Unit 8

Circles

Section 9.1

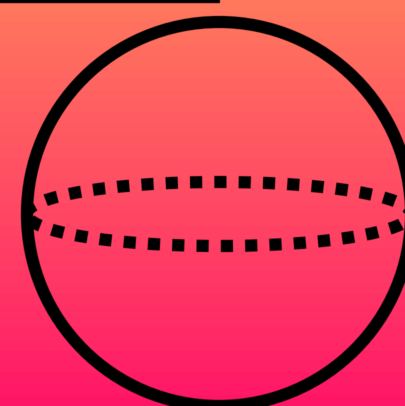
Basic Terms in Circles

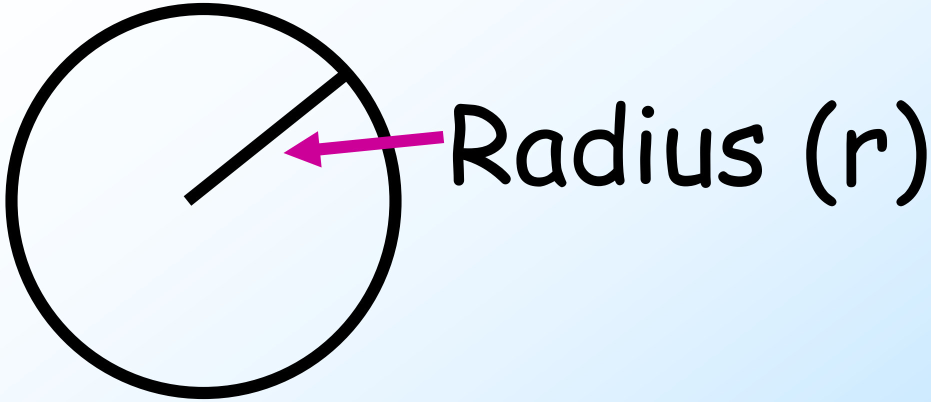
Circle – <u>the set of all points the same distance away from a center point *in a plane.*</u>

A circle is named by its center point.

Ex: <u>Circle A or ⊙ A.</u>

Sphere – <u>the set of all points the same distance away from a center point.</u>



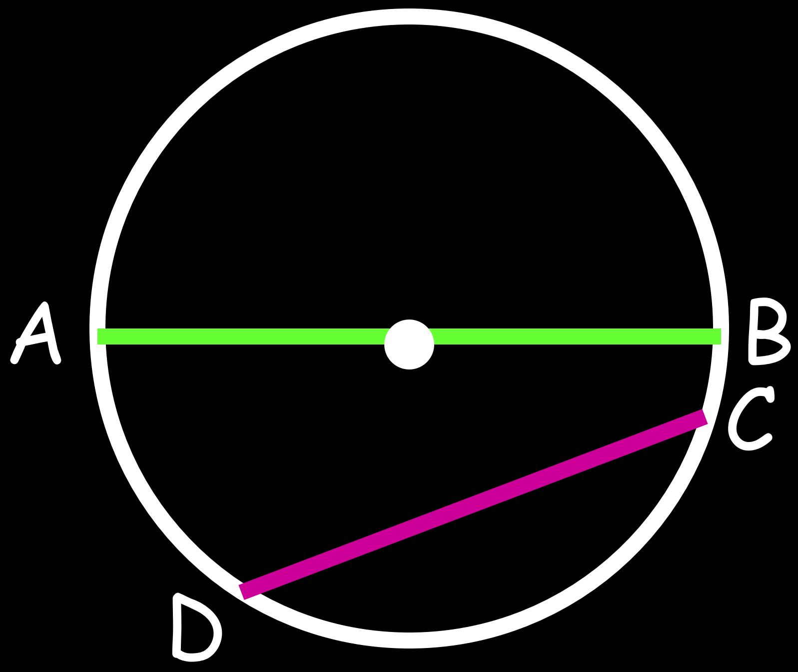


Plural: Radii

Radius – <u>a segment with one endpoint at the center of the circle (or sphere) and one endpoint on the circle (or sphere).</u>

"The distance away from the center of a Circle"

Chord: a segment whose endpoints lie on two different points on the circle.

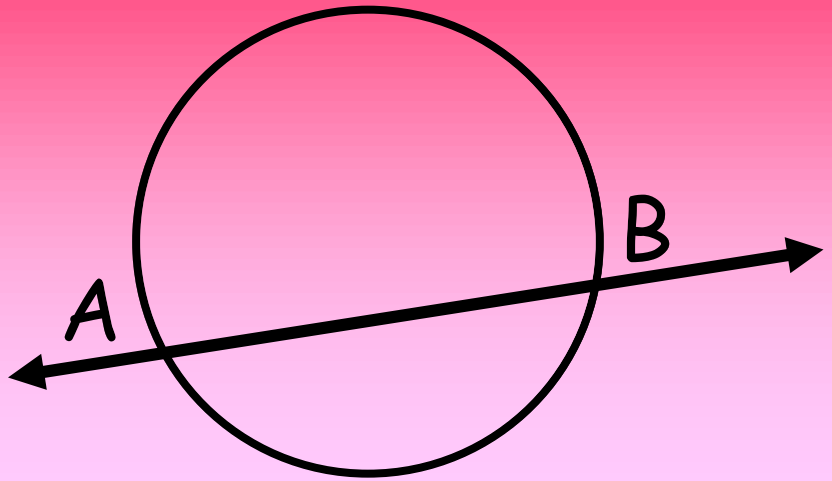


Example: $\overline{DC}$

Diameter: a chord that contains the center of the circle. Example: $\overline{AB}$

A diameter is twice the length of a radius.

Secant – a line that contains a chord.

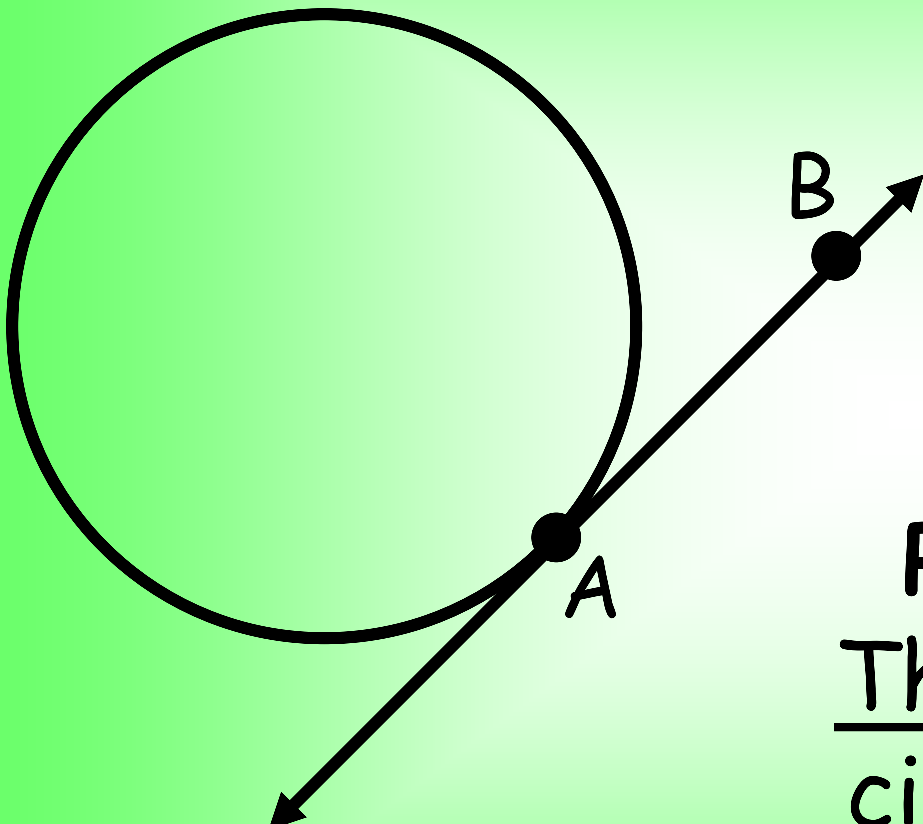


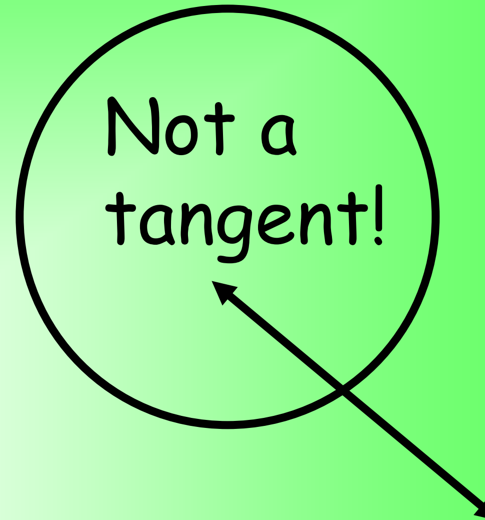
Example: $\overleftrightarrow{AB}$

Note: A chord and a secant can be named using the same letters. The notation tells you whether it is a secant or a chord. A secant is a line; a chord is a segment.

Secant: $\overleftrightarrow{AB}$ Chord: $\overline{AB}$

Tangent – a line that intersects a circle at exactly one point.



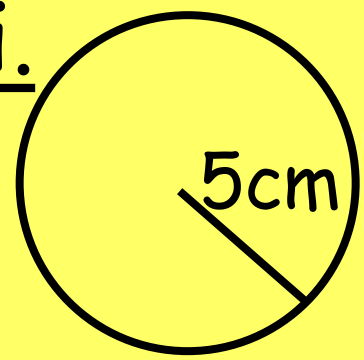


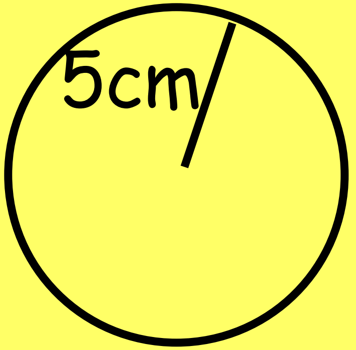
Example: $\overleftrightarrow{AB}$

Point of Tangency:
The point at which the circle and the tangent intersect

Example: A

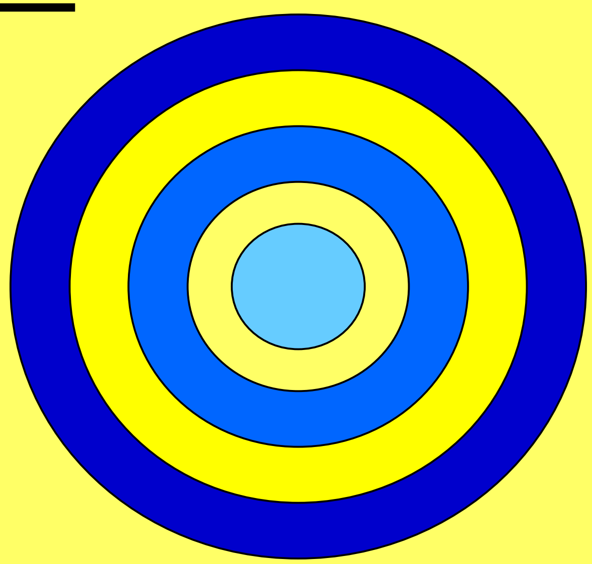
Congruent Circles – <u>circles with congruent radii.</u>





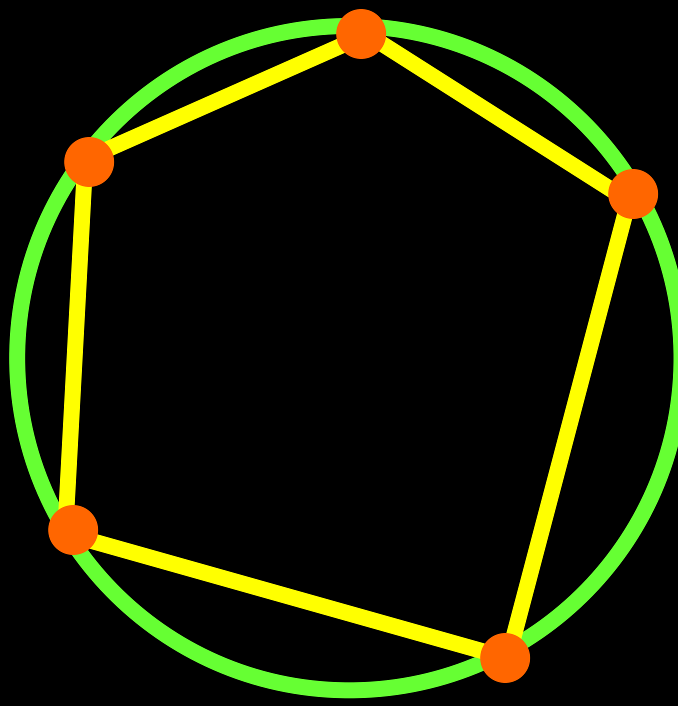
Concentric Circles – <u>circles with the same center point.</u>

"Bulls Eye"



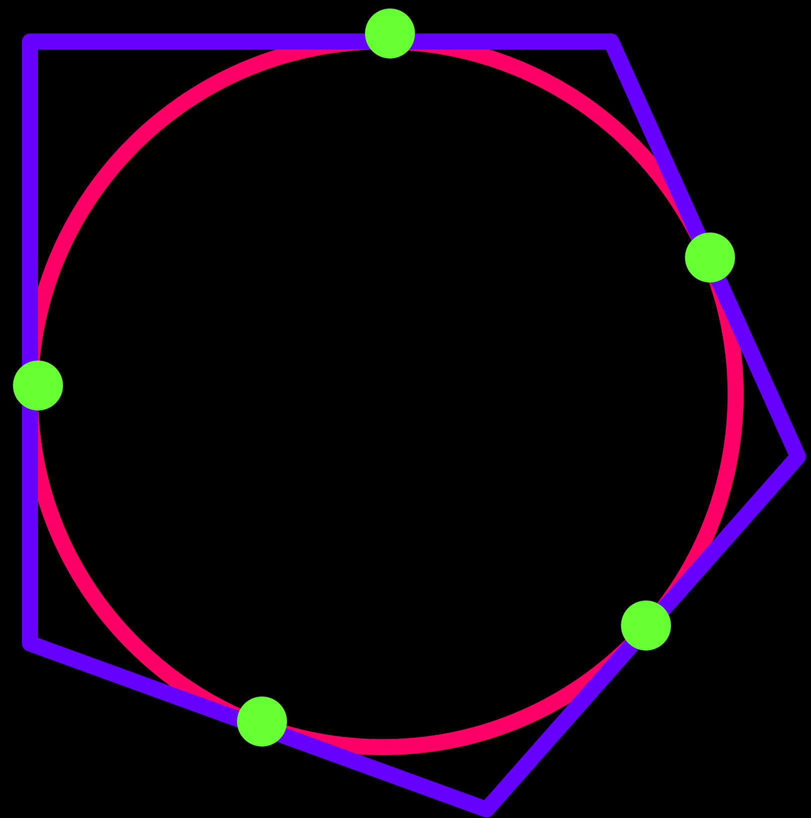
Inscribed Polygon: All vertices of a polygon are on the circle.

"This pentagon is inscribed inside of the circle."



Inscribed Circle: <u>When each side of a polygon is tangent to a circle.</u>

"This circle is inscribed inside of the pentagon."

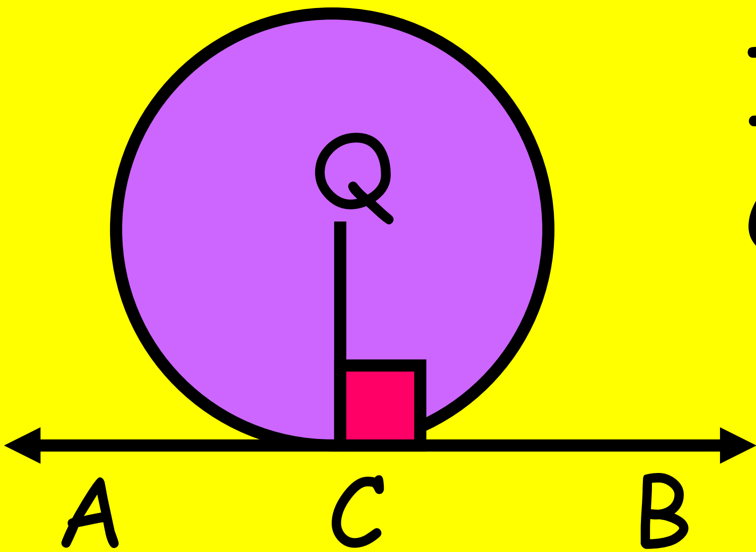


Section 9-2

Tangents

Theorem 9-1

If a line is <u>tangent</u> to a circle, then the line is <u>perpendicular</u> to the <u>radius</u> drawn to the <u>point of tangency</u>.

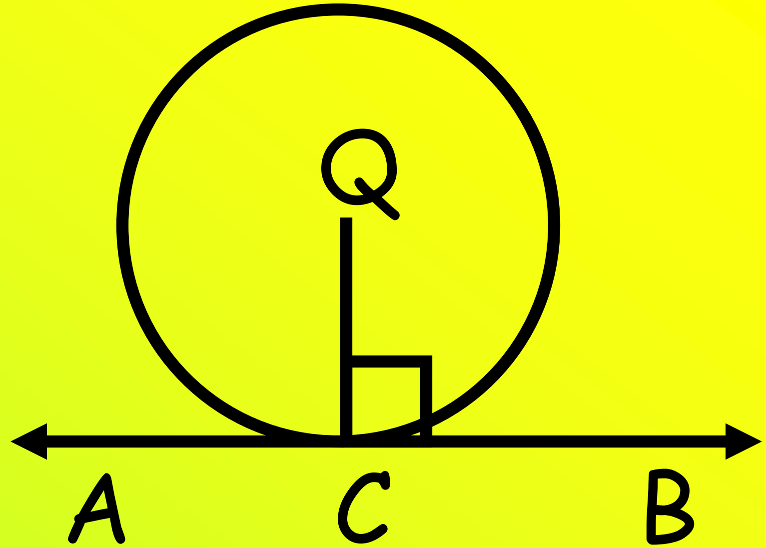


If $\underline{\overleftrightarrow{AB}}$ is tangent to Circle $\underline{Q}$ at point C,

then $\underline{\overline{QC} \perp \overleftrightarrow{AB}}$.

Q is the center of the circle. C is a point of tangency.

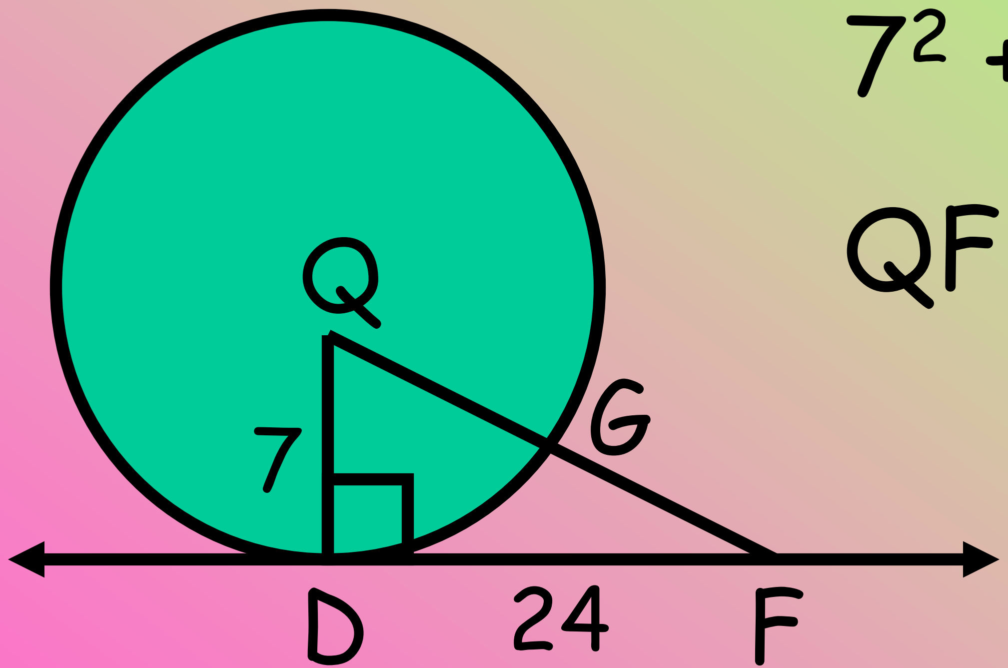
Proof of Theorem 9-1



Statements	Reasons

JUST KIDDING!

Example: Given Circle Q with a radius length of 7. D is a point of tangency. DF = 24, find the length of QF.



$$7^2 + 24^2 = QF^2$$

$$QF = 25$$

NOTE: G is NOT necessarily the midpoint of QF!!

Extension: Find GF.

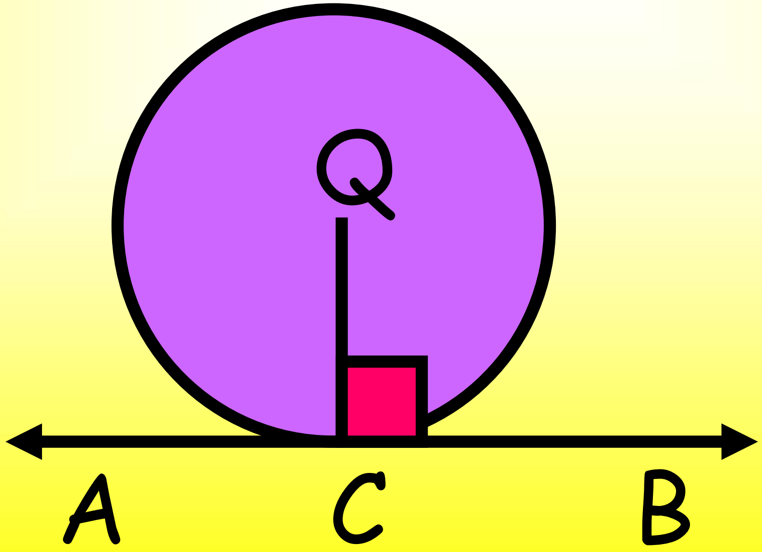
$QF = 25$ $QG = 7$

$\boxed{GF = 18}$

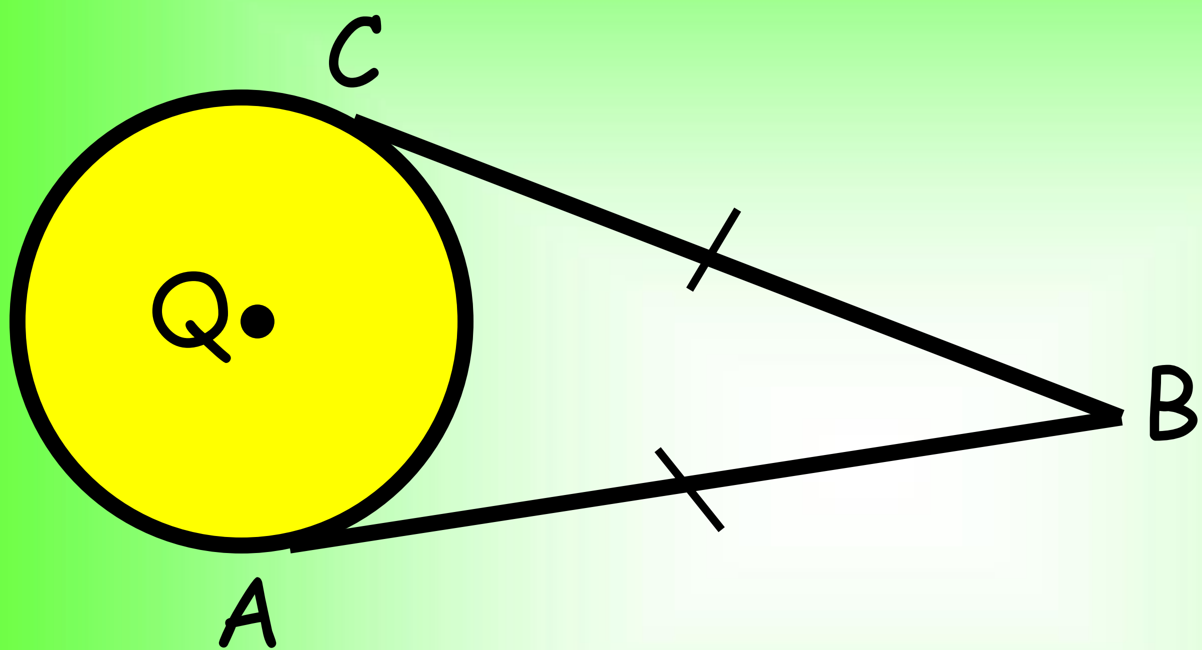
Theorem 9-2

If a line in the plane of a circle is perpendicular to a radius at its outer endpoint, then the line is tangent to the circle.

This is the converse of Theorem 9-1.



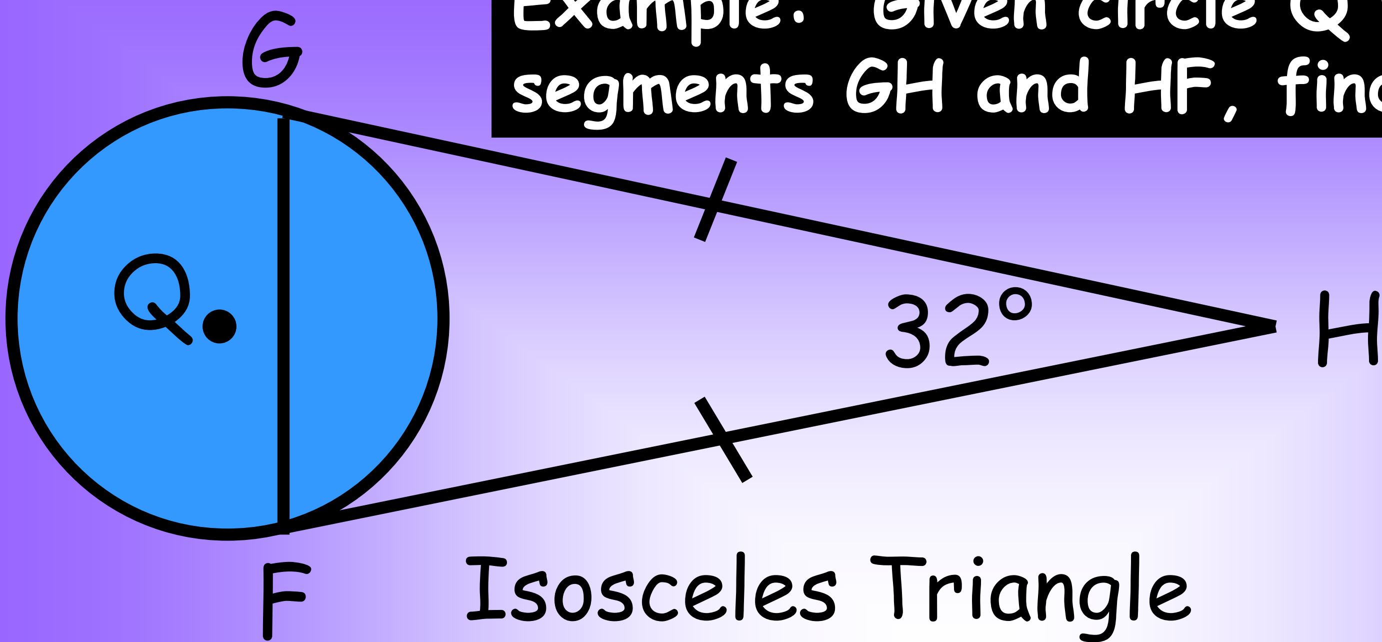
Corollary: Tangent segments from a point to a circle are congruent.



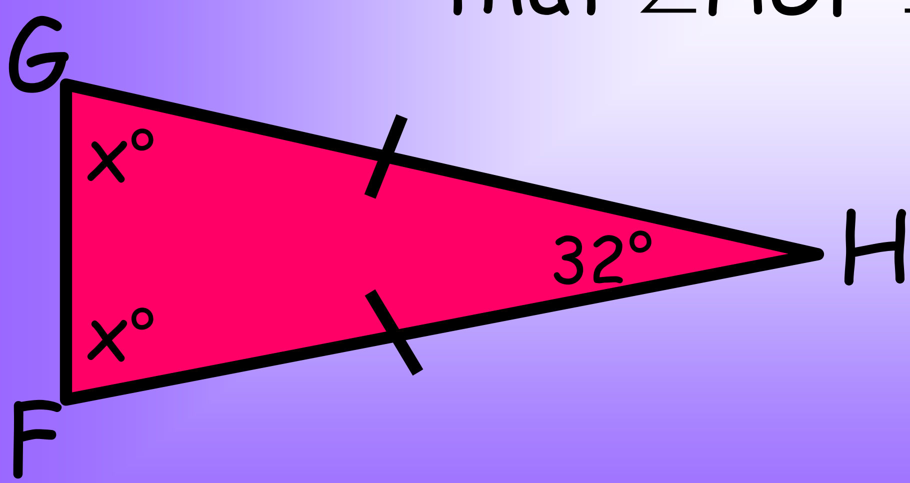
If $\overline{AB}$ and $\overline{BC}$ are tangent segments to circle Q,

then, $\overline{AB} \cong \overline{BC}$.

Example: Given circle Q with tangent segments GH and HF, find the m∠HGF.



Isosceles Triangle Theorem allows us to say that ∠HGF ≅ ∠HFG.



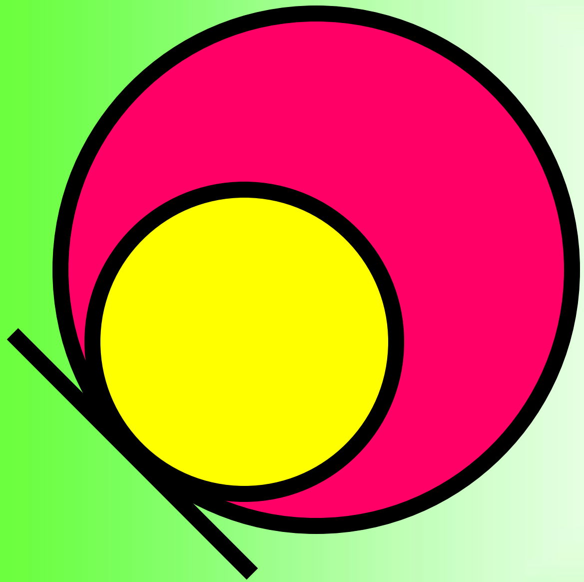
$$x + x + 32 = 180$$

$$2x = 148$$

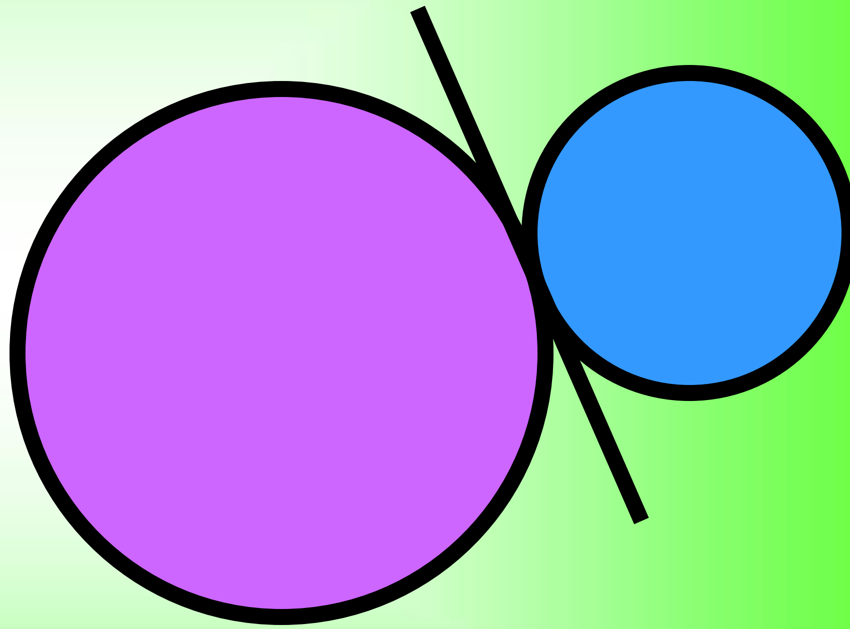
$$x = 74$$

$$m\angle HGF = 74$$

Tangent Circles – <u>coplanar circles that are tangent to the same line at the same point.</u>



Internally Tangent Circles



Externally Tangent Circles