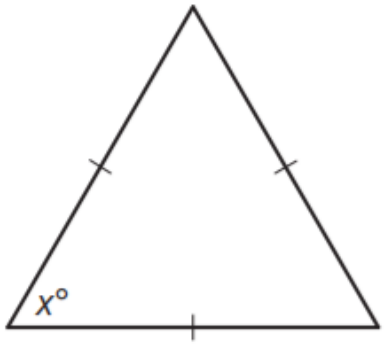
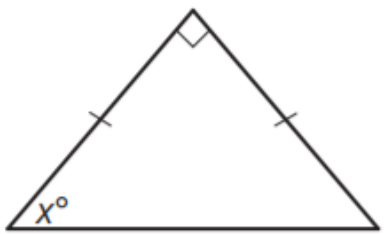
Warm Up

Determine each unknown measure.

1.



2.



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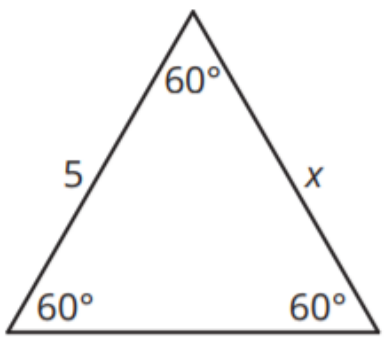
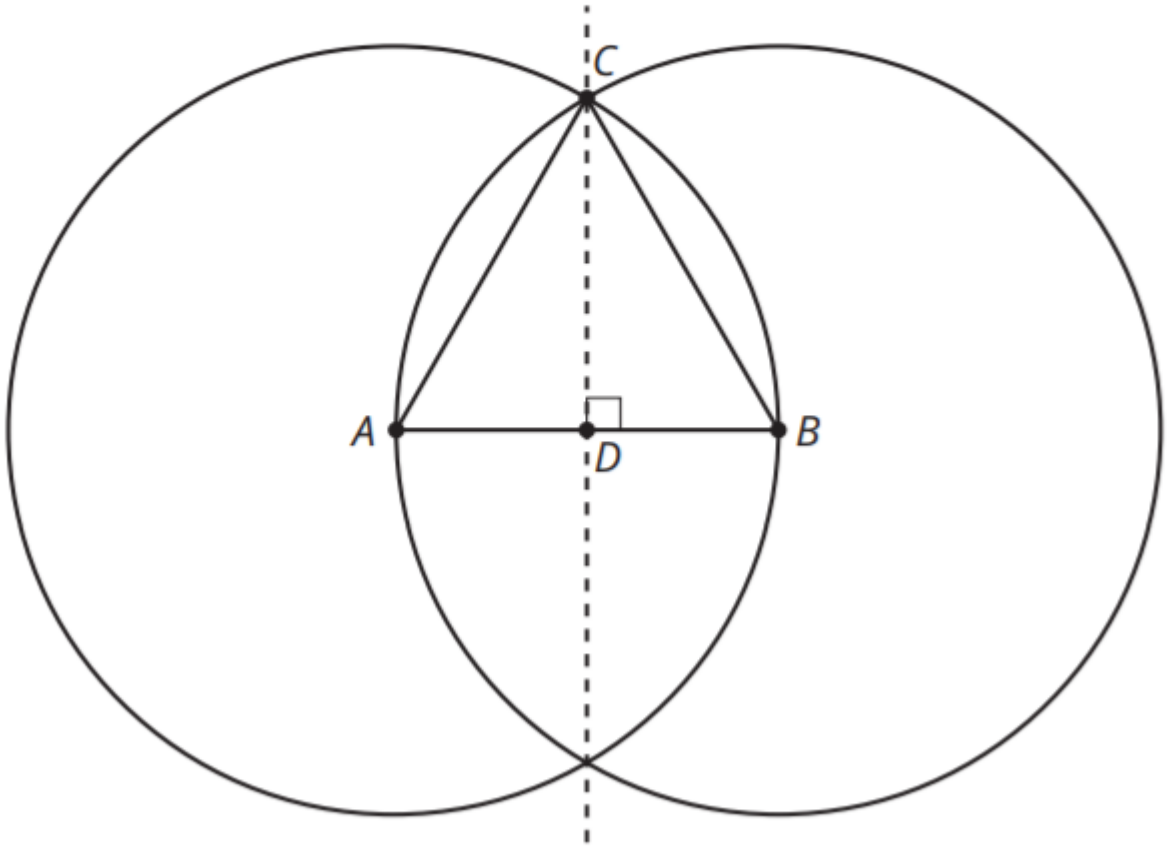
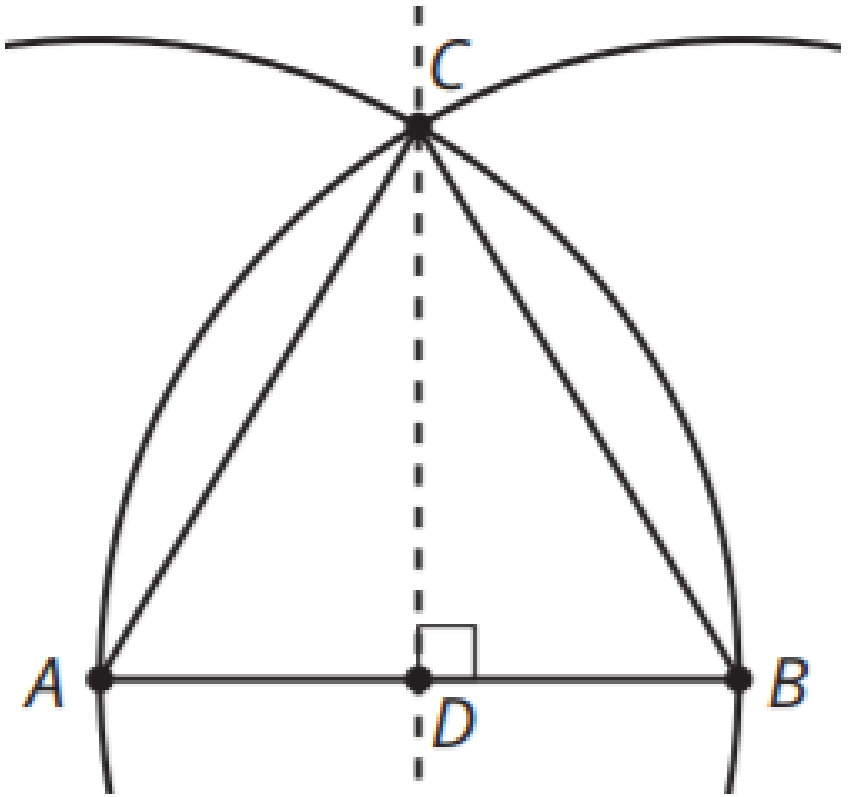


Special Right Triangles

1. Consider the equilateral triangle constructed in the diagram. A perpendicular bisector of $\overline{AB}$ is also constructed, which intersects $\overline{AB}$ at point D.



2. **Use what you know and the Pythagorean Theorem to demonstrate the 30°-60°-90° Triangle Theorem algebraically. Let *a* represent the length of the shorter leg, $\overline{DB}$.**

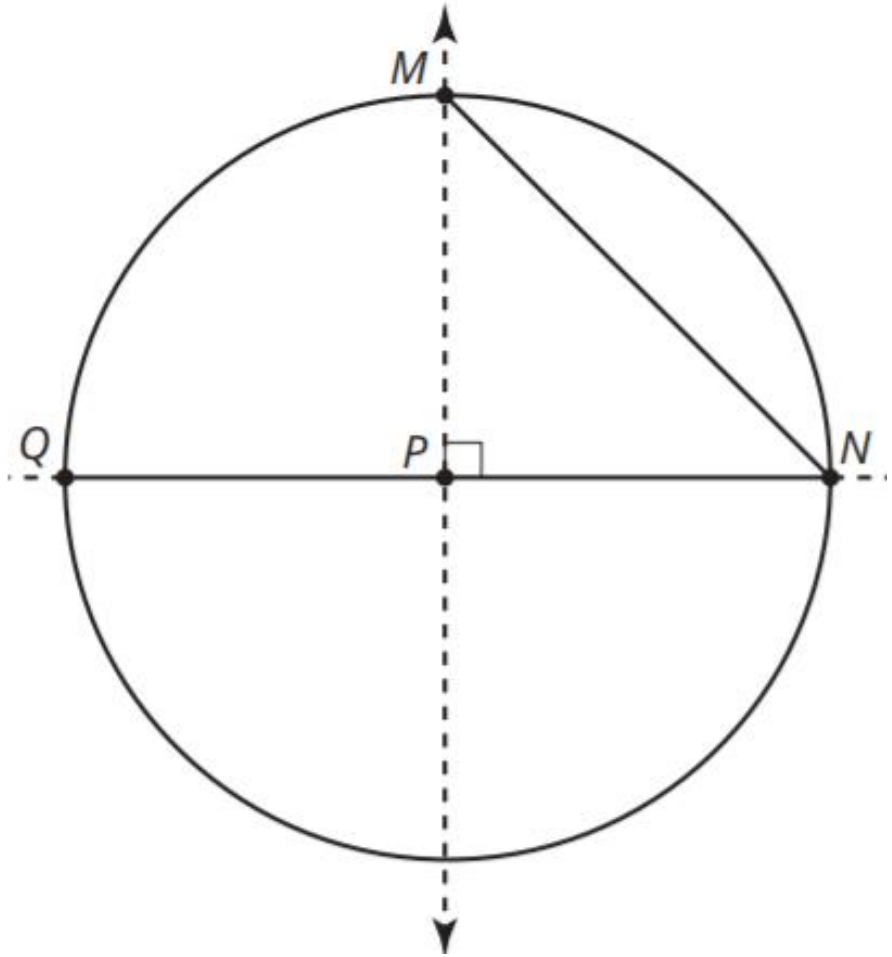


Because you have demonstrated this relationship to be true, you can now refer to it as a theorem. The **30°-60°-90° Triangle Theorem** states: "The length of the hypotenuse in a 30°-60°-90° triangle is 2 times the length of the shorter leg, and the length of the longer leg is $\sqrt{3}$ times the length of the shorter leg."

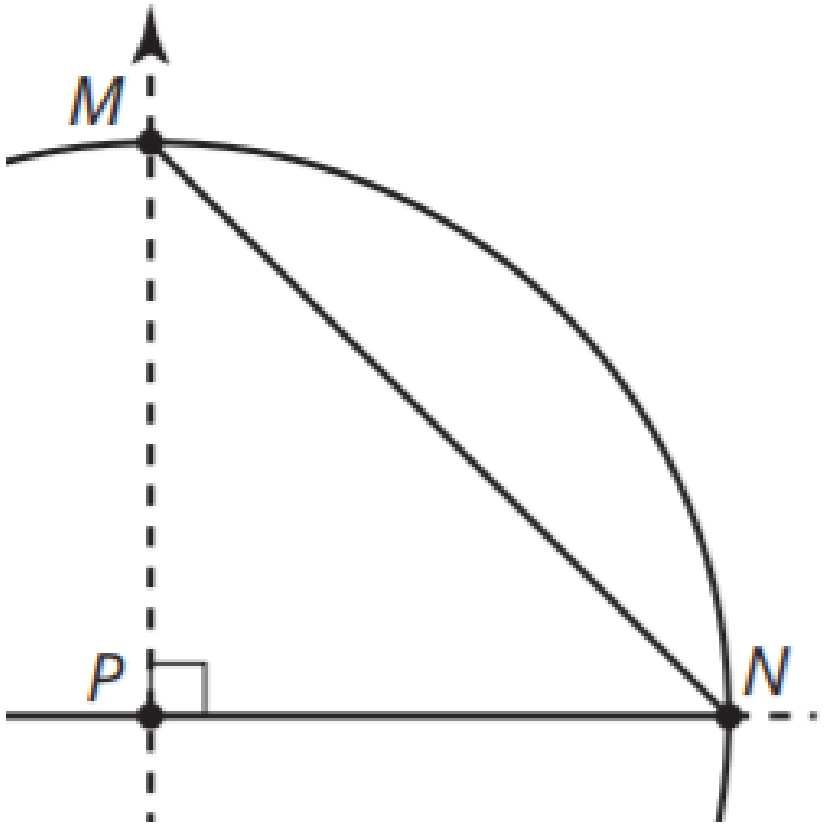
4. **Consider the isosceles right triangle constructed in the diagram. Line *MP* is a perpendicular bisector of diameter $\overline{QN}$.**

   a. **Explain how you know that $\triangle MPN$ is an isosceles right triangle.**

   b. **Explain how you know that $\angle PMN$ and $\angle PNM$ are congruent angles. Label the angle measures in the diagram.**



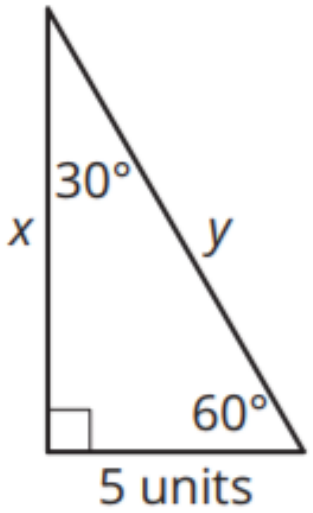
5. Use what you know and the Pythagorean Theorem to demonstrate the 45°-45°-90° Triangle Theorem algebraically. Let *a* represent the length of each congruent leg.



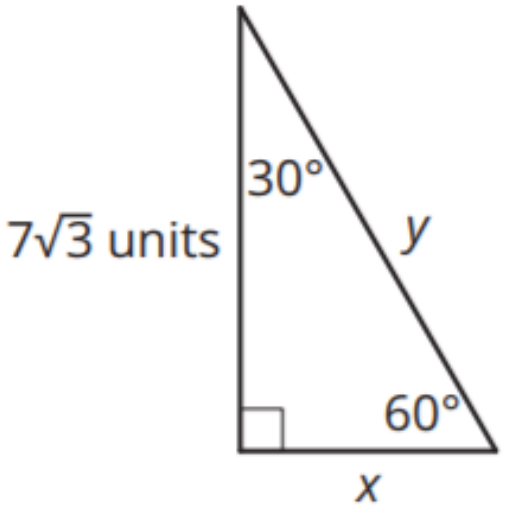
Because you have demonstrated this relationship to be true, you can now refer to it as a theorem. The **45°-45°-90° Triangle Theorem** states: "The length of the hypotenuse in a 45°-45°-90° triangle is $\sqrt{2}$ times the length of a leg."

7. Determine the length of sides *x* and *y* in each triangle.

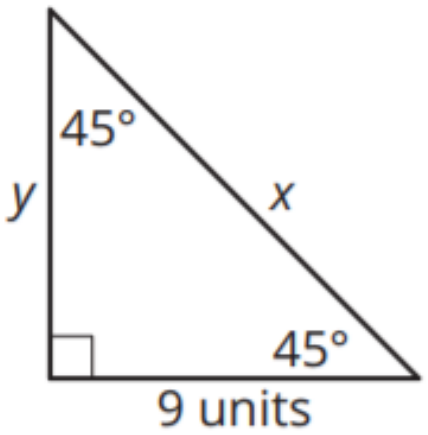
a.



b.



c.



d.