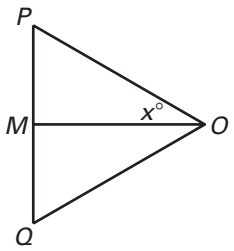
LESSON 11.2

NAME _____ DATE _____

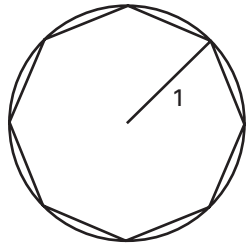
Challenge: Skills and Applications

For use with pages 669–675

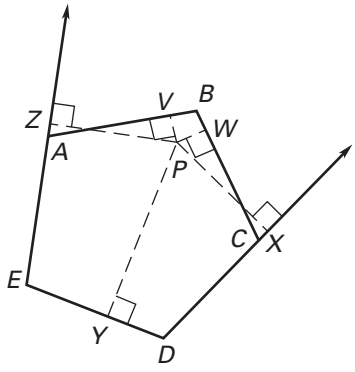
In Exercises 1–8, refer to the diagram. *O* is the center of a regular *n*-gon, and *P* and *Q* are adjacent vertices of the polygon. *M* is the midpoint of $\overline{PQ}$.



1. Identify each of OM, OP, and PQ as the side length, the radius, or the apothem of the n-gon.
2. Find a formula for x in terms of n.
3. Find a formula for the apothem length a in terms of n and the radius r. (*Hint:* Use your answer to Exercise 2.)
4. Find a formula for the side length s in terms of n and the radius r.
5. Find a formula for the apothem a in terms of n and the side length s.
6. Find a formula for the area of a regular n-gon in terms of n and the side length s.
7. Find a formula for the area of a regular n-gon in terms of n and the apothem length a.
8. Find a formula for the area of a regular n-gon in terms of n and the radius r.
9. Consider a regular n-gon inscribed in a circle of radius 1. Use a calculator and the result of Exercise 8 to find the area of the n-gon for $n = 4$, 8, 25, 50, and 100. What number does the area seem to approach as n increases? Round decimals to the nearest hundredth.



10. Refer to the diagram, which shows an arbitrary point P inside a regular pentagon, along with perpendiculars drawn from P to the sides of the pentagon (or extensions of the sides).
    - **a.** Show that $PV + PW + PX + PY + PZ$ does not depend on how P is chosen inside the pentagon.
    - **b.** If $AB = 5$, find the value of $PV + PW + PX + PY + PZ$. Round to the nearest tenth.



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