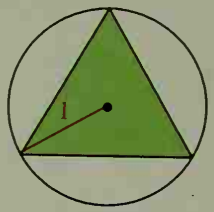
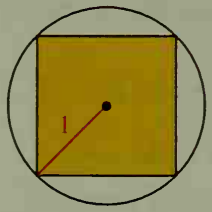
Three regular polygons are inscribed in circles with radii 1. Find the apothem, the perimeter, and the area of each polygon. Use $\sqrt{3} \approx 1.732$ and $\sqrt{2} \approx 1.414$.

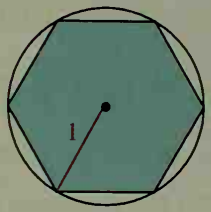
18.



19.

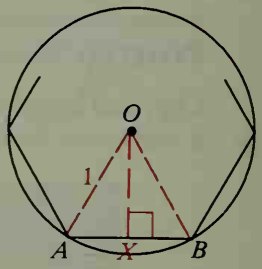


20.



21. Find the perimeter and area of a regular dodecagon (12 sides) inscribed in a circle with radius 1. Use the procedure suggested by Exercise 17.

C **22.** A regular polygon with n sides is inscribed in a circle with radius 1.



a. Explain why $m\angle AOX = \frac{180}{n}$.

b. Show that $AX = \sin\left(\frac{180}{n}\right)^\circ$.

c. Show that $OX = \cos\left(\frac{180}{n}\right)^\circ$.

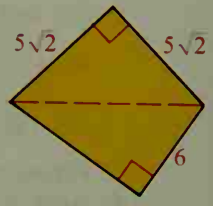
d. Show that the perimeter of the polygon is $p = 2n \cdot \sin\left(\frac{180}{n}\right)^\circ$.

e. Show that the area of the polygon is $A = n \cdot \sin\left(\frac{180}{n}\right)^\circ \cdot \cos\left(\frac{180}{n}\right)^\circ$.

Self-Test 1

Find the area of each polygon.

1. A square with diagonal $9\sqrt{2}$
2. A rectangle with base 12 and diagonal 13
3. A parallelogram with sides 8 and 10 and an angle of measure 60
4. An equilateral triangle with perimeter 12 cm
5. An isosceles triangle with sides 7 cm, 7 cm, and 12 cm
6. A rhombus with diagonals 8 and 10
7. An isosceles trapezoid with legs 5 and bases 9 and 17
8. A regular hexagon with sides 10
9. A regular decagon with sides x and apothem y
10. The quadrilateral shown at the right



Ex. 10