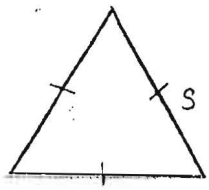
11.2 – Areas of Regular Polygons

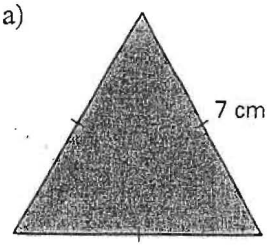
1. Theorem 11.3 – Area of an Equilateral Triangle

$$A = \frac{\sqrt{3}\, s^2}{4}$$

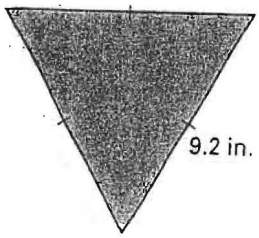


Example 1 – Find the area of each triangle.

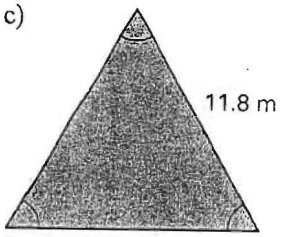
a)



b)



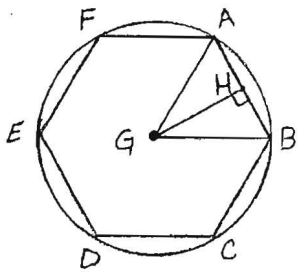
c)



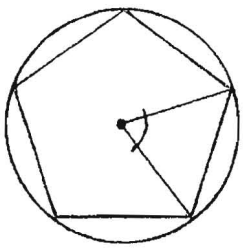
2. Center of a Regular Polygon – the center of its circumscribed circle. (Point G)

3. Radius of a Regular Polygon – the radius of its circumscribed circle. ($\overline{GA}$)

4. Apothem of a Polygon – the distance from the center to any side of a regular polygon. ($\overline{GH}$)



5. Central Angle of a Regular Polygon – an angle whose vertex is the center and whose sides contain two consecutive vertices of the polygon.
To find the measure of the central angle, divide 360° by the number of sides.



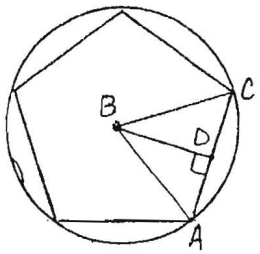
6. Theorem 11.4 – Area of a Regular Polygon

$A = \frac{1}{2}(a)(P)$ where a = apothem and P = perimeter of the polygon

or

$A = \frac{1}{2}(a)(n)(s)$ where a = apothem, n = number of sides and s = side length

Example 2 – A regular pentagon is inscribed in a circle with radius 1 unit.
Find the area of the pentagon.



1. To apply the area formula, you must find the apothem and the perimeter.
2. The measure of the central angle $\angle ABC$ = =
3. Redraw the inner triangle and use trig to find apothem BD and perimeter $5[2(DC)]$.

4. Use the area formula with the perimeter and the apothem to get the final answer.

Example 3 – A regular octagon is inscribed in a circle with radius 2 units.
Find the perimeter and the area of the octagon.