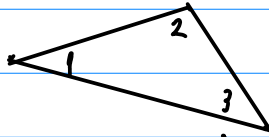


5.1: Polygon Sum Conjecture

n (#sides)
3

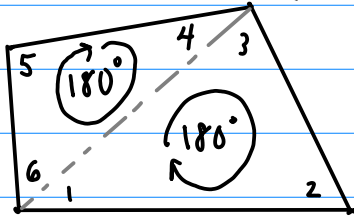


Sum of Measures of interior \angle s

$$m\angle 1 + m\angle 2 + m\angle 3 = \underline{180^\circ}$$

4

2 Δ 's

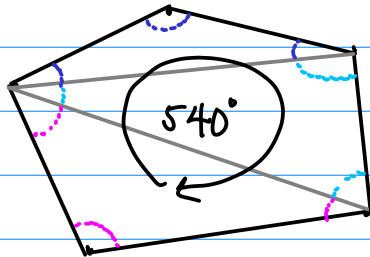


$$\boxed{m\angle 1 + m\angle 2 + m\angle 3} + \boxed{m\angle 4 + m\angle 5 + m\angle 6} = ?$$

$$180^\circ + 180^\circ = 360^\circ$$

5

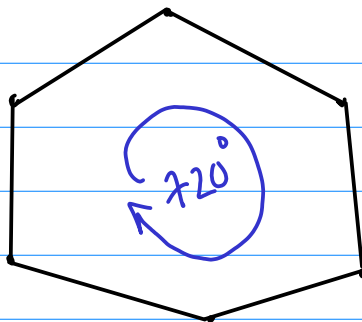
3 Δ 's



$$\begin{array}{r} 180^\circ \\ 180^\circ \\ + 180^\circ \\ \hline 540^\circ \end{array} \quad \begin{array}{r} 180^\circ \\ \times 3 \\ \hline 540^\circ \end{array}$$

6

4 Δ 's



$$\begin{array}{r} 180^\circ \\ \times 4 \\ \hline 720^\circ \end{array}$$

$$\text{Sum of int. } \angle\text{'s} = (\# \Delta\text{'s}) \cdot 180^\circ$$

* $\text{Sum of int. } \angle\text{'s} = (n - 2) 180^\circ = 180^\circ \cdot n - 360^\circ$

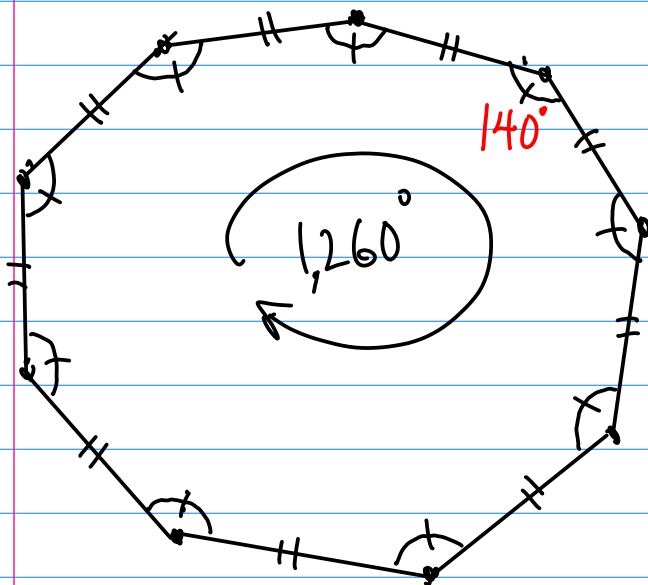
Ex: What is the sum of the measures of the \angle 's of a 27-gon?
 ($n=27$)

$$\begin{aligned} \text{Sum of int. } \angle\text{'s} &= (n-2) \cdot 180^\circ \\ &= (27-2) \cdot 180^\circ \\ &= (25) \cdot 180^\circ \\ &= 4,500^\circ \end{aligned}$$

$$\begin{array}{r} 180 \\ \times 25 \\ \hline 900 \\ 3600 \\ \hline 4500 \end{array}$$

\approx sides & \angle 's

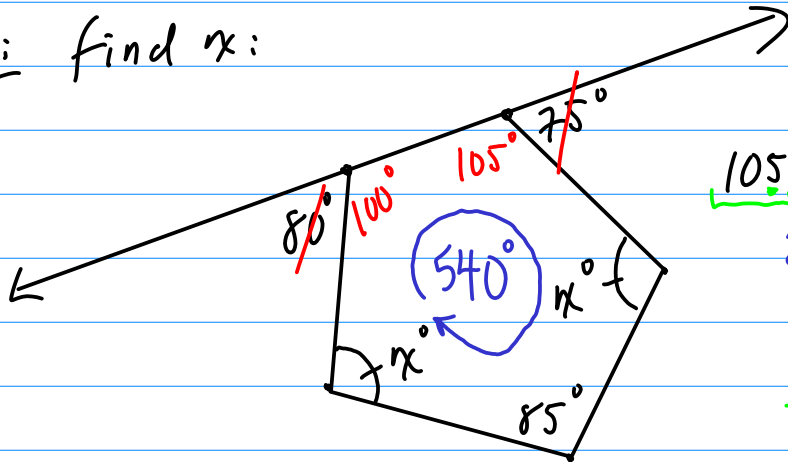
Ex: A regular nonagon has an \angle sum of (a). Each \angle measures (b).



$$\begin{aligned} \text{a) Sum of int. } \angle\text{'s} &= (n-2) \cdot 180^\circ \\ &= (9-2) \cdot 180^\circ \\ &= (7) \cdot 180^\circ \\ &= 1,260^\circ \end{aligned}$$

$$\text{b) } \frac{1260^\circ}{9} = 140^\circ$$

Ex: find x :



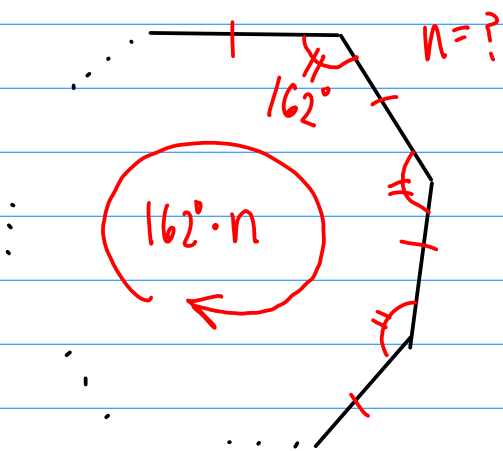
$$\begin{aligned}
 105^\circ + x^\circ + 85^\circ + x^\circ + 100^\circ &= 540^\circ \\
 2x + 290^\circ &= 540^\circ \\
 \underline{-290^\circ \quad -290^\circ} & \\
 2x &= 250 \\
 \underline{\quad \quad \quad 2} & \\
 x &= 125^\circ
 \end{aligned}$$

Ex:

If the \angle 's of a polygon sum to 1620°, how many sides does it have?

$$\begin{aligned}
 \text{Sum of int. } \angle\text{'s} &= (n-2) \cdot 180^\circ \\
 1620 &= (n-2) \cdot 180 \\
 \underline{9 \cdot 180} & \quad \underline{180} \\
 9 &= n-2 \\
 \underline{\quad \quad +2} & \quad \underline{\quad \quad +2} \\
 11 &= n
 \end{aligned}$$

Ex: Each \angle in a regular polygon is 162° . Find the # of sides.



$$\begin{aligned}
 \text{Sum of int. } \angle\text{'s} &= (n-2) \cdot 180^\circ \\
 162 \cdot n &= (n-2) \cdot 180 \\
 162n &= 180n - 360 \\
 \underline{-180n \quad -180n} & \\
 -18n &= -360 \\
 \underline{\quad \quad -18} & \quad \underline{\quad \quad +360} \\
 n &= 20
 \end{aligned}$$