3-5 Polygons

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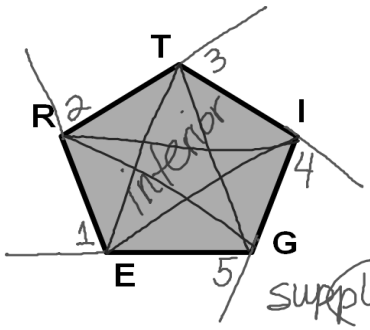
A **polygon** is a many-sided closed figure. (see textbook page 101).



n

pentagon TIGER

vertices: T, I, G, E, R

sides: $\overline{TI}$, $\overline{IG}$, $\overline{GE}$, $\overline{ER}$, $\overline{RT}$

(interior) angles: $\angle T, \angle 1, \angle G, \angle E, \angle R$

supplementary

exterior angles: $\angle 1, \angle 2, \angle 3, \angle 4, \angle 5$

A **diagonal** is a segment that joins 2 nonconsecutive vertices.

diagonals: $\overline{TE}$, $\overline{TG}$, $\overline{IE}$, $\overline{IR}$, $\overline{RG}$

A **regular polygon** is a convex polygon with all sides congruent and all angles congruent.

Can you give some examples of regular polygons? Square, Equilateral Δ

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n

ex. 1

Given: a regular 15-gon

Find: interior angle sum

$(n-2)180$

$(15-2)180 = 2340^\circ$

one interior angle

$\frac{\text{total}}{\#\text{of}\angle s} \quad \frac{2340^\circ}{15} = 156^\circ$

exterior angle sum

360°

one exterior angle

$\frac{\text{total}}{\#\text{of ext}\angle s} \quad \frac{360^\circ}{15} = 24^\circ$

ex. 2

An exterior angle of a regular polygon is 18°.

# of sides? $\frac{360^\circ}{18^\circ} = 20$ sides ($\angle s$)

find interior angle sum $(\underset{20}{n}-2)180 = 18 \cdot 180^\circ = 3240^\circ$

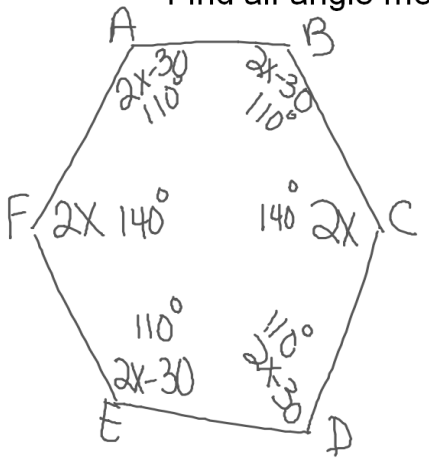
ex. 3

hexagon ABCDEF

$m\angle A = m\angle B = m\angle D = m\angle E = 2x - 30$

$m\angle C = m\angle F = 2x$

Find all angle measures.



110°

140°

sum = (int∠sum)

$12x - 120 = (6-2)180$

$12x - 120 = 720$

$12x = 840$

$x = 70$