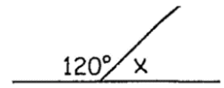
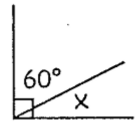
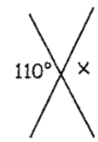
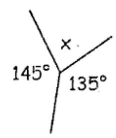
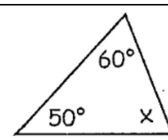
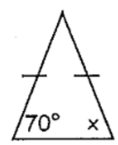
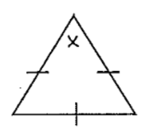
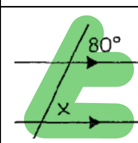
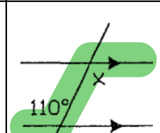
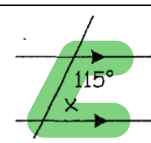
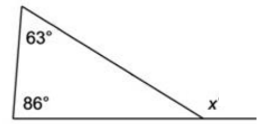
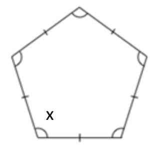
<u>All About Angles!</u>

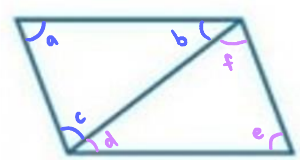
Let's see what we remember…

	Vocabulary	Definition	Example
1.	Supplementary Angles (SA)	Two or more adjacent angles forming a straight line add up to 180°.	 $180 = 120 + x$ (SA) $x = 60°$
2.	Complementary Angles (CA)	Two or more adjacent angles forming a right angle add up to 90°.	 $60 + x = 90$ (CA) $x = 30°$
3.	Opposite Angle Theorem (OAT)	When two lines cross, oppositely aligned angles are equal.	 $x = 110°$ (OAT)
4.	Complete Rotation (CR)	Angles that form a complete rotation (circle) add up to 360°.	 $145 + 135 + x = 360$ (CR) $280 + x = 360$ $x = 80°$
5.	Angle Sum in a Triangle Theorem (ASTT)	Interior angles of any triangle add up to 180°.	 $50 + 60 + x = 180$ (ASTT) $110 + x = 180$ $x = 70°$
6.	Isosceles Triangle Theorem (ITT)	Angles opposite the two equal sides (base angles) in an isosceles triangle are equal.	 $x = 70°$ (ITT)
7.	Equilateral Triangle Theorem (ETT)	All angles in an equilateral triangle are equal (60° each).	 $x = 60°$ (ETT)
8.	Parallel Line Thoerem – Corresponding Angles (PLT-F)	F-pattern Corresponding angles are equal.	 $x = 80°$ (PLT-F)
9.	Parallel Line Thoerem – Alternate Angles (PLT-Z)	Z-pattern Alternate angles are equal.	 $x = 110°$ (PLT-Z)
10.	Parallel Line Thoerem – Co-interior Angles (PLT-C)	C-pattern Co-interior angles **add up to 180°**.	 $115 + x = 180$ (PLT-C) $x = 65°$

	Vocabulary	Definition	Example
11.	Exterior Angle Theorem (EAT)	The measure of an exterior angle of a triangle is equal to the sum of the two remote interior angles.	 $x = 63 + 86$ (EAT) $= 149°$
12.	Regular Polygon (RP)	A polygon whose sides have the same length and whose angles have the same measure.	 S=540° $x = \frac{540}{5}$ (RP) $= 108°$

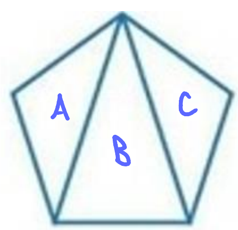
Now let's investigate the Sum of the <u>Interior</u> Angles of any Polygon…

Example 1. Use the Angle Sum in a Triangle Theorem (ASTT) to prove that the sum of the interior angles of a quadrilateral is 360°.



sum of interior angles $= a + b + c + d + e + f$
$= 180 + 180$ (ASTT)
$= 360°$

Example 2. Use the Angle Sum in a Triangle Theorem (ASTT) to prove that the sum of the interior angles of a pentagon is 540°.

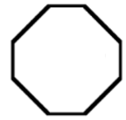


sum of interior angles $= \underset{A}{180} + \underset{B}{180} + \underset{C}{180}$ (ASTT)
$= 540°$

Example 3. Complete the following table (except the last column).

Convex Polygon	Number of Sides (n)	# of Triangles Formed	Sum of Interior Angles	Sum of Exterior Angles
Triangle	3	1	180°	360°
Quadrilateral	4	2	360°	360°
Pentagon	5	3	540°	360°
Hexagon	6	4	720°	360°
Octagon	8	6	1080°	360°
Decagon	10	8	1440°	360°
n-gon	*n*	$n-2$	$(n-2)(180°)$	360°

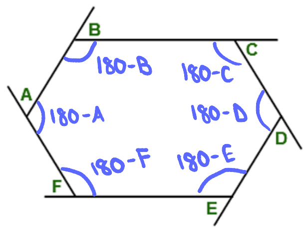
Summary…

	Vocabulary	Definition	Example
13.	Sum of Interior Angles of a Polygon (SIAP)	The sum of the interior angles of a polygon with *n* sides is: S= $(n-2)(180^\circ)$	 $n=8$ $S=(8-2)(180)$ (SIAP) $=6(180)$ $=1080^\circ$

Now let's investigate the Sum of the <u>Exterior</u> Angles of any Polygon…

Example 1. Use the Sum of Interior Angles of a Polygon (SIAP) and Supplementary Angles (SA) to prove that the sum of the exterior angles of a hexagon is 360º.

(SA)

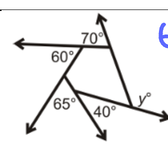


(SIAP)

$$(180-A)+(180-B)+(180-C)+(180-D)+(180-E)+(180-F)=(n-2)(180)$$
$$1080-A-B-C-D-E-F=4(180)$$
$$1080-720=A+B+C+D+E+F$$
$$360^\circ=A+B+C+D+E+F$$

Example 2. Fill in the last column in the table from the previous investigation.

Summary…

	Vocabulary	Definition	Example
14.	Sum of Exterior Angles of a Polygon (SEAP)	The sum of the exterior angles of any polygon is 360º.	 $60+70+65+40+y=360$ (SEAP) $235+y=360$ $y=125^\circ$