

Worksheet 1 (Revised)

Convex Polygons

I. The number of diagonals of a polygon of n sides is given by

$$D = \frac{n(n-3)}{2}$$

Example 1. A hexagon has six sides. Therefore it has $\frac{6(6-3)}{2} = 9$ diagonals?

Example 2. A quadrilateral has four sides. How many diagonals does it have?

Example 3. The formula is a fraction. Is it possible that we could get an answer that is not a whole number?

II. The sum of the measures of the interior angles of a polygon with n sides is given by

$$S = (n - 2) \times 180^\circ$$

Example 4. A pentagon has five sides. Therefore the sum of the measures of its interior angles is $S = (5 - 2) \times 180^\circ = 540^\circ$.

Example 5. A heptagon has seven sides. What is the sum of the measures of its interior angles?

III. The measure of an interior angle of an equiangular polygon is given by

$$I = \frac{(n - 2) \times 180^\circ}{n}$$

Example 6. A nonagon has nine sides. Therefore the measure of an interior angle of an equiangular nonagon is $\frac{(9-2) \times 180^\circ}{9} = \frac{7 \times 180^\circ}{9} = 140^\circ$

Example 7. A decagon has ten sides. What is the measure of an interior angle of an equiangular decagon?

IV. The sum of the measures of the exterior angles of a polygon is 360° .
Therefore the measure of an exterior angle of an equiangular polygon is $\frac{360^\circ}{n}$.

Example 8. The measure of an exterior angle of an equiangular decagon is

$$\frac{360^\circ}{10} = 36^\circ.$$

Example 9. What is the measure of an exterior angle of an equiangular nonagon?

Example 10. Find the number of sides for a regular polygon whose sum of the measures of its interior angles is 1980° .

$$(n - 2) \times 180^\circ = 1980^\circ$$

$$n - 2 = \frac{1980^\circ}{180^\circ} = 11$$

$$n = 13$$

Example 11. Find the number of sides for a regular polygon whose sum of the measures of its interior angles is 2340° .

Example 12. Find the number of sides for a regular polygon whose measure of each interior angle is 150° .

$$\frac{(n - 2)180^\circ}{n} = 150^\circ$$

$$(n - 2)180^\circ = 150^\circ n$$

$$n180^\circ - 2 \times 180^\circ = 150^\circ n$$

$$30^\circ n = 360^\circ$$

$$n = 12$$

Example 13. Find the number of sides for a regular polygon whose measure of each interior angle is 168° .