

8.1



2) Exterior angles in a n-gon. / Are all exterior angles considered w/ Ext. ^{of this polygon?}
 n , # of sides is the same as # of exterior angles
 yes, each side is extended and all are included in the sum

Find the sum of the interior angles.

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|------------|-------------|-------------|-------------|
| 3) Nonagon | 4) 14-gon | 5) 16-gon | 6) 20-gon |
| $n=9$ | $n=14$ | $n=16$ | $n=20$ |
| $(9-2)180$ | $(14-2)180$ | $(16-2)180$ | $(20-2)180$ |
| 1260° | 2160° | 2520° | 3240° |

Classify the polygon by the number of sides given the sum.

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|--|--|---|---|
| 7) $360 = (n-2)180$ | 8) $720 = (n-2)180$ | 9) $1980 = (n-2)180$ | 10) $2340 = (n-2)180$ |
| $\frac{360}{180} = \frac{(n-2)180}{180}$ | $\frac{720}{180} = \frac{(n-2)180}{180}$ | $\frac{1980}{180} = \frac{(n-2)180}{180}$ | $\frac{2340}{180} = \frac{(n-2)180}{180}$ |
| $2 = n-2$ | $4 = n-2$ | $11 = n-2$ | $13 = n-2$ |
| $+2$ | $+2$ | $+2$ | $+2$ |
| $n=4$ | $n=6$ | $n=13$ | $n=15$ |
| Quadrilateral | Hexagon | 13-gon | 15-gon |

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|---------------------------------|---------------------------------------|---|
| 11) $n=5$ $(5-2)180$
540° | 12) $n=6$ $(6-2)180$
720° | 13) $n=8$ $(8-2)180$
1080° |
| $540 = x + 86 + 140 + 138 + 59$ | $720 = x + 121 + 96 + 101 + 162 + 90$ | $1080 = x + 143 + 2x + 152 + 116 + 125 + 140 + 139$ |
| $540 = x + 423$ | $720 = x + 570$ | $1080 = 3x + 815$ |
| $x=117$ | $x=150$ | $265 = 3x$ |
| | | $x = \frac{265}{3}$ 88.33 or $28\frac{1}{3}$ |

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|-------------------------------|-----------------------------------|--|
| 14) $360 = x + 78 + 106 + 65$ | 15) $360 = 2x + 45 + 40 + x + 77$ | 16) $360 = x + x + 58 + 39 + 50 + 48 + 59$ |
| $360 = x + 243$ | $360 = 3x + 162$ | $360 = 2x + 254$ |
| $x=111$ | $198 = 3x$ | $106 = 2x$ |
| | $x=66$ | $x=53$ |

17) Sum of measures of the exterior angles of an octagon is greater than the sum of the measures of the exterior angles of a hexagon. They justify by saying that an octagon has 2 more sides than a hexagon.

18) measures of interior angles of a quadrilateral are x° , $2x^\circ$, $3x^\circ$ and $4x^\circ$. what is the largest angle?

$360 = x + 2x + 3x + 4x$ $4(36)$
 $360 = 10x$
 $x = 36$ **B. = 144°**

The sum of the measures of any convex n-gon is always 360° . Therefore octagons and hexagons will have the same exterior angle sum of 360° .

Find measures of interior and exterior angle of regular polygon.

19) Regular Pentagon

$$n=5$$

Ext. \angle

$$\frac{360}{5} = 72^\circ$$

Int. \angle

$$180 - 72 = 108^\circ$$

20) Regular 18-gon

$$n=18$$

Ext. \angle

$$\frac{360}{18} = 20^\circ$$

Int. \angle

$$180 - 20 = 160^\circ$$

21) Regular 90-gon

$$n=90$$

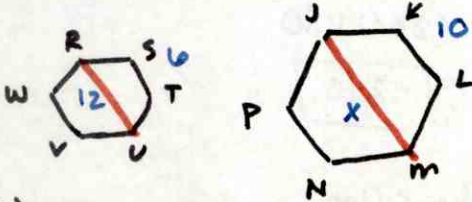
Ext. \angle

$$\frac{360}{90} = 4^\circ$$

Int. \angle

$$180 - 4 = 176^\circ$$

22) Hexagons RSTUVW and JKLMNP are similar. \overline{RU} and \overline{JM} are diagonals. Given $ST=6$, $KL=10$ and $RU=12$, find JM .



$$\frac{6}{10} = \frac{12}{x}$$

$$6x = 120$$

$$x = 20$$

23) Why are any two regular pentagons similar?

Definition of Similarity: corresponding angles are congruent and corresponding sides are proportional

The interior angle measures are the same in both pentagons and the ratio of corresponding sides would be the same.

Find the value of n for each regular n -gon.

24) Each interior angle has a measure of 156°

$$\begin{aligned} \text{Ext angle} &= 180 - 156 \\ &= 24^\circ \end{aligned}$$

$$156 = \frac{(n-2)(180)}{n}$$

$$24 = \frac{360}{n}$$

$$24n = 360$$

$$n = 15$$

25) Each exterior angle has a measure of 9° .

$$9 = \frac{360}{n}$$

$$9n = 360$$

$$n = 40$$

26) Determine if it is possible for a regular polygon to have an interior angle w/ the given angle measure? Explain.

a. 165°

$$\begin{aligned} \text{Ext } \angle &= 180 - 165 \\ &= 15^\circ \end{aligned}$$

$$15 = \frac{360}{n}$$

$$15n = 360$$

$$n = 24$$

yes

b. 171°

$$\begin{aligned} \text{Ext } \angle &= 180 - 171 \\ &= 9^\circ \end{aligned}$$

$$9 = \frac{360}{n}$$

$$9n = 360$$

$$n = 40$$

yes

c. 75°

$$\begin{aligned} \text{Ext } \angle &= 180 - 75 \\ &= 105^\circ \end{aligned}$$

$$105 = \frac{360}{n}$$

$$105n = 360$$

$$n = 3.428571429$$

No, needs to be a pos. integer

d. 40°

$$\begin{aligned} \text{Ext } \angle &= 180 - 40 \\ &= 140^\circ \end{aligned}$$

$$140 = \frac{360}{n}$$

$$140n = 360$$

$$n = 2.571428571$$

No, needs to be a pos. integer