

Classwork: Polygon Word Problems

X-gon 1. State the name of a polygon that has "x" sides.

heptagon 2. State the name of a polygon that has "7" sides.

360° 3. State the sum of the exterior angles of a convex nonagon.

135° 4. Find the measure of each interior angle of a regular octagon.

$$Int \angle = \frac{180(n-2)}{n} = \frac{1080}{8} = 135^\circ$$

15 sides 5. If the sum of the interior angles of a convex polygon is 2,340°, how many sides does it have?

$$2340 = 180(n-2)$$

$$13 = n-2$$

$$15 = n$$

20 sides 6. If each exterior angle of a regular polygon is 18°, how many sides does the polygon have?

$$n(18^\circ) = 360$$

$$n = 20$$

x=24 7. The measures of the exterior angles of a convex pentagon are $\angle p = x$, $\angle q = 2x$, $\angle r = 3x$, $\angle s = 4x$, and $\angle t = 5x$. Find "x".

$$15x = 360$$

$$x = 24$$

67° 8. Three interior angles of a convex quadrilateral are 47°, 128°, and 118°. Find the measure of the fourth angle.

$$\begin{array}{r} \text{Sum} = 360 \\ 360 \\ - 293 \\ \hline 67 \end{array}$$

- Octagon 9. If each interior angle of a regular polygon is 135° , what is the name of the polygon?

$$135 = \frac{180(n-2)}{n} \quad -45n = -360$$

$$135n = 180n - 360 \quad n = 8$$

- 3600° 10. Find the sum of the interior angles of a convex 22-gon.

$$\text{Sum} = 180(22-2)$$

$$= 3600$$

- 72° 11. Find the measure of each exterior angle of a regular pentagon.

$$5(\text{Ext}) = 360$$

$$\text{Ext} = 72^\circ$$

- $x = 30$ 12. The measures of the interior angles of a pentagon are $\angle G = 5x$, $\angle R = 2x$, $\angle A = 4x - 10$, $\angle N = 4x$, and $\angle D = 3x + 10$. Find "x".

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

$$= 540$$

$$18x = 540$$

$$x = 30$$

- $130^\circ, 150^\circ$ 13. Six angles of a convex octagon are congruent. Each of the two remaining angles is 20° more than one of the other six angles. Find the measure of each angle.

$$x$$

$$x + 20$$

$$6x + 2(x + 20) = 1080$$

$$6x + 2x + 40 = 1080$$

$$8x = 1040$$

$$x = 130$$

$$\text{Sum} = 180(8-2)$$

$$= 1080$$

- Pentagon 14. The sum of the interior angles of a convex polygon is 9 times the measure of an exterior angle of a regular hexagon. What is the name of the polygon?

$$180(n-2) = 9\left(\frac{360}{6}\right)$$

$$180n - 360 = 540$$

$$180n = 900$$

$$n = 5$$

- 43 sides 15. The sum of the measures of the interior angle of a convex polygon is between 7300° and 7500° . Determine the number of sides that the polygon has. EXPLAIN YOUR REASONING!

$$7500 = 180(n-2)$$

$$41.\bar{6} = n-2$$

$$43.\bar{6} = n$$

$$7300 = 180(n-2)$$

$$40.\bar{5} = n-2$$

$$42.\bar{5} = n$$

Word Problems Assignment

octagon 1. State the name of the polygon that has 8 sides.

n-gon 2. State the name of the polygon that has "n" angles.

3780° 3. Find the sum of the measures of the interior angles of a convex 23-gon.

$$\begin{aligned} \text{Sum} &= 180(23-2) \\ &= 3780 \end{aligned}$$

175° 4. Four interior angles of a pentagon have the following measures: 95°, 100°, 90°, and 80°. Find the measure of the fifth angle.

$$\begin{aligned} \text{Sum} &= 540 \\ &\begin{array}{r} 540 \\ - 365 \\ \hline 175 \end{array} \end{aligned}$$

18° 5. Find the measure of each exterior angle of a regular 20-gon.

$$\begin{aligned} 20(\text{Ext}) &= 360 \\ \angle &= 18^\circ \end{aligned}$$

x=17 6. The measures of the exterior angles of a convex hexagon are $\angle a = 3x + 7$, $\angle b = 4x + 5$, $\angle c = 2x + 3$, $\angle d = 7x - 4$, $\angle e = x + 10$, and $\angle f = 3x - 1$. Find "x".

$$\begin{aligned} 360 &= 20x + 20 \\ 340 &= 20x \\ x &= 17 \end{aligned}$$

24 sides 7. If each interior angle of a regular polygon is 165°, how many sides does it have?

$$\begin{aligned} 165 &= \frac{180(n-2)}{n} \\ 165n &= 180n - 360 \\ -15n &= -360 \quad n = 24 \end{aligned}$$

360° 8. Find the sum of the measures of the exterior angles of a 100-gon.

17 sides 9. Find the number of sides in a polygon in which the interior angle measure sum is 2700°

$$\begin{aligned} 2700 &= 180(n-2) \quad 15 = n-2 \quad n = 17 \end{aligned}$$

162°

10. Find the measure of each interior angle of a regular 20-gon.

$$\text{Int } \angle = \frac{180(20-2)}{20} = \frac{3240}{20} = 162^\circ$$

33°

11. The sum of the measures of four exterior angles of a convex pentagon is 327°. Find the measure of the fifth angle.

$$\begin{array}{r} 360 \\ - 327 \\ \hline 33 \end{array}$$

9 sides

12. If each exterior angle of a regular polygon is 40°, how many sides does the polygon have?

$$\begin{aligned} n(40) &= 360 \\ n &= 9 \end{aligned}$$

14 or 15 sides

13. The sum of the measures of the interior angles of a polygon is between 2100° and 2400°. How many sides does the polygon have?

$$2400 = 180(n-2)$$

$$13.\bar{3} = n-2$$

$$15.\bar{3} = n$$

$$2100 = 180(n-2)$$

$$11.\bar{6} = n-2$$

$$13.\bar{6} = n-2$$

45°, 90°, 135°

14. The measure of the second angle of a pentagon is twice the measure of the first angle. The measure of each of the other three angles is three times the measure of the first. What is the measure of each angle?

$$1^{\text{st}} = x$$

$$2^{\text{nd}} = 2x$$

$$3^{\text{rd}} - 5^{\text{th}} = 3x$$

$$\text{Sum} = 540$$

$$x + 2x + 3(3x) = 540$$

$$12x = 540$$

$$x = 45$$

15. Your friend is working on a problem and claims the sum of the measures of the exterior angles of a regular polygon is 720°. Do you agree or disagree? Explain your reasoning.

Disagree,
Exterior angles always
360°

$$720 = 180(n-2)$$

$$4 = n-2$$

$$6 = n$$

Agree, If you use the sum of the interior angles formula, you can solve for 6 sides. A hexagon has an interior angle sum of 720°.