11.1
Interior Angles of a Polygon

Figure	# of Sides	# of △	Sum of the Int. Angles
	3	1	1(180) = 180
	4	2	2(180) = 360
	5	3	3(180) = 540
	6	4	4(180) = 720
heptagon	7	5	5(180) = 900
n-gon	n	n - 2	(n-2)180 = sum

Sum of the int ∠s of a polygon = (n-2)180

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Ex 1
Find the sum of the interior angles of a convex 20-gon

- Sum = (n-2)180
- Sum = (20-2)180
- Sum = 18 · 180
- Sum = 3240

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Ex 2

The measures of 4 angles in a pentagon are: 90, 108, 108, and 114. Find the 5th angle.

$90+108+108+114+X=\text{Sum}$

$420+X=540$

$-420 \quad -420$

$X=120$

$\text{Sum}=(n-2)180$

$\text{Sum}=(5-2)180$

$=3\cdot180$

$=540$

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Ex 3

In a convex hexagon, the 6 angle measures are:

x, 2x, 3x, 3x, 3x, 3x Find x.

$\text{Sum}=X+2x+3x+3x+3x+3x$

$\text{Sum}=(n-2)180$

$=(6-2)180$

$=4\cdot180$

$=720$

$\frac{720=15x}{15}$

$48=x$

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Ex 4

The sum of the interior angles of a polygon is 2520. What is the total number of sides?

$\text{Sum} = (n-2)180$

$\frac{2520}{180} = \frac{(n-2)180}{180}$

$14 = n-2$

$+2 \quad +2$

$16 = n$

$2520 = 180n - 360$

$+360 \quad +360$

$\frac{2880 = 180n}{180}$

$16 = n$

$n = 16$

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To find the measure of each angle of a regular polygon

$$\text{Angle measure} = \frac{\text{Sum}}{\text{\# of angles}} = \frac{(n-2)180}{n}$$

Ex 5

Find each angle measure of the given regular polygon

a) decagon $\angle = \frac{\text{Sum}}{\#\text{ of }\angle} = \frac{(10-2)180}{10} = \frac{8 \cdot 180}{10} = \frac{1440}{10} = 144^\circ$

b) 30-gon $= \frac{(n-2)180}{n} = \frac{(30-2)180}{30} = \frac{28 \cdot 180}{30} = \frac{5040}{30} = 168^\circ$

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Ex 6

Each interior angle of a regular polygon is 135°.

Name the polygon.

$\angle = \frac{\text{Sum}}{\#\angle}$

$135 = \frac{(n-2)180}{n}$

$n\left[135 = \frac{180n-360}{n}\right]n$

$135n = 180n - 360$

$-180n \quad -180n$

$-45n = -360$

$-45 \quad -45$

$n = 8$ Octagon

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Ex 7.

The measure of each interior angle of a regular polygon is 150. Name the polygon.

$\angle = \frac{(n-2)180}{n}$

$n\left[150 = \frac{180n-360}{n}\right]n$

$150n = 180n - 360$

$-180n \quad -180n$

$-30n = -360$

$-30 \quad -30$

$n = 12$

Dodecagon

Short Cut

$\frac{180}{-\text{angle}}$ $\frac{360}{\text{answer}} = \#\text{sides}$

answer

ex

$180 - 150 = 30$ $\quad \frac{360}{30} = 12$

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Short cut for finding the number of sides in a regular polygon given the angle measure.

$$\#\text{ sides} = \frac{360}{(180 - \angle)}$$

Ex 8

Each interior angle of a regular polygon is 108°

Name the polygon

$180 - 108 = 72$

$\frac{360}{72} = 5$ pentagon

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