

## CIRCLE PUZZLE

### Performance Standard 9B.J

Calculate the measure of an inscribed angle using the marked tangent, a secant, chords and angles .

- *Mathematical knowledge:* Determine the correct angle measurement using central angles, inscribed angles, arcs, angles between tangents and chords and their relationships;
- *Strategic knowledge:* Use an auxiliary line segment and a sequence of inscribed angles and arc relationships as well as the angle between the tangent and the chord;
- *Explanation:* Explain completely what was done and why it was done.

### Procedures

1. Provide students with sufficient learning opportunities to develop the following in order to identify, describe, classify and compare relationships using points, lines, planes, and solids.
  - Solve problems using relationships between and among figures.
2. The student is given a copy of the task to be completed in a classroom setting. It is assumed that students have studied and discussed central angles, inscribed angles, arcs, angles between tangents and chords, and their relationships.
3. Evaluate the work using the mathematics rubric:
  - A 4 in mathematical knowledge would require a correct answer of  $55^\circ$ . A mathematical error in addition or subtraction would earn a score of 3.
  - A 4 in strategic knowledge would require an auxiliary line segment QM and a sequence of inscribed angles and arc relationships as well as the angle between the tangent and the chord QM.
  - A 4 in explanation would require a complete description of the process and the reason for each step.

### Examples of Student Work follow

### Resources

- Copies of the “Circle Puzzle” task sheet
- Mathematics Rubric

### Time Requirements

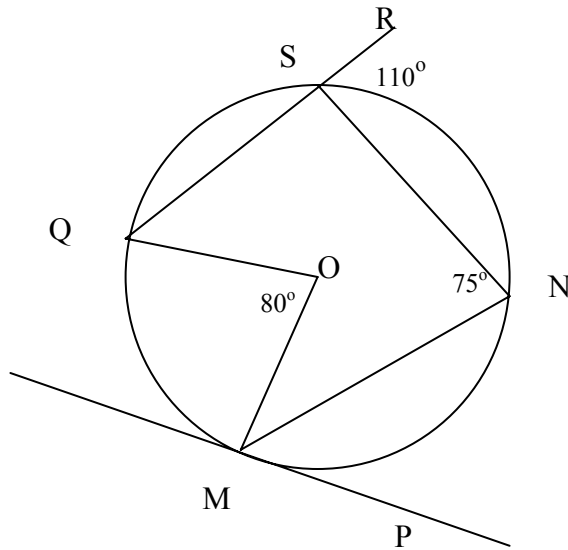
- One class period

NAME \_\_\_\_\_ DATE \_\_\_\_\_

### CIRCLE PUZZLE

#### Student Task Sheet

Find the measure of angle OQS from the following figure:



O is the center of the circle.

Angle RSN measures  $110^\circ$

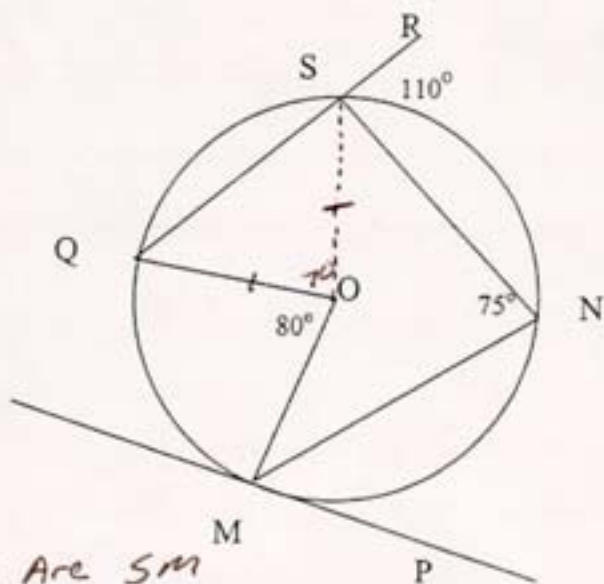
Angle SNM measures  $75^\circ$

MP is tangent to the circle at M

Angle QOM measures  $80^\circ$

S, Q, M and N are on the circle.

Find the measure of angle OQS from the following figure:



O is the center of the circle.

Angle RSN measures  $110^\circ$

Angle SNM measures  $75^\circ$

MP is tangent to the circle at M

Angle QOM measures  $80^\circ$

S, Q, M and N are on the circle.

$$75 \times 2 = 150^\circ = \text{Arc SM}$$

$$150 - 80 = 70^\circ = \text{Arc QS}$$

$$\angle QOS = 70^\circ$$

$$\begin{array}{r} 180 \\ - 70 \\ \hline 110 \\ \div 2 \\ \hline \end{array}$$

$$\boxed{55^\circ = \angle OQS}$$

to find Arc SM I multiplied 75 by 2 to get 150. Then I subtracted 80 to get 70 for Arc QS. If  $\angle QOS = 70^\circ$  then  $\angle OQS + \angle OSQ$  both equal  $55^\circ$  because  $\overline{OQ}$  &  $\overline{OS}$  are equal so therefore  $\angle OQS = 55^\circ$ .

