# 2.4 Angle Properties in Polygons

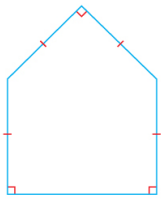
Dec. 5, 201
Nov. 21, 2012
Dec. 4, 2013
Dec. 10, 2015

**GOAL**

Determine properties of angles in polygons, and use these properties to solve problems.

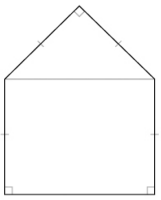
***EXPLORE...***

- A pentagon has three right angles and four sides of equal length, as shown. What is the sum of the measures of the angles in the pentagon?



***SAMPLE ANSWER***

I drew a diagonal joining the two angles that are not right angles. This cut the pentagon into a rectangle and a triangle. I knew that the quadrilateral was a rectangle, not a trapezoid, because the two right angles share an arm, so their other arms must be parallel. As well, the other arms are equal length. I knew that the sum of the measures of the angles in a rectangle is 360° and the sum of the measures of the angles in a triangle is 180°, so the sum of the measures of the angles in the pentagon must be 540°.



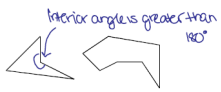
2.4 Page 1

## 2.4 Angle Properties in Polygons

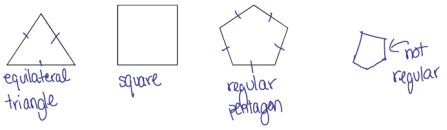
A **polygon** is a many-sided figure.

Convex Polygons


Concave Polygons

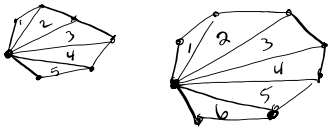



A **Regular** Polygon is a polygon with all equal sides and angles



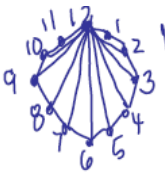

Interior Angles

| Polygon | Diagram | Number of Sides | Number of (Δs) formed | Sum of interior ∠s |
|---|---|---|---|---|
| Triangle | | 3 → | 1 | 180° |
| Quadrilateral | | 4 → | 2 | 2×180° = 360° |
| Pentagon | | 5 → | 3 | 3×180° = 540° |
| Hexagon | | 6 → | 4 | 4×180° = 720° |
| General case N-gon | | N | N-2 | (N-2)(180°) |




Dec 4-10:18 AM

1. Predict the sum of the measures of the interior angle of a dodecagon (12 sides). Verify your prediction using triangles.




10 triangles

sum of interior angles $= (n-2) \times 180°$
$= 10 \times 180°$
$= 1800°$

one interior angle $= \frac{1800}{12}$
$= 150°$

2. If the sum of the interior angles of a polygon is 2340°, how many sides does the polygon have?

how many triangles? $\frac{2340}{180} = 13$ triangles

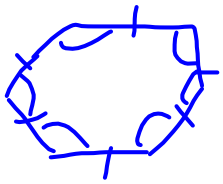
Then there are $13+2 = 15$ sid

3. If the polygon is regular, find the measure of each interior angle of an icosagon. (20 sides)

total sum $= 18$ (triangles) $\times 180°$
$= 3240°$

$\frac{3240}{20}$

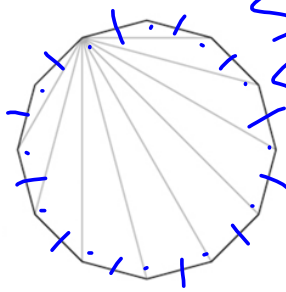
$162°$



Dec 4-10:24 AM

**Section 2.4 Notes: Angle Properties in Polygons**

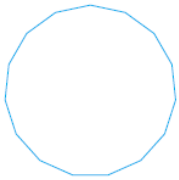
E) A dodecagon (12 sides)



$S = (n-2)(180°)$
$S = (12-2)(180°)$
$S = 1800°$
$\frac{1800}{12}$
$S = 150°$

**Your Turn (pg 97)**

Determine the measure of each interior angle of a regular 15-sided polygon (a pentadecagon).



$S = (n-2)(180°)$
$S = (15-2)(180°)$
$S = \frac{2340°}{15}$
$S = 156°$

Dec 4-10:48 AM

## Attachments

PM11-2s4-interior.gsp

PM11-2s4-exterior.gsp

2s4e1 finalt.mp4

2s4e2 finalt.mp4

2s4e3 finalt.mp4