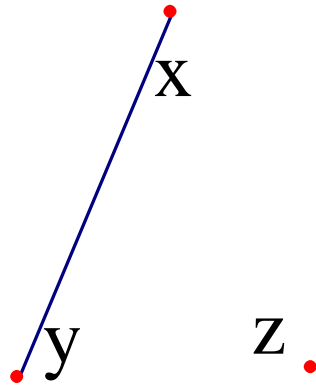


Triangles and Other Polygons

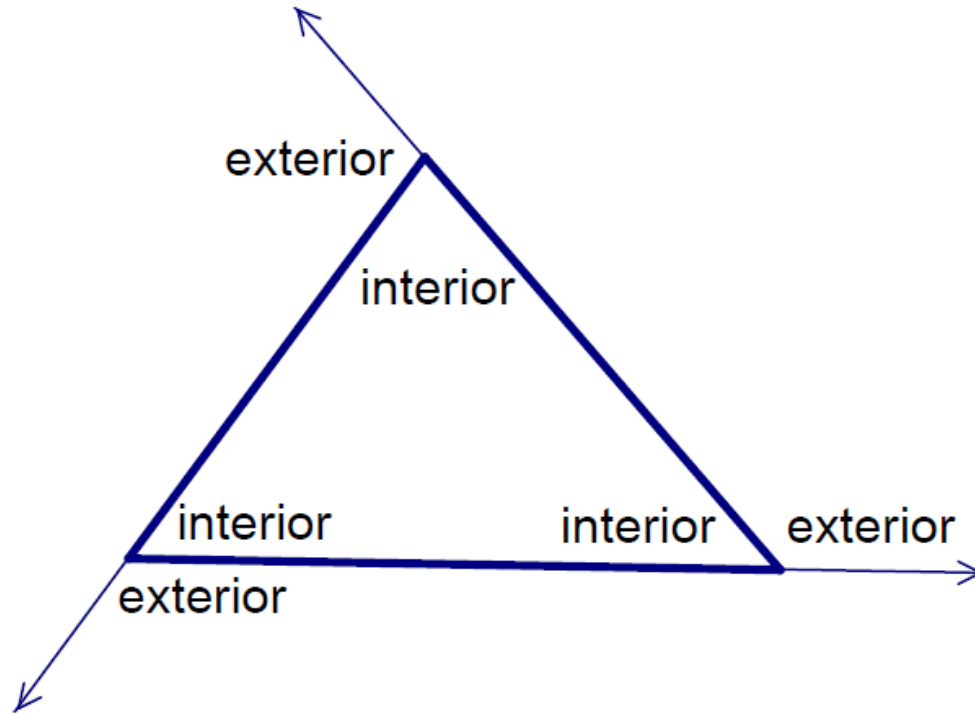
Thm. Triangle Sum Theorem

The interior angles of a triangle add up to 180°



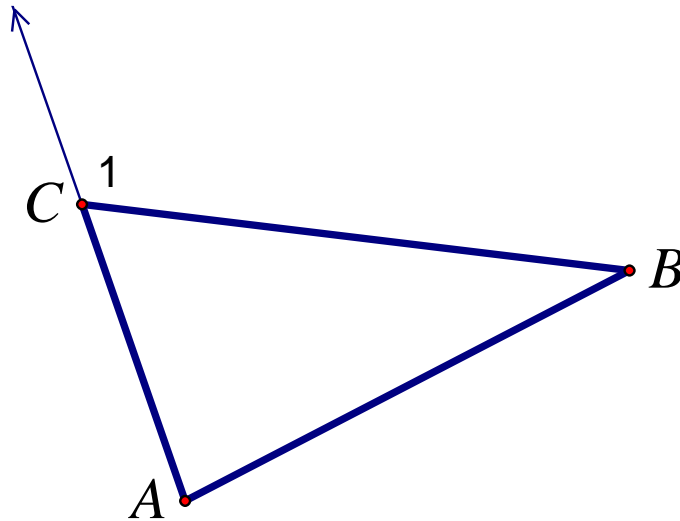
$$x + y + z = 180$$

“Interior” and “Exterior” Angles



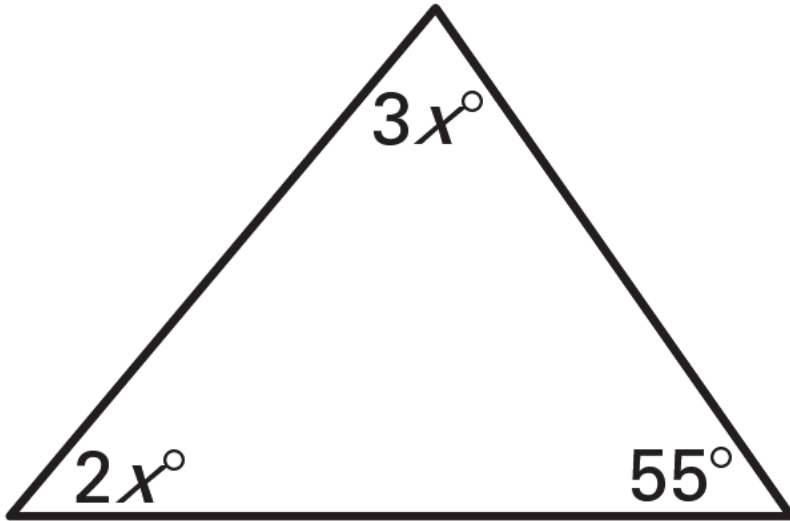
Thm. Exterior Angle Theorem

An exterior angle equals the sum of the two nonadjacent interior angles.



$$m\angle 1 = m\angle A + m\angle B$$

Ex. Find the value of x .



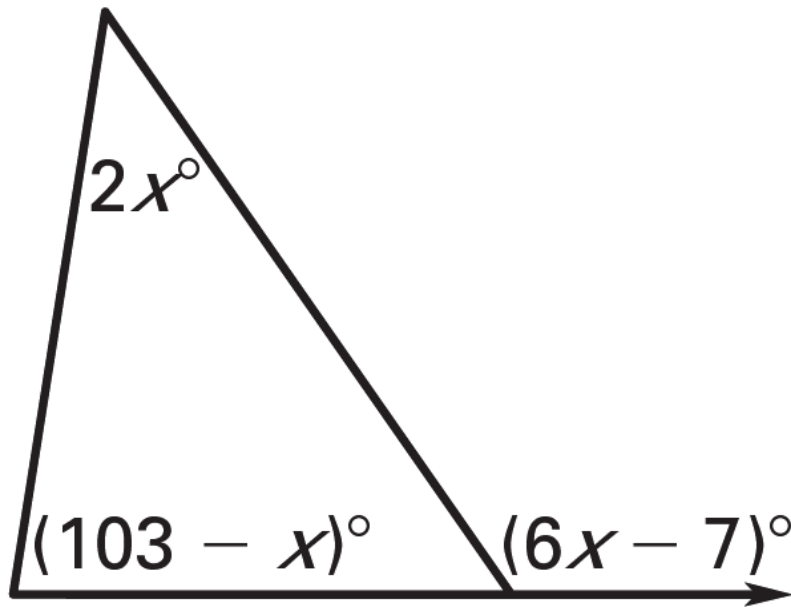
$$2x + 3x + 55 = 180$$

$$5x + 55 = 180$$

$$5x = 125$$

$$x = 25$$

Ex. Solve for x .



outside = inside + inside

$$6x - 7 = \underline{2x} + \underline{103 - x}$$

$$\begin{array}{r} 6x - 7 = x + 103 \\ -x \quad -x \end{array}$$

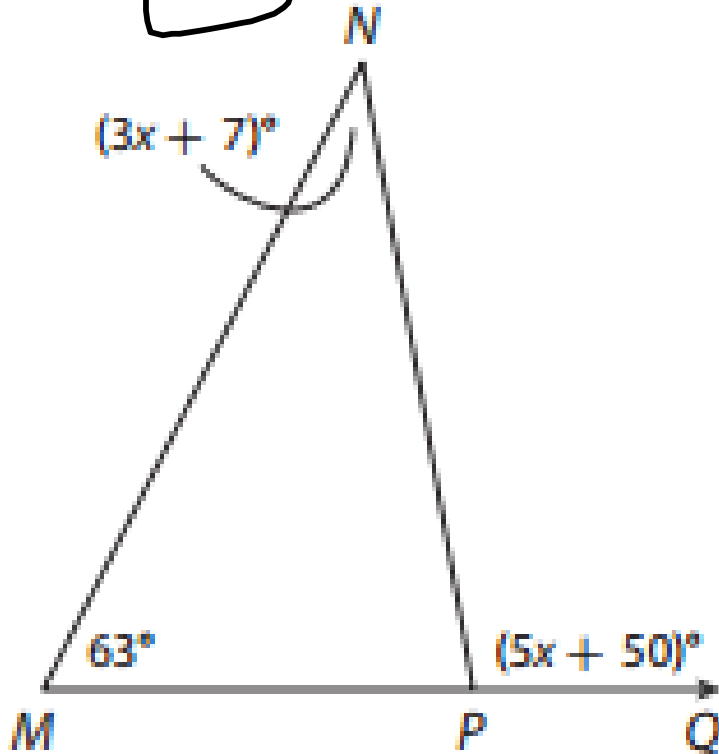
$$\begin{array}{r} 5x - 7 = 103 \\ +7 \quad +7 \end{array}$$

$$\frac{5x}{5} = \frac{110}{5}$$

$$\boxed{x = 22}$$

Ex. Solve for $m\angle N$.

$$m\angle N = 3(10) + 7 = \boxed{37}$$



outside = inside + inside

$$5x + 50 = 3x + 7 + 63$$

$$\begin{array}{r} 5x + 50 = 3x + 70 \\ -3x \qquad -3x \end{array}$$

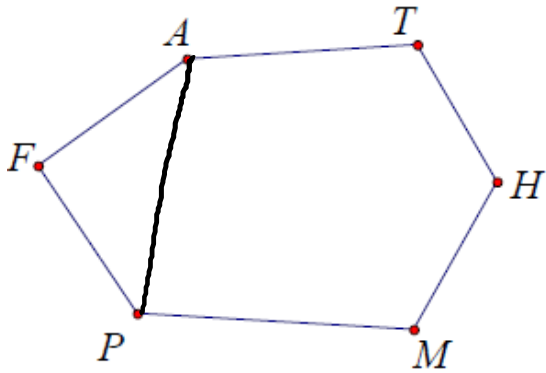
$$\begin{array}{r} 2x + 50 = 70 \\ -50 \qquad -50 \end{array}$$

$$2x = \frac{20}{2}$$

$$x = 10$$

What Is a Polygon?

Def. A polygon is a flat shape that has many sides.



← This is polygon “*FPMHTA*”

(notice that the letters go around in order)

Def. A polygon is called regular if all sides and angles in the polygon are congruent.

Def. A diagonal connects two non-adjacent vertices.

Naming Polygons

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

$$180^\circ$$

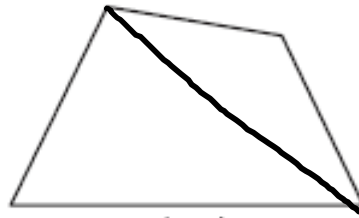
triangle



1 triangle

$$2(180) = 360$$

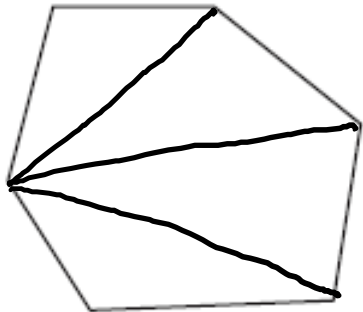
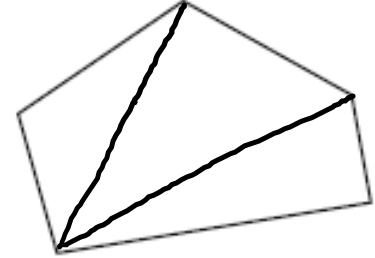
quadrilateral



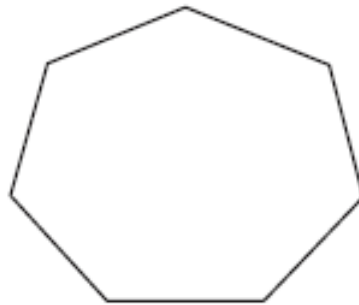
2 triangles

$$3(180) = \boxed{540}$$

5 sides \rightarrow 3 triangles



6 sides \rightarrow 4 triangles
 $4(180) = \boxed{720}$



7 sides \rightarrow 5 triangles
 $5(180) = 900$



8 sides \rightarrow 6 triangles
 $6(180) = 1080$

Thm. Interior Angles Theorem

If a polygon has n sides, then the sum of the interior angles is $n-2$ triangles

$$S = 180(n - 2)$$

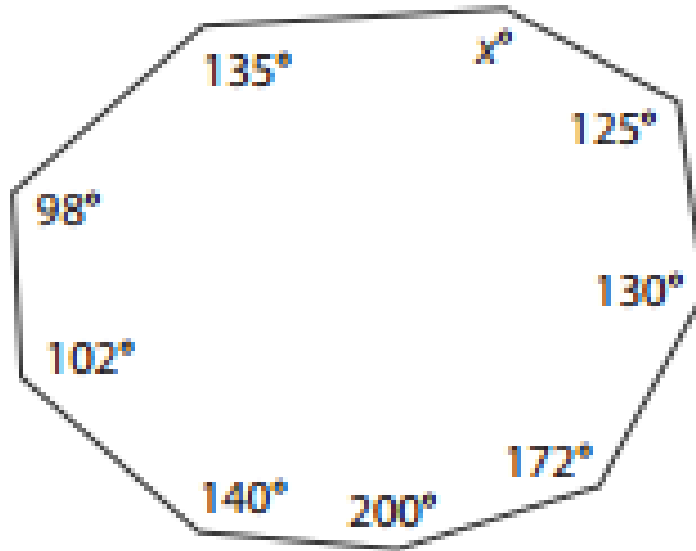
Ex. Find the sum of the interior angles of a dodecagon.

12 sides \rightarrow 10 triangles $\rightarrow 180(10) = 1800$

Ex. Solve for x .

9 sides \rightarrow 7 triangles

$$\rightarrow 7(180) = 1260$$



$$\begin{array}{r} 1260 \\ - 125 \\ - 130 \\ - 172 \\ - 200 \\ - 140 \\ - 102 \\ - 98 \\ - 135 \\ \hline 158 \end{array}$$

Ex. Find the measure of the fourth interior angle of a quadrilateral if the other three measures are 89° , 80° , and 104° .

$$\begin{array}{r} 4 \text{ side} \rightarrow 2 \text{ triangles} \rightarrow 2(180) = 360 \\ - 89 \\ - 80 \\ - 104 \\ \hline 87 \end{array}$$