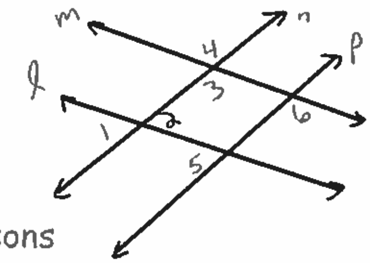
Given: $\angle 2$ is supplementary to $\angle 4$

$\angle 3 \cong \angle 6$

Prove: $\angle 4$ is supplementary to $\angle 5$

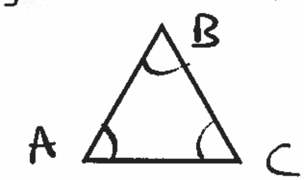


	Statements	Reasons
1	$\angle 2$ is supplementary to $\angle 4$, $\angle 3 \cong \angle 6$	Given
2	$n \parallel p$	Corr. ∠s Conv.
3	$\angle 2 \cong \angle 5$	Alt. Int. ∠s Thrm.
4	$\angle 4$ is supp. to $\angle 5$	≅ supp. conv.
5		
6		

Theorem: Each angle of an equiangular triangle has measure 60°.

Given: Equiangular Triangle ABC

Prove: $m\angle A = m\angle B = m\angle C = 60^{0}$



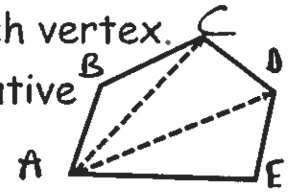
	Statements	Reasons
1.	Equiangular ΔABC	Given
2.	$\angle A \cong \angle B \cong \angle C$	Def. of equiangular
3.	$m\angle A = m\angle B = m\angle C$	Def. of ≅ ∠s
4.	$m\angle A + m\angle B + m\angle C = 180^\circ$	Δ Sum Thrm
5.	$m\angle A + m\angle A + m\angle A = 180^\circ$	Subst. Prop. of = (3→4)
6.	$3m\angle A = 180^\circ$	Dist. Prop.
7.	$m\angle A = 60^\circ$	Div. Prop. of =
8.	$m\angle A = m\angle B = m\angle C = 60^{0}$	Trans. Prop. of =

Angles of a Polygon

Polygon: A closed figure made of line segments.

Only two segments can meet at each vertex.

Diagonal: A segment joining two nonconsecutive vertices of a polygon.



Convex Polygon: 1. Extending each side does not go into the polygon.

2. All diagonals are in the interior of the polygon.

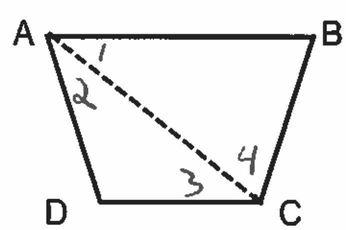
Regular Polygon: A polygon that is both equiangular and equilateral.

↳ All ≅ sides

↳ All ≅ ∠s

Quadrilateral Sum Theorem

The sum of the measures of the interior angles of a quadrilateral is 360°.



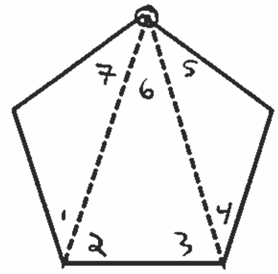
Given: Quad ABCD

Prove: $m\angle A + m\angle B + m\angle C + m\angle D = 360^\circ$

∃ → "There exists"

	Statements	Reasons
1	Quad ABCD	Given
2	Draw $\overline{AC}$	Through any 2 pts ∃ exactly 1 line.
3	$m\angle 2 + m\angle D + m\angle 3 = 180^\circ$ $m\angle 1 + m\angle B + m\angle 4 = 180^\circ$	△ Sum Thrm.
4	$m\angle 1 + m\angle 2 + m\angle B + m\angle 3 + m\angle 4 + m\angle D = 360^\circ$	Add. Prop. of = (3 + 3)
5	$m\angle A = m\angle 1 + m\angle 2$, $m\angle C = m\angle 3 + m\angle 4$	∠ Add Post.
6	$m\angle A + m\angle B + m\angle C + m\angle D = 360^\circ$	Subst. Prop. of = (5 → 4)

Sum of the interior angles of a polygon:

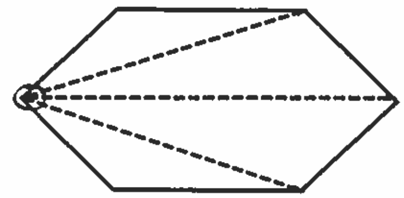


$n = 5$ {Pentagon}

of Δs = 3

Sum of the interior $\angle$s $= 3(180^\circ)$

$I_{Sum} = 540^\circ$



$n = 6$ {Hexagon}

of Δs = 4

$I_{Sum} = 4(180^\circ)$

$I_{Sum} = 720^\circ$

$$\boxed{I_{Sum} = (n-2)180^\circ}$$

Sum of the exterior angles of a polygon:

$I_1 + E_1 = 180^\circ$ {$\angle$ Add Post}

$I_2 + E_2 = 180^\circ$ { " }

$I_3 + E_3 = 180^\circ$ { " }

$\vdots \qquad \vdots \qquad \vdots$

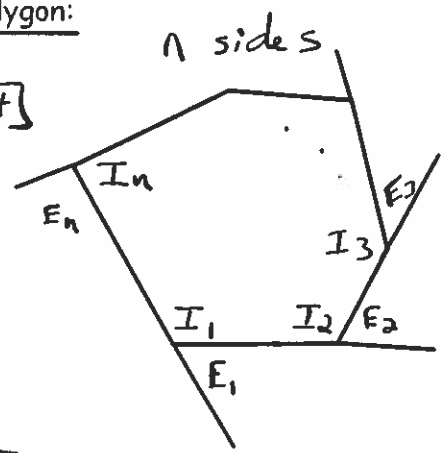
$I_n + E_n = 180^\circ$ { " }

$I_{Sum} + E_{Sum} = 180n$

$(n-2)180 + E_{Sum} = 180n$

$180n - 360 + E_{Sum} = 180n$

$E_{Sum} = 360^\circ$



Applying Interior and Exterior Angle Theorems for Polygons

1. What is the sum of the interior angles of an octagon?

$n = 8$

$I_{sum} = (n-2)180^\circ$

$I_{sum} = 6(180^\circ)$

$\boxed{I_{sum} = 1080^\circ}$

2. What is the sum of the exterior angles of an octagon?

$n = 8$ $\boxed{E_{sum} = 360^\circ}$ ← ALWAYS!!

3. What is the measure of each interior angle of a REGULAR octagon?

* $I_1 = \frac{I_{sum}}{n}$ $I_1 = \frac{1080}{8}$ $\boxed{I_1 = 135^\circ}$

4. What is the measure of each exterior angle of a REGULAR octagon?

* $E_1 = \frac{360^\circ}{n}$ or * $I_1 + E_1 = 180^\circ$

$E_1 = \frac{360^\circ}{8}$ $135 + E_1 = 180^\circ$

$\boxed{E_1 = 45^\circ}$ $\boxed{E_1 = 45^\circ}$

5. If the measure of one interior angle of a regular polygon is 162°, how many sides does the polygon have?

$I_1 = 162^\circ$ $I_1 = \frac{I_{sum}}{n}$

$n[162] = \left[\frac{(n-2)180}{n}\right]n$ * $n \neq 0$, # of sides

$162n = 180n - 360$

$-18n = -360$

$\boxed{n = 20}$