

<name>

Class: Honors Geometry

Date: <date>

Topic: Lesson 7-5 (Areas of Regular Polygons)

Definition

Circumscribed circle

Circle that goes thru all vertices of the regular polygon.

Center of regular polygon

Center of the regular poly's circumscribed circle.

Radius of regular polygon

Segment (or distance) fm center to any vertex of regular poly.

Apothem of regular polygon

Perpendicular distance fm center to side of regular poly.

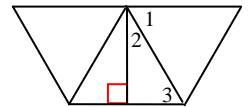
Theorem 7-12

Area of a Regular Polygon

$$A = \frac{1}{2}ap \text{ where } a \text{ is the apothem \& } p \text{ is perimeter}$$

Examples

1. A portion of a regular hexagon has apothem and radii drawn. Find the measure of each numbered angle.



$$m\angle 1 = 360/6 = 60.$$

$$m\angle 2 = 60/2 = 30.$$

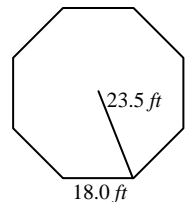
$$m\angle 3 = 60.$$

2. Find area of regular poly w/20 12-in. sides & a 37.9-in. apothem.

Here $n = 20$, $s = 12$ and $a = 37.9$. Thus $p = 20 \cdot 12 = 240$ and

$$A = \frac{1}{2}ap = \frac{1}{2} \cdot 37.9 \cdot 240 = 4548 \text{ in}^2.$$

3. A library is a regular octagon. Side=18.0 ft. Radius = 23.5 ft. Find area of library to nearest 10 ft.



Hypotenuse=23.5, base=9 ($\frac{1}{2}$ the side).

$$a^2 + 9^2 = 23.5^2; a = \sqrt{23.5^2 - 9^2} = \sqrt{471.25} \approx 21.7$$

$$\text{Perimeter } p = 8 \cdot 18 = 144$$

$$A = \frac{1}{2}ap = \frac{1}{2} \cdot 21.7 \cdot 144 = 1562.4 \approx 1560 \text{ ft (rounding to nearest 10 ft)}$$

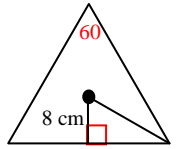
<name>

Class: Honors Geometry

Date: <date>

Topic: Lesson 7-5 (Areas of Regular Polygons)

4. Find area of equilateral Δ w/apothem 8 *cm*. Leave answer in simplest radical form.



30-60-90 triangle. Apothem is opposite the 30 so it is the shortest side. Hypotenuse is radius (len $2 \cdot 8 = 16$). Len of the remaining leg of $\Delta = 8\sqrt{3}$. Thus a side of the triangle is $2 \cdot 8\sqrt{3} = 16\sqrt{3}$ and the perimeter is $3 \cdot 16\sqrt{3} = 48\sqrt{3}$.

The area $A = \frac{1}{2}ap = \frac{1}{2} \cdot 8 \cdot 48\sqrt{3} = 192\sqrt{3} \text{ cm}^2$.