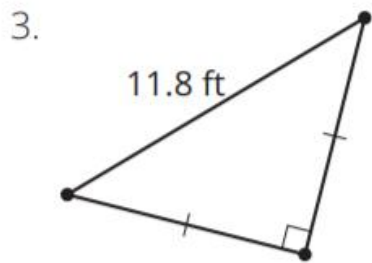
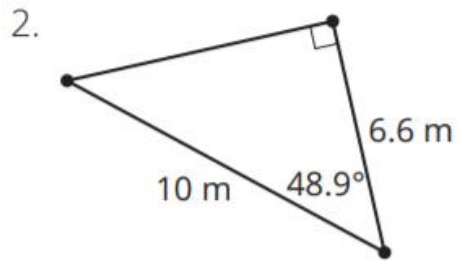
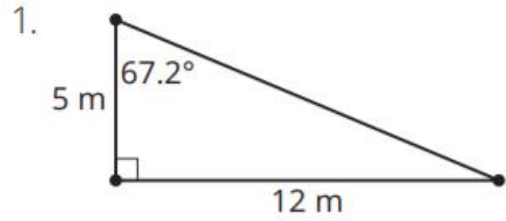


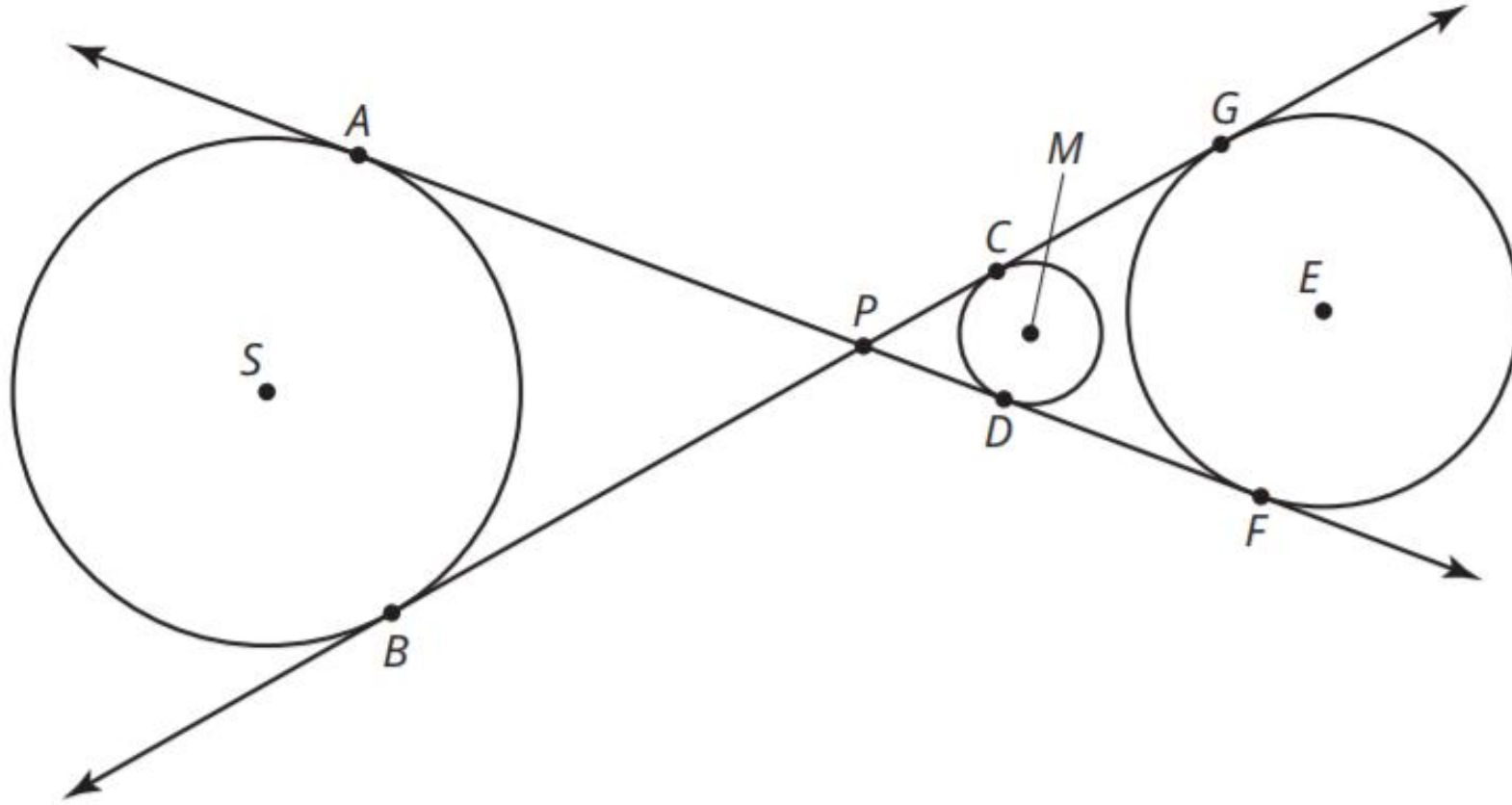
Warm Up

Determine all the angle measures and side lengths of each right triangle.



Consider point P located outside of circles M , E , and S . Lines AF and BG are drawn tangent to the circles as shown.

M1-215



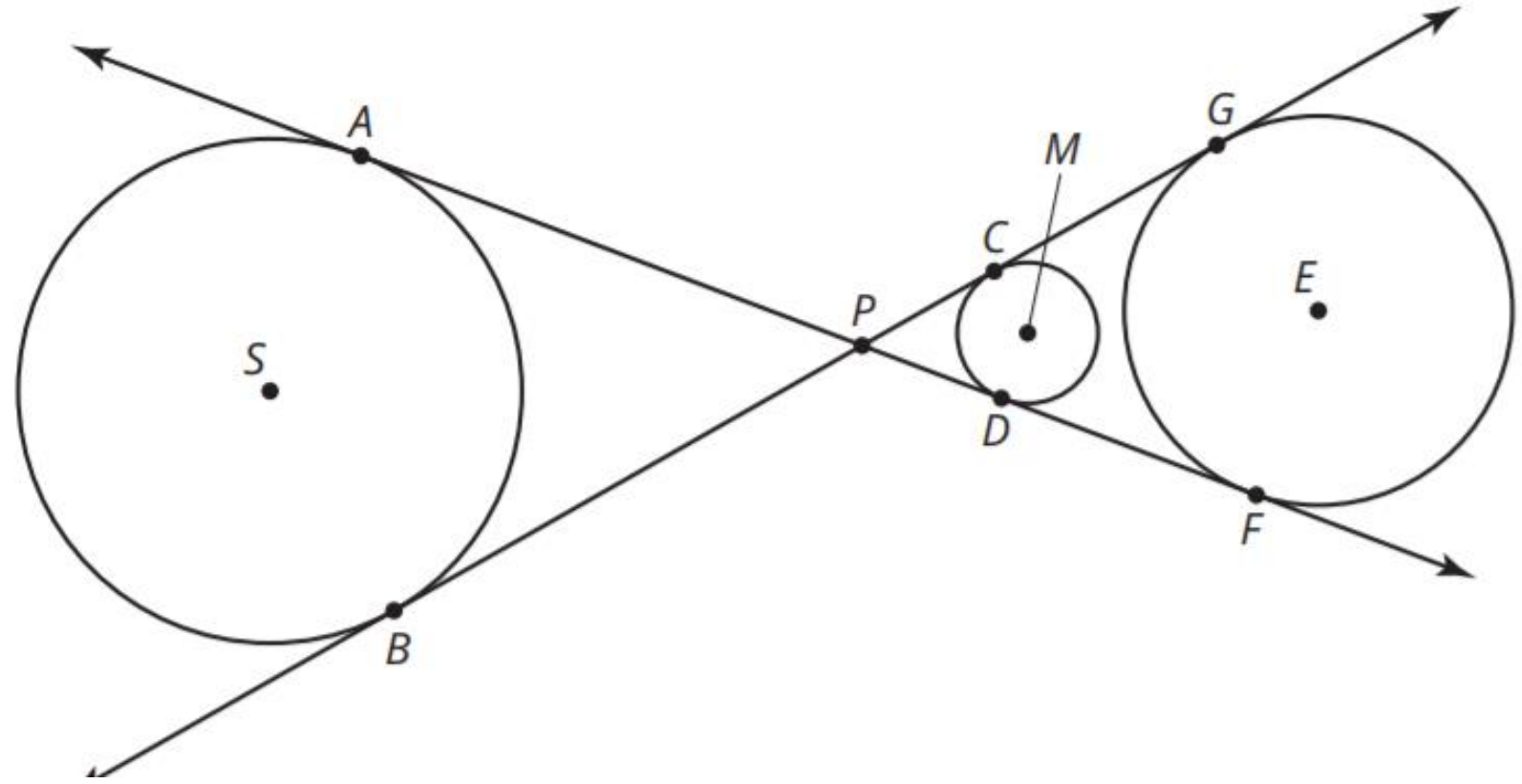
A **tangent segment** is a line segment formed by connecting a point outside of the circle to a point of tangency.

1. Identify the two tangent segments drawn from point P associated with each circle. Then, compare the lengths of the two segments.

a. circle S

b. circle M

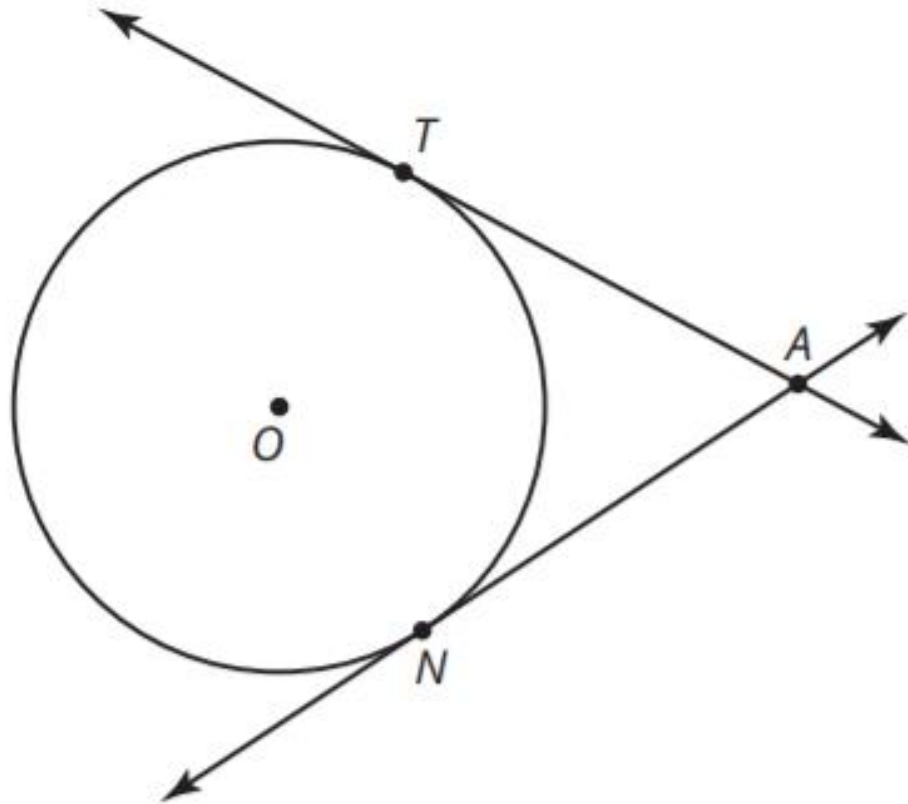
c. circle E



Worked Example

M1-216

Consider this proof plan of the Tangent Segment Theorem.



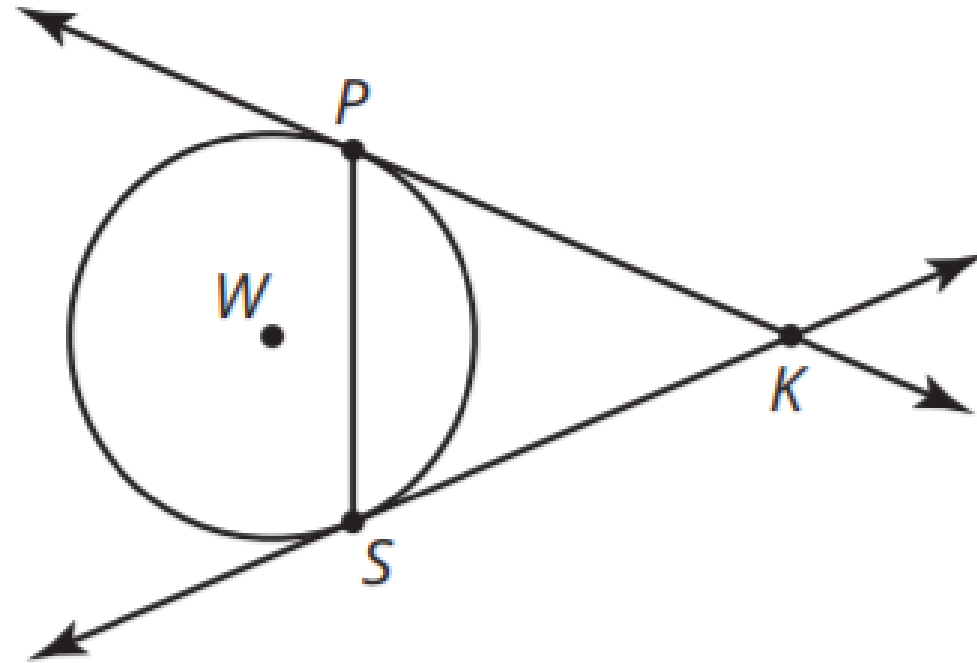
Given: \overleftrightarrow{AT} is tangent to circle O at point T .

\overleftrightarrow{AN} is tangent to circle O at point N .

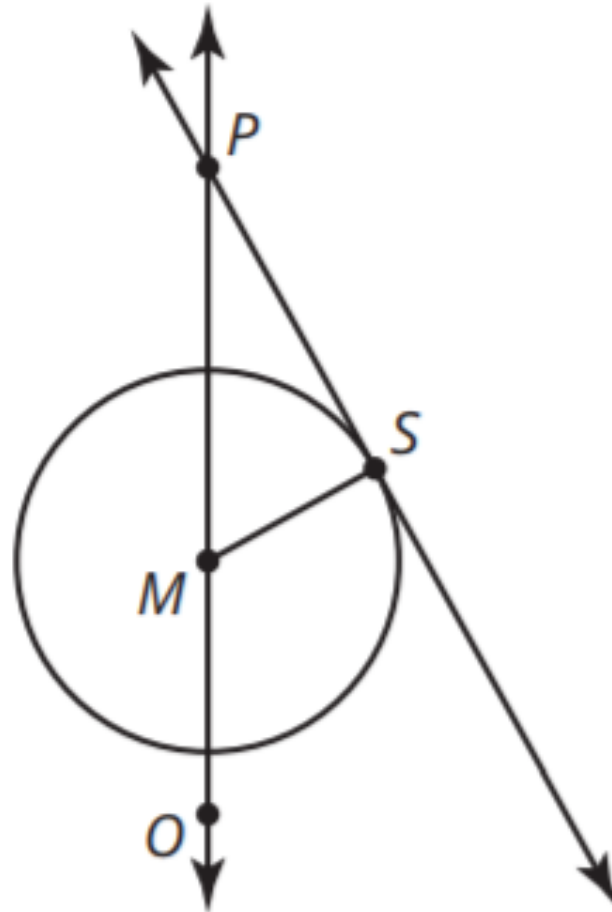
Prove: $\overline{AT} \cong \overline{AN}$

The **Tangent Segment Theorem** states: "If two tangent segments are drawn from the same point on the exterior of a circle, then the tangent segments are congruent."

In the figure, \overleftrightarrow{KP} and \overleftrightarrow{KS} are tangent to circle W and $m\angle PKS = 46^\circ$. Calculate $m\angle KPS$. Explain your reasoning.



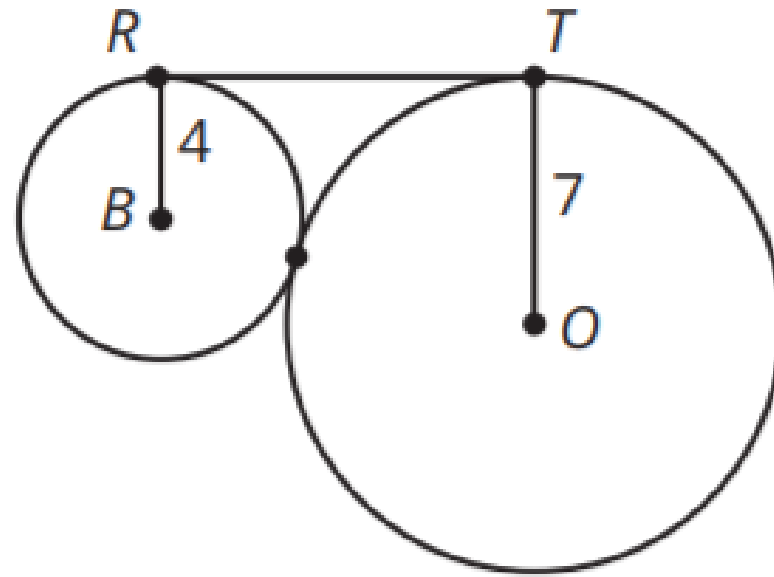
In the figure, \overleftrightarrow{PS} is tangent to circle M and $m\angle SMO = 119^\circ$.
Calculate $m\angle MPS$. Explain your reasoning.



6. In the figure,

- Circle B and circle O are tangent circles.
- The length of radius BR is 4.
- The length of radius OT is 7.
- Segment RT is a common tangent.

Calculate the length of segment RT .



Tangent circles

are circles that lie in the same plane and intersect at exactly one point.

1. List the four triangle congruence theorems associated with right triangles.
2. List the four triangle congruence theorems associated with all triangles.