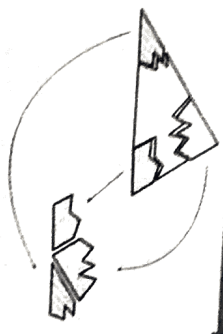


OBJECTIVE: EXPLORE INTERIOR ANGLES OF POLYGONS

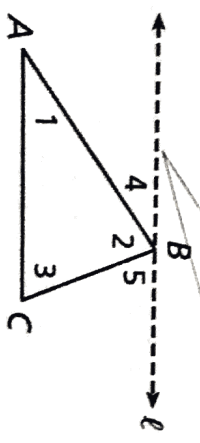


• What do you notice?

• The sum of the interior angles of a triangle add to 180

An auxiliary line is a line that is added to a figure to aid in a proof.

An auxiliary line used in the Triangle Sum Theorem. Line l is parallel to line segment AC . We can draw this auxiliary line because of the parallel postulate (there is only one line parallel to line segment AC that goes through point B)



Interior Angles

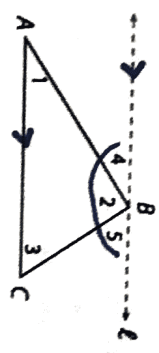
• An interior angle is an angle formed by two sides of a polygon with a common vertex.

• A triangle has three interior angles



Explore Angles in a Quadrilateral

- Draw a large-ish quadrilateral on one of your half sheets using a ruler.
- Cut your quadrilateral out.
- Tear off the four corners of the quadrilateral.
- Rearrange the angles so their sides are adjacent and their vertices meet at a point



Steps

Reasons

1. Draw line l through point B parallel to AC .	1. Parallel Postulate
2. $m\angle 1 = m\angle 4$ and $m\angle 3 = m\angle 5$	2. Alt. Interior \angle s
3. $m\angle 4 + m\angle 2 + m\angle 5 = 180^\circ$	3. Angle Addition Postulate and definition of straight angle
4. $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$	4. Substitution

Triangle Explore Activity

- Draw a large-ish triangle on one of your half sheets using a ruler.
- Cut your triangle out.
- Tear off the three corners of the triangle.
- Rearrange the angles so their sides are adjacent and their vertices meet at a point

• What do you notice?

• The sum of the interior angles of a quadrilateral add to 360

Polygon- a closed figure having three or more sides and lying on one plane



Number of Sides	Name of Polygon
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
7	Heptagon
8	Octagon
9	Nonagon
10	Decagon
12	Dodecagon
n	n -gon

11 sides = hendecagon

A polygon is **concave** if any part of a diagonal contains points in the exterior of the polygon. If no diagonal contains points in the exterior, then the polygon is **convex**.

OR we can say a polygon is concave if it has one or more interior angles greater than 180° , convex if it does not

<http://www.mathopenref.com/polygonconcaave.html>



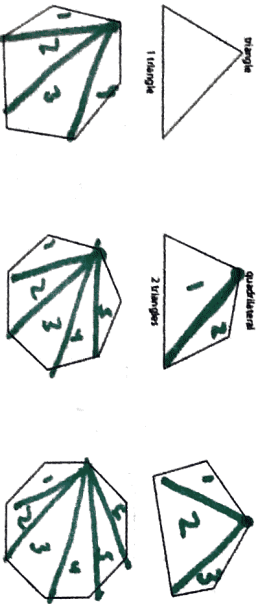
Concave quadrilateral



Convex quadrilateral

Draw the diagonals from any one vertex of the polygon. How many triangles are formed?

pg. 1084



Fun Facts!

- 11 hendecagon
 - 12 dodecagon
 - 13 triskaidecagon or tridecagon
 - 14 tetrakaidecagon or tetradecagon
 - 15 pendedecagon
 - 16 hexdecagon
 - 17 heptdecagon
 - 18 octdecagon
 - 19 enneadecagon
 - 20 icosagon
- but you can just say 13-gon

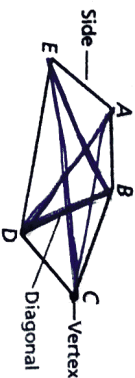
All the sides are congruent in an equilateral polygon. All the angles are congruent in an equiangular polygon. A **regular polygon** is one that is both equilateral and equiangular. If a polygon is not regular, it is called irregular.

Fill in the Chart

$$(n-2)180$$

Polygon	Number of Sides	Number of Triangles	Sum of Interior Angle Measures
Triangle	3	1	$(1)180^\circ = 180^\circ$
Quadrilateral	4	2	$(2)180^\circ = 360^\circ$
Pentagon			$()180^\circ =$
Hexagon			$()180^\circ =$
Decagon			$()180^\circ =$

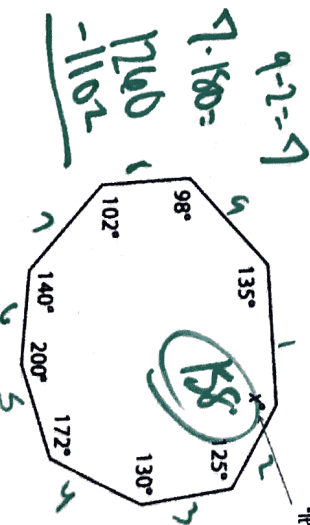
Each segment that forms a polygon is a **side of the polygon**. The common endpoint of two sides is a **vertex of the polygon**. A segment that connects any two nonconsecutive vertices is a **diagonal**.



FROM NOW ON WE WILL ONLY BE TALKING ABOUT CONVEX POLYGONS!

Find the sum of the angles then Find x

"It's Right Here"



1. Find the sum of the interior angle measures of a convex heptagon. $180(5) = 900$

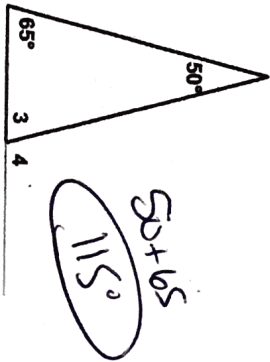
2. Find the measure of each interior angle of a regular 16-gon. $\frac{2520}{16} = 157.5$

3. If a polygon has an interior angle sum of 1800°, what type of polygon is it?

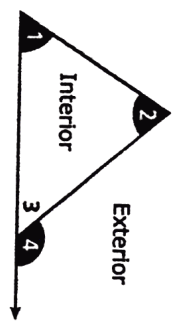
$$\frac{1800}{180} = 10 + 2 = 12$$

doodecagon

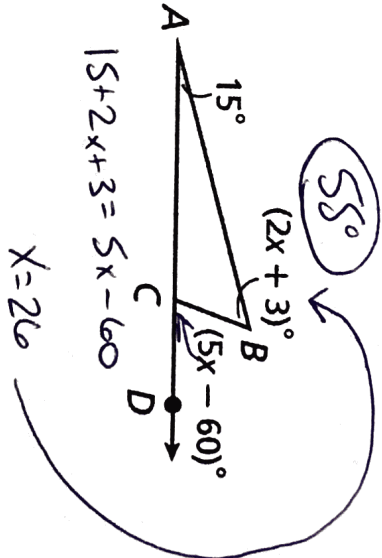
Find $m\angle 4$



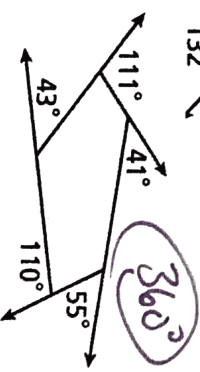
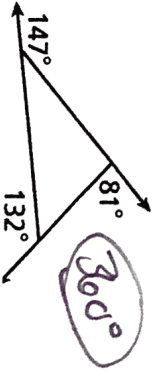
What is the relationship between angle 4 and angles 1 and 2?



Find $m\angle B$

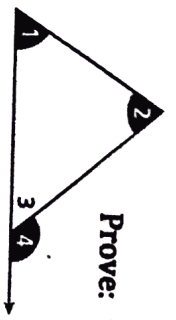


Find the measure of all exterior angles. What is their sum?



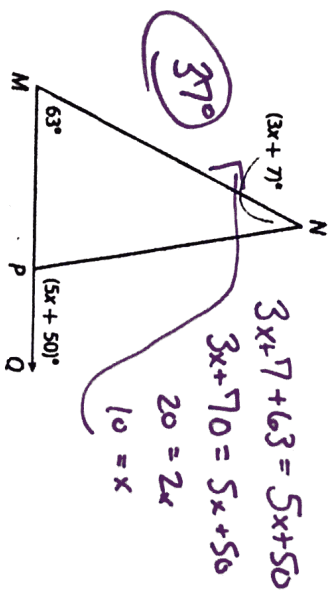
Write a Paragraph Proof

Prove: $m\angle 1 + m\angle 2 = m\angle 4$

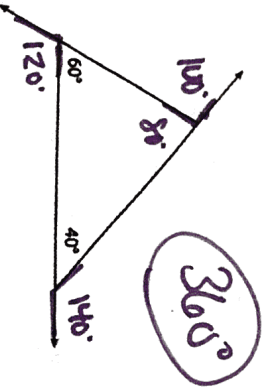


$m\angle 1 + m\angle 2 + m\angle 3 = 180$ Triangle Angle Sum Theorem
 $m\angle 3 + m\angle 4 = 180$ Linear Pair
 $m\angle 1 + m\angle 2 + m\angle 3 = m\angle 3 + m\angle 4$ substitution
 $-m\angle 3$
 $m\angle 1 + m\angle 2 = m\angle 4$ subtraction

11. Determine $m\angle N$ in $\triangle MNP$.



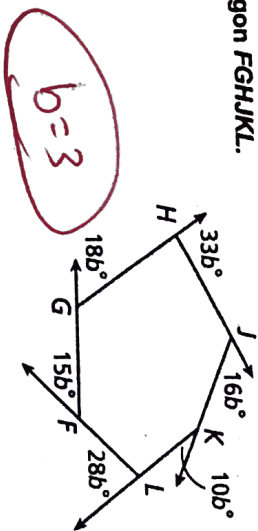
Find the measure of all exterior angles. What is their sum?



Find the measure of each exterior angle of a regular 20-gon.

$$\frac{360}{20} = 18$$

Find the value of b in polygon FGHJKL.



Homework

• Pg. 1090 (1-9)

• Pg. 1091-1092 (10-15)