

GEOMETRY REGULAR POLYGONS

A **polygon** is a closed plane figure with at least three sides. The sides intersect only at their endpoints and no adjacent sides are collinear.

A **regular polygon** is equilateral (all sides congruent) and equiangular (all angles congruent).

Directions: Complete the following table. Some hints are given below.

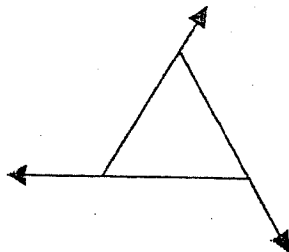
Polygon	1. Number of Sides	2. Number of Angles	3. Number of Triangles Formed	4. Sum of Interior Angles	5. One Interior Angle of Regular Polygon	6. Sum of Exterior Angles	7. One Exterior Angle of Regular Polygon
Triangle	3						
Quadrilateral	4						
Pentagon	5						
Hexagon	6						
Octagon	8						
Decagon	10						
Dodecagon	12						
n-gon	n						

Hints:

1. Complete columns 1 through 5 first.

- You already know the answers for a triangle.
- Sketch polygons with 4, 5, 6, 8, 10, and 12 sides.
- Divide each polygon into triangles by drawing all the diagonals from one vertex. Use this to help you determine the sum of the interior angles.

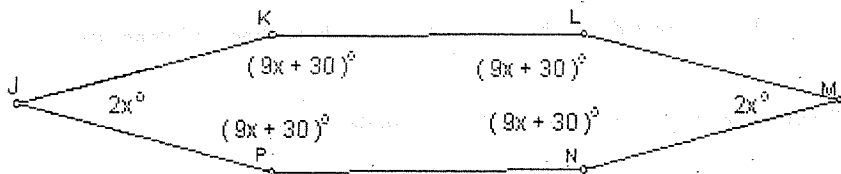
2. For columns 6 and 7, extend each side of the polygon so that there is one exterior angle at each vertex. For example, a triangle will look like the following.



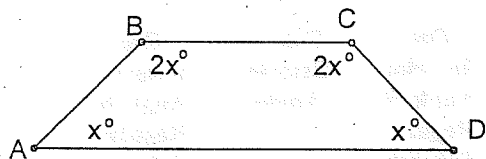
Examples

1. Find the measures of each interior angle.

a)



b)



2. Find the measure of each interior angle and each exterior angle of a regular 15-gon.

3. Six angles of a convex octagon are congruent. Each of the other two angles has a measure 20 more than the measure of each of the other six angles. Find the measure of each angle.

4. If the sum of the interior angles of a regular polygon is 1080, find (a) the number of sides, (b) one exterior angle, and (c) one interior angle.

5. In Pentagon PQRST, $m\angle P = 60$ and $m\angle Q = 130$. $\angle S$ and $\angle T$ are each three times as large as $\angle R$. Find the measures of $\angle R$, $\angle S$ and $\angle T$.