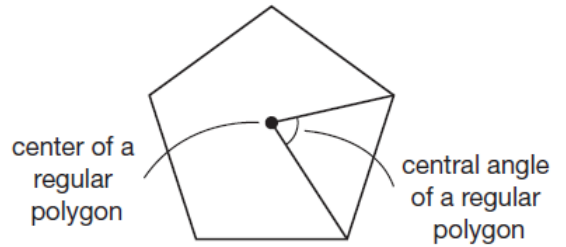


Geometry Lesson 66

Objective: TSW find areas and perimeters of regular polygons.

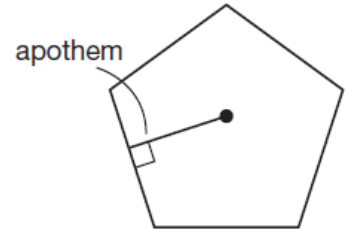
_____ of a Regular Polygon - A point within the polygon that is equidistant from all vertices.

Central _____ of a Regular Polygon - The angle whose vertex is the center of a regular polygon and whose sides pass through consecutive vertices.



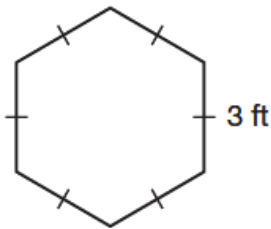
_____ - The perpendicular distance from the center of a regular polygon to a side.

You can use the formula $P = ns$ to find the perimeter of a regular polygon. In the formula, P represents the perimeter, n represents the number of sides, and s represents the side length.



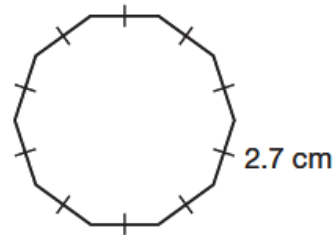
Example 1 Finding Perimeters of Regular Polygons

a. Find the perimeter of the polygon.



SOLUTION

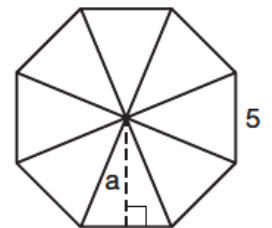
b. Find the perimeter of the polygon.



SOLUTION

You can find the area, A , of a regular polygon using only the apothem and perimeter. Consider an n -sided regular polygon with a side length of s . Divide the polygon into n triangles so the vertices of each triangle are the center of the polygon and the endpoints of a side as shown. By definition, the height of each triangle is the apothem, a .

The base of each triangle has a length of s . So, the area of each triangle is $\frac{1}{2}as$. The total area of the polygon is n times the area of one triangle, or



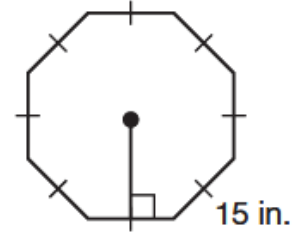
The formula for the perimeter of a regular polygon is $P = ns$. By substitution, the area of a regular polygon is

Area Formula for Regular Polygons - The area, A , of a regular polygon is half the apothem length a and the perimeter P of the regular polygon.

Example 2 Using the Area Formula

Find the area of a regular octagon with an apothem about 18 inches.

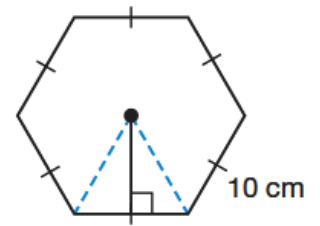
SOLUTION



Example 3 Finding the Area of a Regular Hexagon

Use the apothem and perimeter to find the area of this regular hexagon.

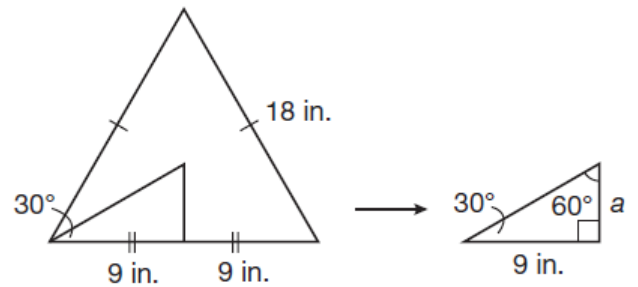
SOLUTION



Example 4 Finding the Area of an Equilateral Triangle

Find the area of an equilateral triangle with 18-inch sides.

SOLUTION



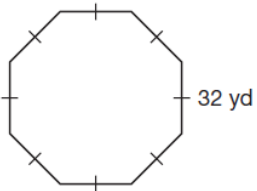
Example 5 Application: Land Survey

A plot of land is in the shape of a regular octagon with 10-mile side lengths and apothem of about 12 miles. The plot needs to be divided into eight equal parcels of land. What will the area of land be in each parcel?

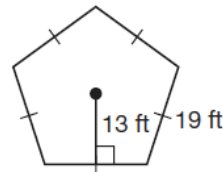
SOLUTION

You Try!!!!

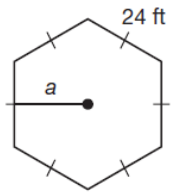
a. Find the perimeter of this octagon.



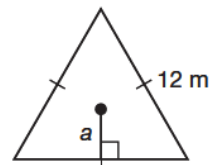
b. Use the area formula for regular polygons to find the area of this pentagon.



c. Find the area of this hexagon.



d. Find the area of this equilateral triangle.



e. The shape of a playground is a regular hexagon where each side length is 78 feet long. The playground is to be resurfaced with a nonslip rubber material. What is the total area that must be surfaced?