle

An angle in a circle with its vertex and endpoints of its arms on the circle.

For example, ∠ PQR

Section 8.1 Properties of Tangents to a Circle



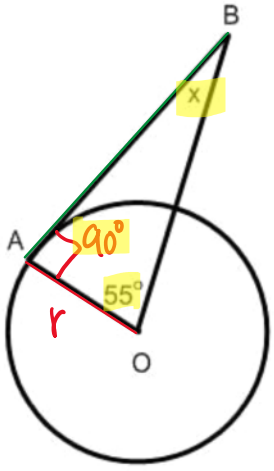


Tangent-Radius Property

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

Example Problems

A) Point O is the center of a circle and AB is tangent to the circle. In OAB, $\angle AOB = 55^0$. Determine the measure of $\angle OBA$.



Since $\angle A = 90°$ and $\angle 0 = 55°$

Then $90 + 55 = 145°$

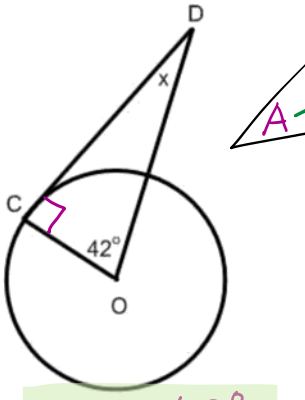
The three angles in a triangle add to $180°$

$\angle X = 180° - 90 - 55$

$\angle X = 35°$

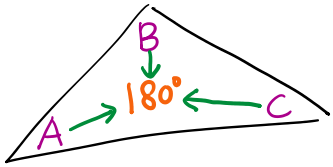
Try to find the missing angles in the following diagrams

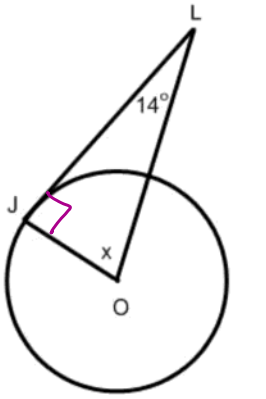
A) Try



$\angle x = 48°$

B) Try

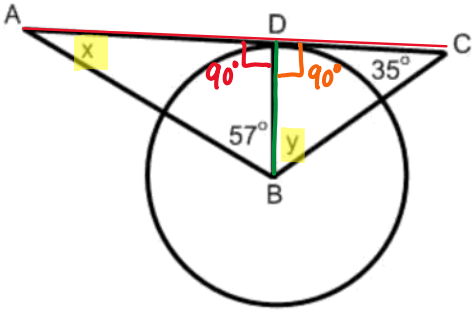


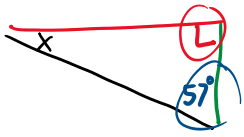


$\angle x = 76°$

Application Example

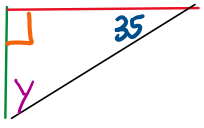
Since AC is a tangent ...





$\angle x = 180° - 90° - 57°$

$\angle x = 33°$



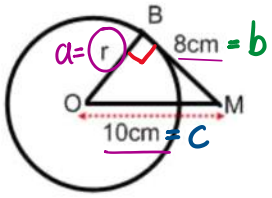
$\angle y = 180° - 90° - 35°$

$\angle y = 55°$

find √□

Using the Pythagorean Theorem in a Circle

1.



Since BM is a tangent we know that ∠OBM = 90°

$a^2 + b^2 = c^2$

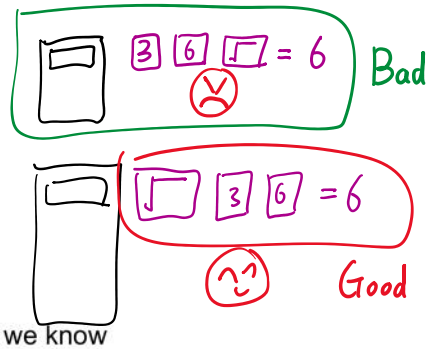
$a^2 + 8^2 = 10^2$

$a^2 + 64 = 100$ (−)

$a^2 = 100 - 64$

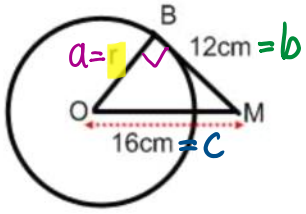
$a^2 = 36$

$a = \sqrt{36} = 6$



Try this one!

2.



Since BM is a tangent we know that ∠OBM = 90°

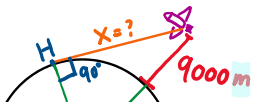
$a^2 + b^2 = c^2$

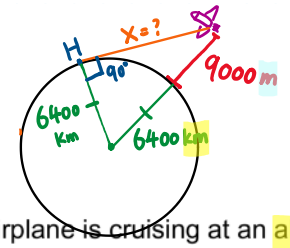
$a^2 + 12^2 = 16^2$

$a^2 + 144 = 256$ (−)

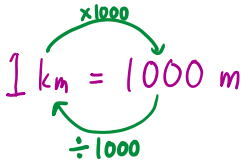
$a^2 = 112$

$a = \sqrt{112} = \boxed{10.58 \text{ cm}}$

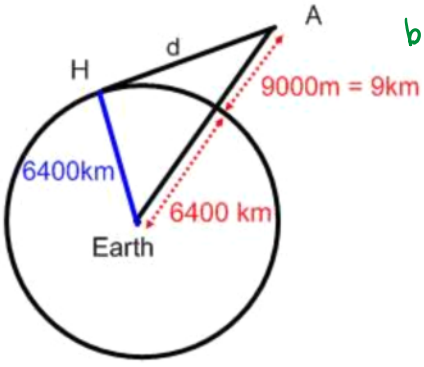


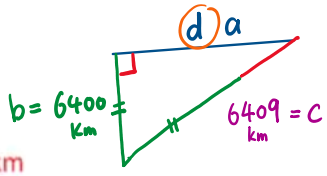


3. An airplane is cruising at an altitude of 9000m. A cross section of the earth is a circle with a radius approximately 6400km. A passenger wonders how far she is from a point H on the horizon she sees outside the window. Calculate the distance to the nearest kilometer.



9000 m ÷ 1000 = 9 km





$a^2 + 6400^2 = 6409^2$

$a^2 + 40960000 = 41075281$ (−)

$a^2 = 115281$

$a = \sqrt{115281}$

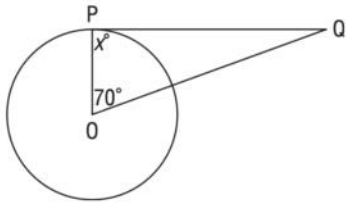
$a = 339.5$ km

Homework Pg 388 (attached to this) #5-8, 12, 14, 17

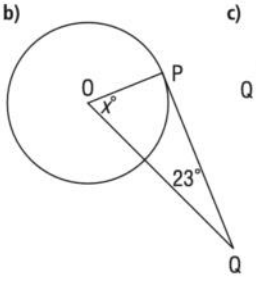
Circle Geometry Lesson 1: Properties of Tangents to a circle HOMEWORK

5. Point P is a point of tangency and O is the centre of each circle. Determine each value of $x°$.

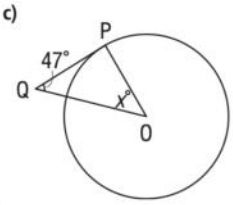
a)



b)

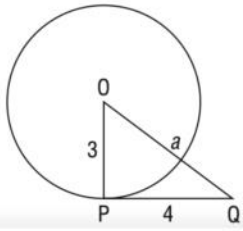


c)

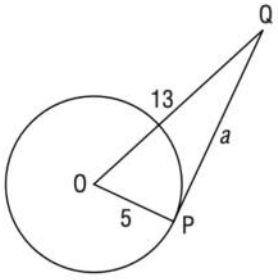


6. Point P is a point of tangency and O is the centre of each circle. Determine each value of a.

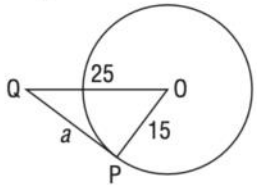
a)



b)

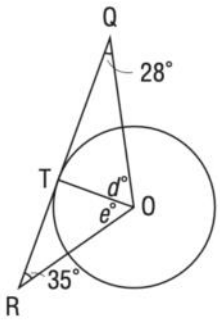


c)

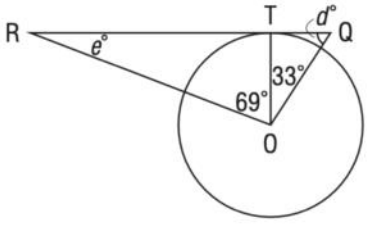


7. Point T is a point of tangency and O is the centre of each circle. Determine each value of $d°$ and $e°$.

a)

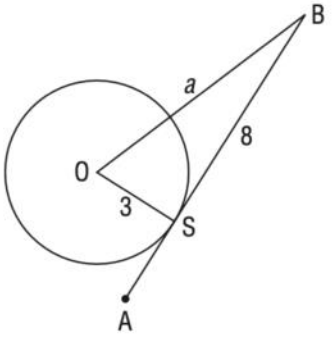


b)

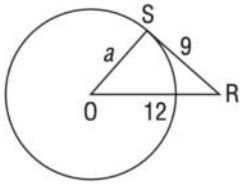


8. Point S is a point of tangency and O is the centre of each circle. Determine each value of a to the nearest tenth.

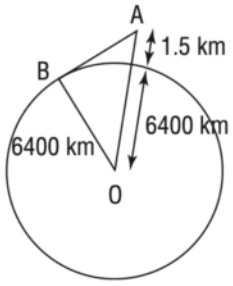
a)



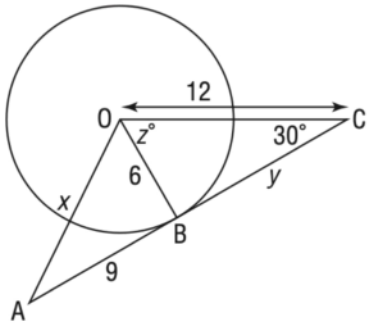
b)



12. A small aircraft, A, is cruising at an altitude of 1.5 km. The radius of Earth is approximately 6400 km. How far is the plane from the horizon at B? Calculate this distance to the nearest kilometre.



14. Point O is the centre of the circle. Point B is a point of tangency. Determine the values of x, y, and $z°$. Give the answers to the nearest tenth where necessary. Justify the strategies you used.



17. A circular mirror with radius 20 cm hangs by a wire from a hook. The wire is 30 cm long and is a tangent to the mirror in two places. How far above the top of the mirror is the hook? How do you know?