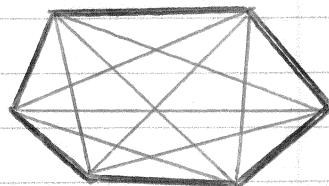


Geometry Ch 8-1 Exer., pg 504 #1-16, 18, 24-26

1. Sketch a convex hexagon.  
Draw all of its diagonals.



2. How many exterior angles are there in an  $n$ -gon?  
Are all exterior angles considered when you use  
the Polygon Exterior Angles Theorem?

Each vertex corresponds with two exterior angles. A pentagon has 5 vertices and 10 exterior angles. An octagon has 8 vertices and 16 exterior angles. Thus, an  $n$ -gon would have  $2n$  exterior angles.

However only  $n$  exterior angles would be considered in the Polygon Exterior Angle Theorem.

Find the sum of the measures of the interior angles of the indicated convex polygon.

3. Nonagon [9 sides]  
 $(9-2)(180) = 1260^\circ$

4. 14-gon  
 $(14-2)(180) = 2160^\circ$

5. 16-gon  
 $(16-2)(180) = 2520^\circ$

6. 20-gon  
 $(20-2)(180) = 3240^\circ$

The sum of the measures of the interior angles of a convex polygon is given. Classify the polygon by the number of sides.

7.  $360^\circ$

$$(n-2)(180) = 360$$

$$n-2 = 2$$

$$n = 4$$

4 sides: quadrilateral

8.  $720^\circ$

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

$$n-2 = 4$$

$$n = 6$$

6 sides: hexagon

9.  $1980^\circ$

$$(n-2)(180) = 1980$$

$$n-2 = 11$$

$$n = 13$$

13 sides: 13-gon

10.  $2340^\circ$

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

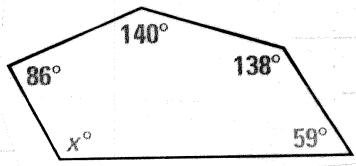
$$n-2 = 13$$

$$n = 15$$

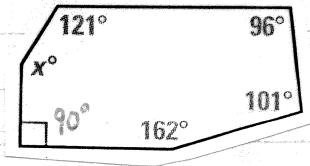
15 sides: 15-gon

Find the value of  $x$

11.



12.



5 sides.

$$\sum \text{int angles} = (5-2)180 = 540$$

$$x + 86 + 140 + 138 + 59 = 540$$

$$x + 423 = 540$$

$$x = 117^\circ$$

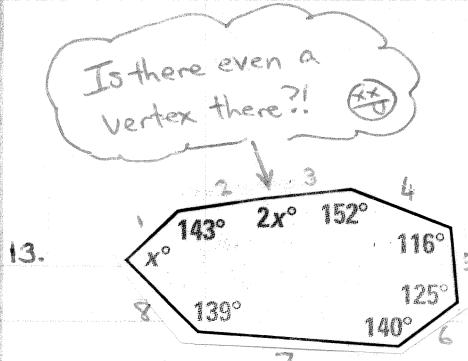
6 sides

$$\sum \text{int angles} = (6-2)180 = 720$$

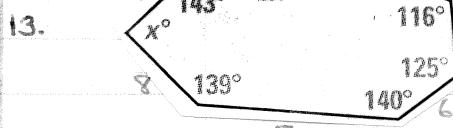
$$x + 121 + 96 + 101 + 162 + 90 = 720$$

$$x + 570 = 720$$

$$x = 150^\circ$$



13.



8 sides

$$\sum \text{int angles} = (8-2)(180) = 1080$$

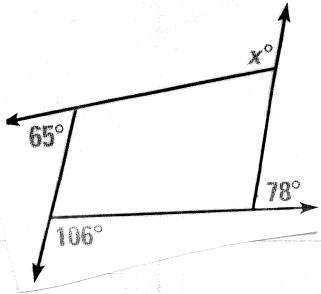
$$x + 143 + 2x + 152 + 116 + 125 + 140 + 139 = 1080$$

$$3x + 815 = 1080$$

$$3x = 265$$

$$x = 88.33\bar{3}^\circ$$

14.



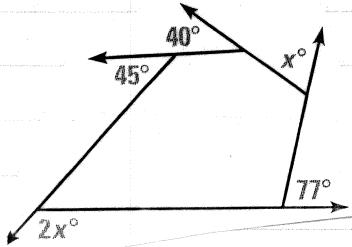
Exterior angles will always sum to  $360^\circ$ , no matter the sides of the polygon.

$$65 + x + 78 + 106 = 360$$

$$x + 249 = 360$$

$$x = 111^\circ$$

15.



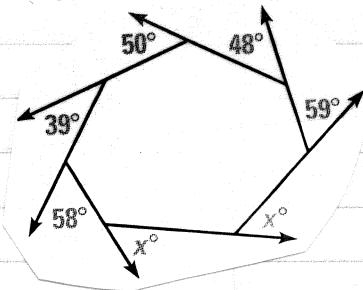
$$2x + 45 + 40 + x + 77 = 360$$

$$3x + 162 = 360$$

$$3x = 198$$

$$x = 66$$

16.



$$58 + 39 + 50 + 48 + 59 + x + x = 360$$

$$254 + 2x = 360$$

$$2x = 106$$

$$x = 53$$

18. The measures of the interior angles of a quadrilateral are  $x$ ,  $2x$ ,  $3x$ , and  $4x$ . What is measure of largest angle?

A.  $120^\circ$

B.  $144^\circ$

C.  $160^\circ$

D.  $360^\circ$

$$x + 2x + 3x + 4x = 360$$

$$10x = 360$$

$$x = 36$$

Largest angle:  $4(36) = 144$

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

24. Each interior angle has a measure of  $156^\circ$

Interior Method:

$$\text{Total Interior} = 156n$$

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

$$156n = (n-2)180$$

$$156n = 180n - 360$$

$$360 = 24n$$

$$\boxed{15 = n}$$

Exterior Method:

If interior angles =  $156^\circ$ ,  
exterior angles =  $24^\circ$

$$24n = 360$$

$$\boxed{n = 15}$$

25. Each exterior angle has a measure of  $9^\circ$

Interior Method:

If exterior angles =  $9^\circ$ ,

interior angles =  $171^\circ$

Exterior Method:

$$9n = 360$$

$$\boxed{n = 40}$$

$$\text{Total interior} = 171n$$

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

$$171n = (n-2)180$$

$$171n = 180n - 360$$

$$360 = 9n$$

$$\boxed{40 = n}$$

26. Is it possible for a regular polygon to have an interior angle with the given measure?

A.  $165^\circ$        $165n = (n-2)180$

$$165n = 180n - 360$$

$$360 = 15n$$

$$24 = n \quad \text{Yes}$$

B.  $171^\circ$        $171n = (n-2)180$

$$171n = 180n - 360$$

$$360 = 9n$$

$$40 = n \quad \text{Yes}$$

C.  $75^\circ$        $75n = (n-2)180$

$$75n = 180n - 360$$

$$360 = 105n$$

$$3.429 = n \quad \text{No}$$

D.  $40^\circ$        $40n = (n-2)180$

$$40n = 180n - 360$$

$$360 = 140n$$

$$2.571 = n \quad \text{No}$$

The number of sides must be a positive integer.