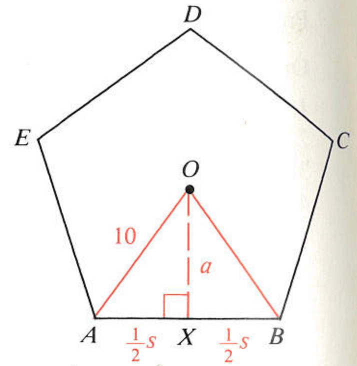
4. Complete the table below.

Number of sides of regular polygon	9	10	360	?	?
Measure of central angle (in degrees)	?	?	?	30	20

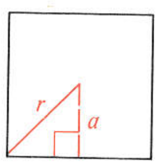
Find the area of each regular polygon described.

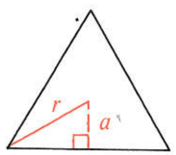
5. A regular octagon with side 4 and apothem a.
6. A regular pentagon with side s and apothem 3.
7. A regular decagon with side s and apothem a.
8. $ABCDE$ is a regular pentagon with radius 10.
   a. $m\angle AOB = \underline{\ ?\ }$
   b. Explain why $m\angle AOX = 36$.
   Note: For parts (c)–(e), use the table on page 271 or a calculator.
   c. $\cos 36° = \frac{a}{10}$. To the nearest tenth, $a \approx \underline{\ ?\ }$.
   d. $\sin 36° = \frac{\frac{1}{2}s}{?}$. To the nearest tenth, $s \approx \underline{\ ?\ }$.
   e. Find the perimeter and area of the pentagon.

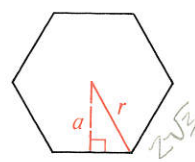


Written Exercises

Copy and complete the tables for the regular polygons shown. In these tables, p represents the perimeter and A represents the area.







A

	r	a	A
1.	$8\sqrt{2}$	?	?
2.	?	5	?
3.	?	?	49
4.	?	$\sqrt{6}$	?

	r	a	p	A
5.	6	?	?	?
6.	?	4	?	?
7.	?	?	12	?
8.	?	?	$9\sqrt{3}$	?

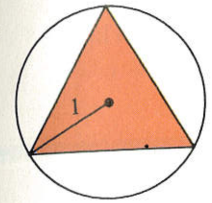
	r	a	p	A
9.	4	?	?	?
10.	?	$5\sqrt{3}$	?	?
11.	?	6	?	?
12.	?	?	$12\sqrt{3}$	?

Find the area of each polygon.

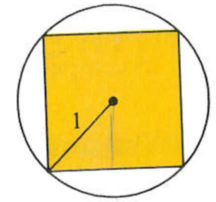
B 13. Equilateral triangle with radius $4\sqrt{3}$
14. Square with radius $8k$
15. Regular hexagon with perimeter 72
16. Regular hexagon with apothem 4

Three regular polygons are inscribed in circles with radii 1. Find the apothem, the perimeter, and the area of each polygon. Use $\sqrt{3} \approx 1.73$ and $\sqrt{2} \approx 1.41$.

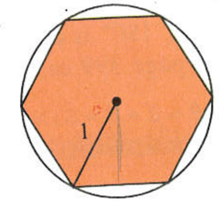
17.



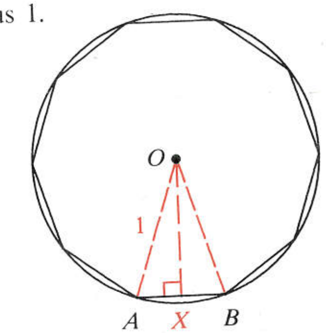
18.



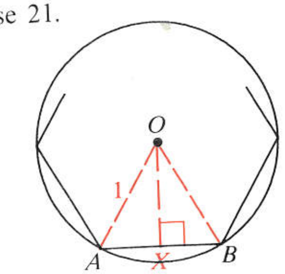
19.



20. Let s be the length of the side of a square that is inscribed in a circle with radius r.
   a. Find s and the perimeter, p, in terms of r.
   b. Express an approximation to the perimeter found in part (a) by using $\sqrt{2} \approx 1.414$.
21. A regular decagon is shown inscribed in a circle with radius 1.
   a. Explain why $m\angle AOX = 18$.
   b. Use a calculator or the table on page 271 to evaluate OX and AX below.
   $\sin 18° = \frac{AX}{1}$, so $AX \approx \underline{\ ?\ }$
   $\cos 18° = \frac{OX}{1}$, so $OX \approx \underline{\ ?\ }$
   c. Perimeter of decagon $\approx \underline{\ ?\ }$
   d. Area of $\triangle AOB \approx \underline{\ ?\ }$
   e. Area of decagon $\approx \underline{\ ?\ }$



C 22. Find the area and perimeter of a regular dodecagon (12 sides) inscribed in a circle with radius 1. Use the procedure suggested by Exercise 21.
23. 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 $AX = \sin\left(\frac{180}{n}\right)°$.
   c. Show that $OX = \cos\left(\frac{180}{n}\right)°$.
   d. Show that the perimeter of the polygon is $p = 2n \cdot \sin\left(\frac{180}{n}\right)°$.
   e. Show that the area of the polygon is $A = n \cdot \sin\left(\frac{180}{n}\right)° \cdot \cos\left(\frac{180}{n}\right)°$.



COMPUTER KEY-IN

If a regular n-sided polygon is inscribed in a circle with radius 1, then its perimeter and area are given by the formulas previously derived in Exercise 23.

Perimeter $= 2n \cdot \sin\left(\frac{180}{n}\right)°$ Area $= n \cdot \sin\left(\frac{180}{n}\right)° \cdot \cos\left(\frac{180}{n}\right)°$