

Name \_\_\_\_\_  
Geometry

Polygons

Sum of the interior angles of a polygon	$(n - 2)180$
Sum of the exterior angles of a polygon	$360^\circ$
Each interior angle of a regular polygon	$\frac{(n - 2)180}{n}$
Each exterior angle of a regular polygon	$\frac{360}{n}$

# Geometry

NAME: \_\_\_\_\_

## WORKSHEET: Polygon Angle Measures

PERIOD: \_\_\_\_\_ DATE: \_\_\_\_\_

Use the given information to complete the table. Round to the nearest tenth if necessary.

	# Sides	Interior Angle Sum	Measure of ONE INTERIOR Angle (Regular Polygon)	Exterior Angle Sum	Measure of ONE EXTERIOR Angle (Regular Polygon)
1)	$n$				
2)	14				
3)	24				
4)	17				
5)		1080°			
6)		900°			
7)		5040°			
8)		1620°			
9)			150°		
10)			120°		
11)			156°		
12)					10°
13)					7.2°
14)					90°
15)					5°

2

# **Geometry**

NAME: \_\_\_\_\_

WORKSHEET: *Angles of Polygons – Review* PERIOD: \_\_\_\_\_ DATE: \_\_\_\_\_

## **USING THE INTERIOR & EXTERIOR ANGLE SUM THEOREMS**

- 1) The measure of one exterior angle of a regular polygon is given.  
Find the number of sides for each.

a)  $72^\circ$

b)  $40^\circ$

- 2) Find the measure of an interior and an exterior angle of a regular 46-gon.

- 3) The measure of an exterior angle of a regular polygon is  $2x$ , and the measure of an interior angle is  $4x$ .

- a) Use the relationship between interior and exterior angles to find  $x$ .

- b) Find the measure of one interior and exterior angle.

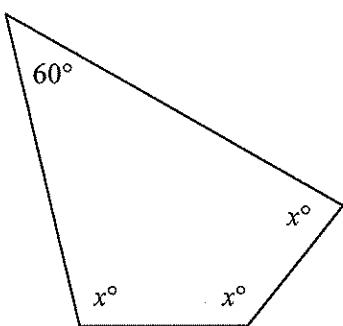
- c) Find the number of sides in the polygon and the type of polygon.

- 4) The measure of one interior angle of a regular polygon is  $144^\circ$ .  
How many sides does it have?

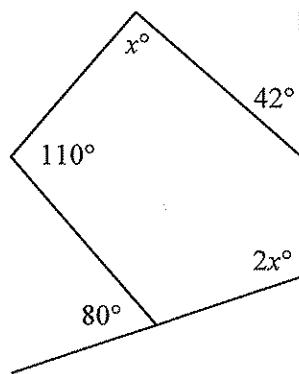
- 5) Five angles of a hexagon have measures  $100^\circ$ ,  $110^\circ$ ,  $120^\circ$ ,  $130^\circ$ , and  $140^\circ$ .  
What is the measure of the sixth angle?

6) Find the value of  $x$ .

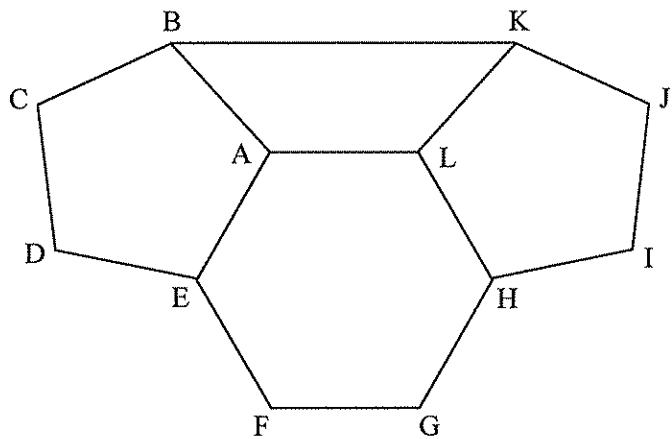
a)



b)



7) ABCDE and HIJKL are regular pentagons and AEFGHL is a regular hexagon.  
If  $\angle ABK \cong \angle LKB$ , find  $m\angle ABK$ .



# Geometry

NAME: \_\_\_\_\_

WORKSHEET: *Polygons & Interior Angles* PERIOD: \_\_\_\_\_ DATE: \_\_\_\_\_

## USING THE INTERIOR ANGLE SUM THEOREM

Since a hexagon has six (6) sides, we can find the sum of all six interior angles by using  $n = 6$  and:

$$\begin{aligned} \text{Sum} &= (n - 2) \cdot 180^\circ \\ &= (6 - 2) \cdot 180^\circ \\ &= (4) \cdot 180^\circ \\ \text{Hexagon Sum} &= 720^\circ \end{aligned}$$

All regular polygons are equiangular, therefore, we can find the measure of *each* interior angle by:

$$\text{One interior angle of a } \textit{regular} \text{ polygon} = \frac{(n - 2) \cdot 180^\circ}{n}$$

← Sum of all angles  
← # of sides (angles)

For a *hexagon*:      One interior angle =  $\frac{720^\circ}{6} = 120^\circ$

Note: The previous information could also be used to find the number of sides for a *regular* polygon given the measure of one interior angle.

Example: How many sides does a regular polygon have if one interior angle measures  $157.5^\circ$ ?

From above:

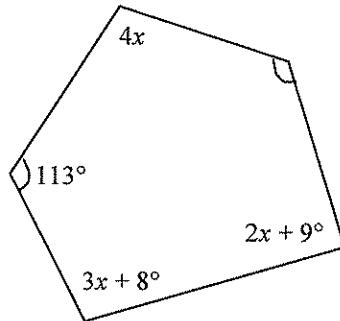
$$157.5 = \frac{(n - 2) \cdot 180}{n} \quad \textit{OR} \quad 157.5n = (n - 2) \cdot 180$$

What is the value of  $n$ ?

**PRACTICE... Show all work required to complete each of the following.**

- 1) What is another name for a regular quadrilateral?
- 2) Find the sum of the measures of the interior angles of a convex heptagon.
- 3) What is the measure of each interior angle of a regular pentagon?

- 4) The sum of the interior angles of a polygon is  $1620^\circ$ . How many sides does it have?
- 5) Can the interior angles of a polygon have a sum between  $4300^\circ$  and  $4400^\circ$ ?  
If so, how many sides can it have?
- 6) The measure of the interior angle of a regular polygon is  $179^\circ$ . How many sides does it have?
- 7) Is it possible for a regular polygon to have each of its interior angles measure  $142^\circ$ ?  
Support your answer.
- 8) Find the value of  $x$  in the figure given.



Name \_\_\_\_\_

Geometry

- Polygons

Sketch each:

1. Concave pentagon

2. Convex septagon

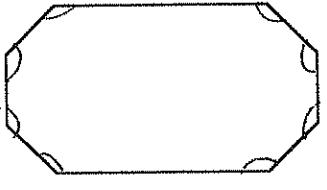
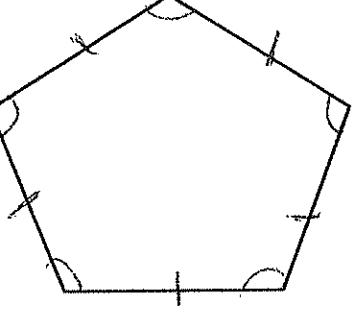
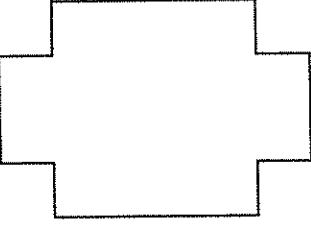
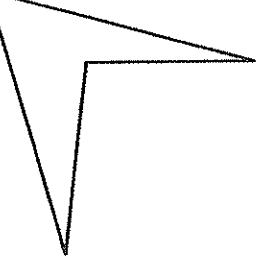
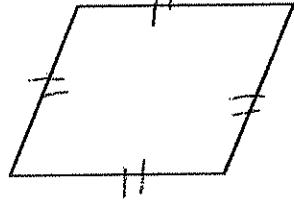
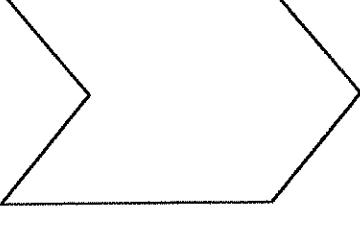
3. Concave octagon

4. Concave equilateral quadrilateral

5. Convex equiangular hexagon

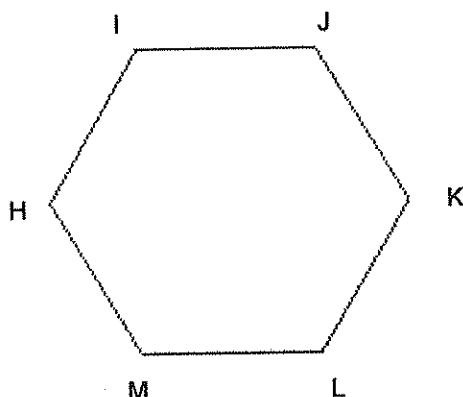
6. Convex regular decagon

Classify each diagram:

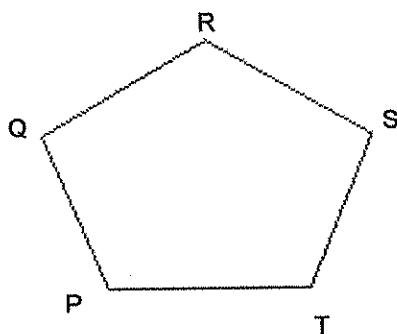
Concave Convex Triangle decagon	Equiangular Equilateral Regular nonagon	Hexagon Octagon dodecagon	Septagon Pentagon Quadrilateral
7. _____	8. _____		
			
9. _____	10. _____		
			
11. _____	13. _____		
			

Name the Polygon two different ways. Remember - this doesn't mean classify!!

14.



15.



Matching:

16. \_\_\_\_\_ dodecagon

A. 3

17. \_\_\_\_\_ triangle

B. 4

18. \_\_\_\_\_ pentagon

C. 5

19. \_\_\_\_\_ nonagon

D. 6

20. \_\_\_\_\_ quadrilateral

E. 7

21. \_\_\_\_\_ hexagon

F. 8

22. \_\_\_\_\_ octagon

G. 9

23. \_\_\_\_\_ heptagon

H. 10

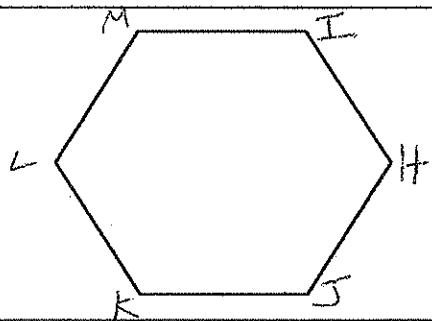
24. \_\_\_\_\_ decagon

I. 12

25. Name all angles consecutive to  $\angle H$

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25.

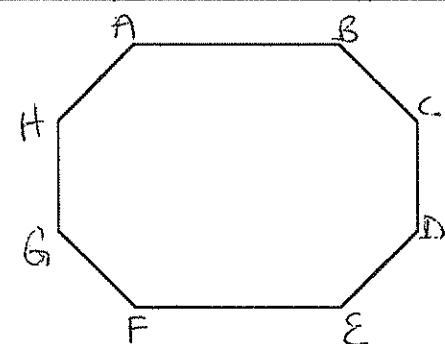


26. Name two diagonals.

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& \_\_\_\_\_

26.

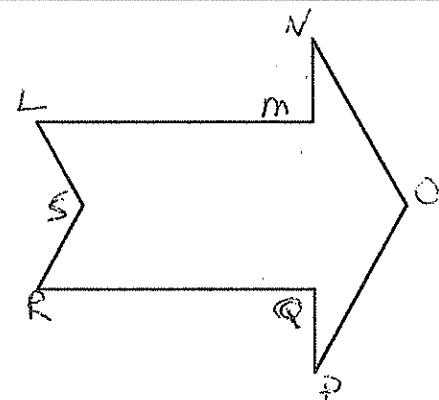


27. Name two consecutive sides.

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& \_\_\_\_\_

27.



28. Explain why the given figure is not a polygon. Your answer must be in complete sentences.

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29. Explain in complete sentences what it means if a polygon is regular. Sketch an example.

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Geometry

Name \_\_\_\_\_

Date \_\_\_\_\_

Find the SUM of the interior angles of each polygon.

- a. octagon \_\_\_\_\_
- b. pentagon \_\_\_\_\_
- c. hexagon \_\_\_\_\_
- d. heptagon \_\_\_\_\_

Find the SUM of the exterior angles of each polygon.

- a. octagon \_\_\_\_\_
- b. pentagon \_\_\_\_\_

What is the measure of EACH interior angle of a regular:

- a. octagon \_\_\_\_\_
- b. pentagon \_\_\_\_\_
- c. hexagon \_\_\_\_\_
- d. decagon \_\_\_\_\_

What is the measure of EACH exterior angle of a regular:

- a. octagon \_\_\_\_\_
- b. pentagon \_\_\_\_\_
- c. hexagon \_\_\_\_\_
- d. decagon \_\_\_\_\_

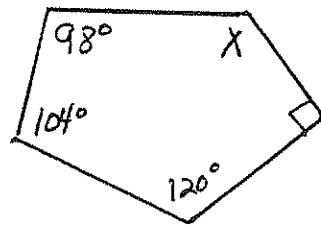


Find the measure of the variables.

a)

$$x = \underline{\hspace{2cm}}$$

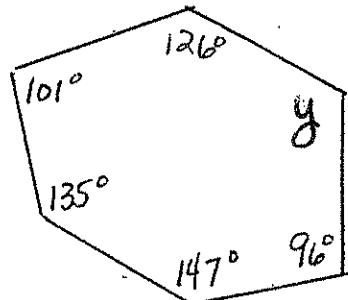
a)



b)

$$y = \underline{\hspace{2cm}}$$

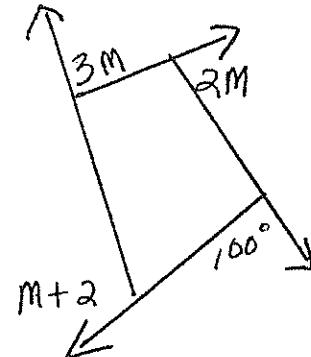
b)



c)

$$m = \underline{\hspace{2cm}}$$

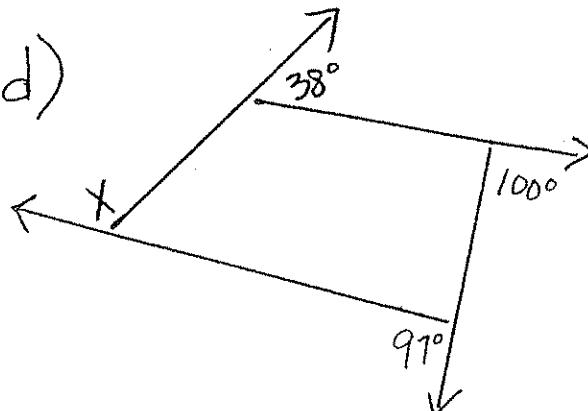
c)



d)

$$x = \underline{\hspace{2cm}}$$

d)



12

Find the measure of the variables.

e)

$$x = \underline{\hspace{2cm}}$$

f)

$$x = \underline{\hspace{2cm}}$$

$$y = \underline{\hspace{2cm}}$$

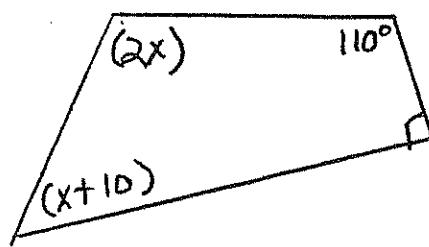
g)

$$x = \underline{\hspace{2cm}}$$

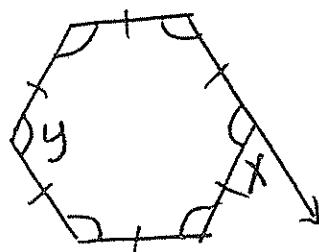
h)

$$x = \underline{\hspace{2cm}}$$

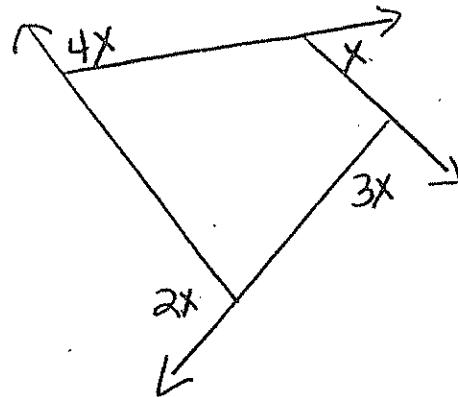
e)



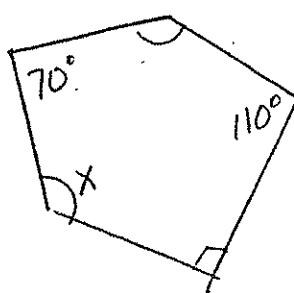
f)



g)

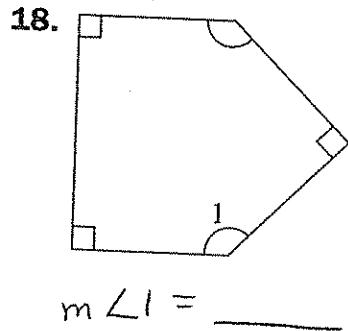
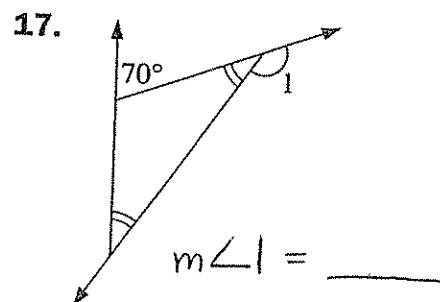
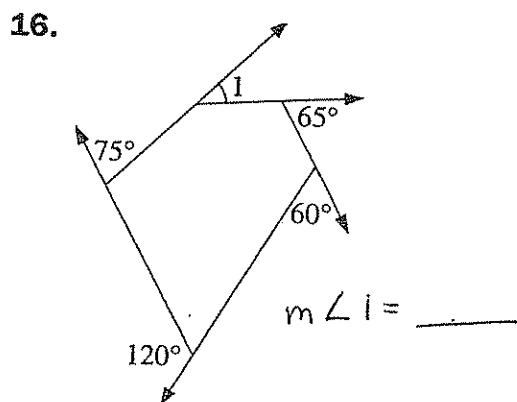
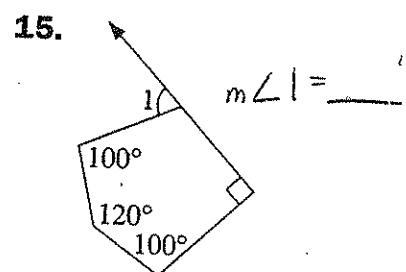
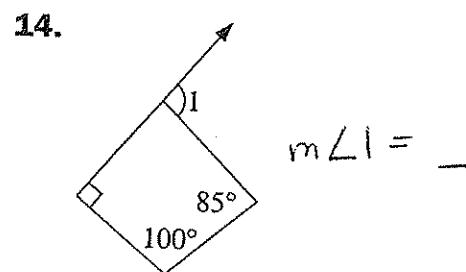
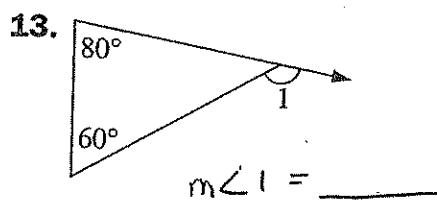


h)

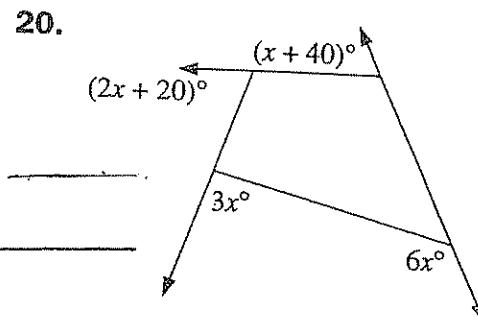
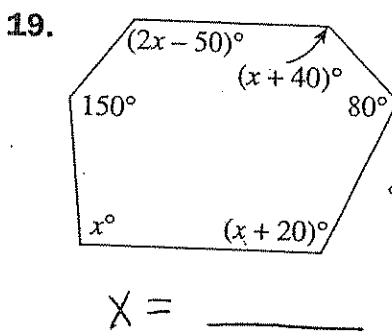


13

Find the measure of  $\angle 1$  in each figure.

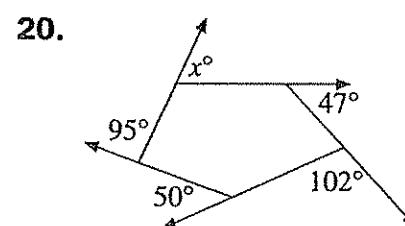
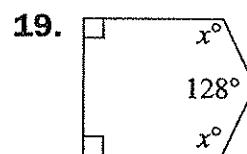
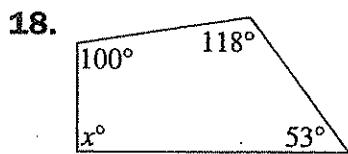


Find the measure of each angle.



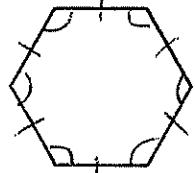
$$\begin{aligned} x &= \underline{\hspace{2cm}} \\ x + 40 &= \underline{\hspace{2cm}} \\ 2x + 20 &= \underline{\hspace{2cm}} \\ 3x &= \underline{\hspace{2cm}} \\ 6x &= \underline{\hspace{2cm}} \end{aligned}$$

\* Find each unknown angle measure.

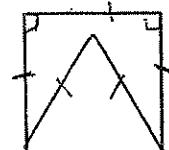


For questions 1 - 4, classify each polygon. Be as specific as possible.

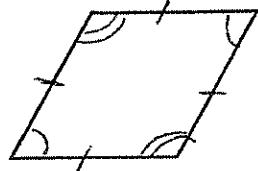
21.



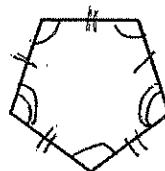
22.



23.

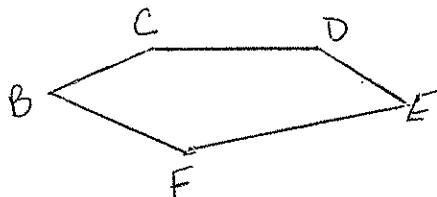


24.



25. Which of the polygons in 1 - 4 is concave? \_\_\_\_\_

26. Given:



a) How many different ways can the polygon be named? \_\_\_\_\_

b) Name a pair of consecutive sides. \_\_\_\_\_

c) Name a pair of nonconsecutive vertices. \_\_\_\_\_

27. True or False? Every equilateral polygon is equiangular. \_\_\_\_\_

28. True or False? Every regular polygon is convex. \_\_\_\_\_

29. True or False? Every three sided polygon is convex. \_\_\_\_\_

30. Sketch a plane figure that is not a polygon and explain why it is not.

31. Sketch the following:

a) convex equilateral pentagon

b) concave octagon

c) regular quadrilateral

	Interior	Exterior
Sum	$(n-2) \cdot 180$	$360^\circ$
Each for Regular	$\frac{(n-2) \cdot 180}{n}$	$\frac{360}{n}$

32. Find the sum of the interior angles of each convex polygon.

a) nonagon \_\_\_\_\_

b) 50-gon \_\_\_\_\_

33. *EXTRA CREDIT* Find the measure of each interior angle of a regular hexagon. \_\_\_\_\_

34. Find the measure of each exterior angle of a regular decagon. \_\_\_\_\_

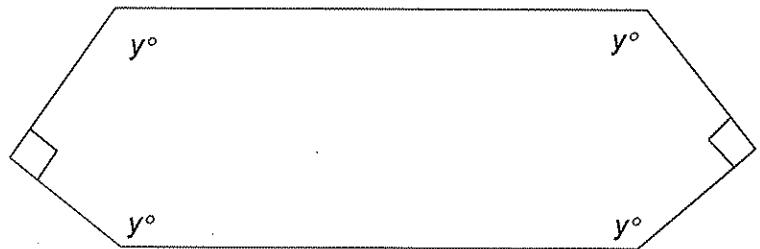
35. The measure of each exterior angle in a regular polygon is  $24^\circ$ . How many sides does the polygon have? \_\_\_\_\_

36. Two interior angles of a pentagon measure  $80^\circ$  and  $100^\circ$ . The other three angles are congruent. Find the measure of each of the three angles. \_\_\_\_\_

Find the value for each variable.

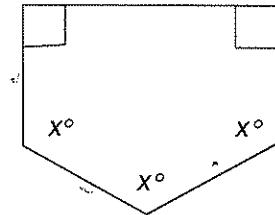
1.

$$y = \underline{\hspace{2cm}}$$



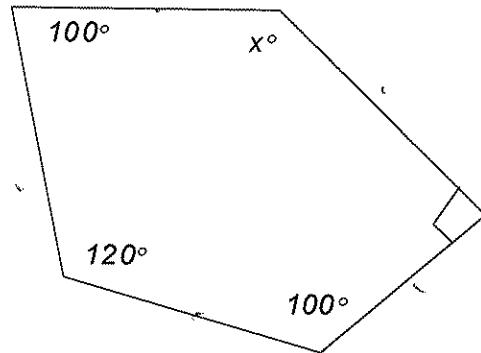
2.

$$x = \underline{\hspace{2cm}}$$



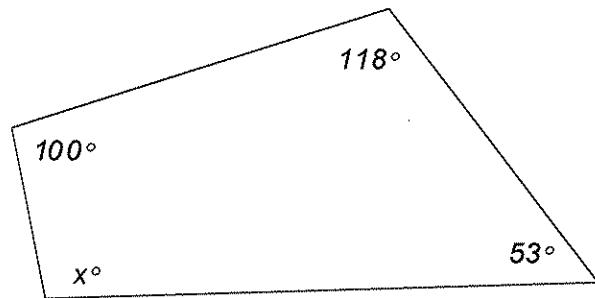
3.

$$x = \underline{\hspace{2cm}}$$



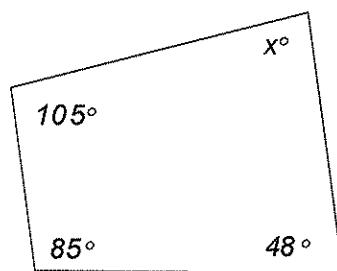
4.

$$x = \underline{\hspace{2cm}}$$



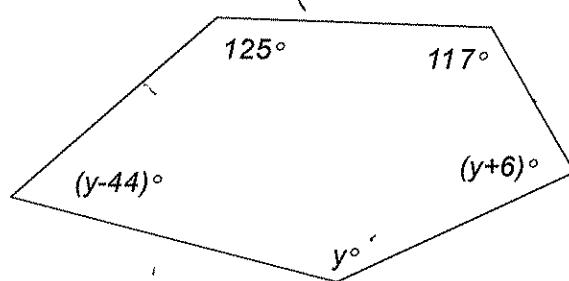
5.

$$x = \underline{\hspace{2cm}}$$



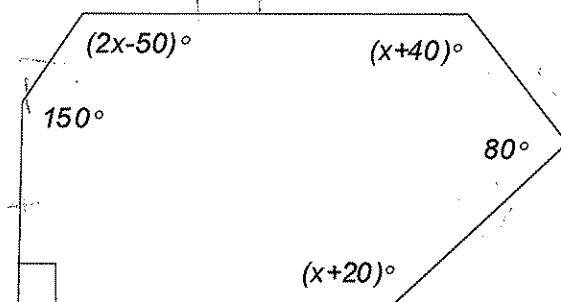
6.

$$y = \underline{\hspace{2cm}}$$

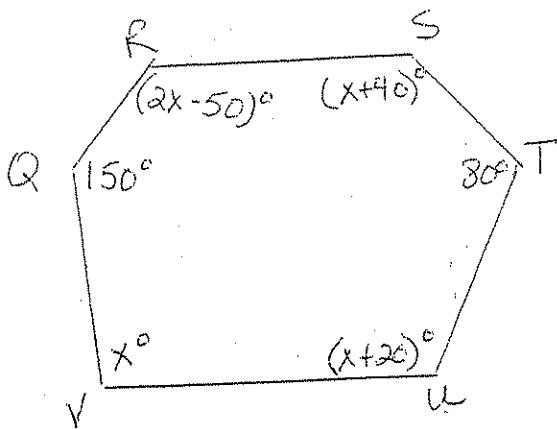


7.

$$x = \underline{\hspace{2cm}}$$



① NAME \_\_\_\_\_



$$x = \underline{\quad}$$

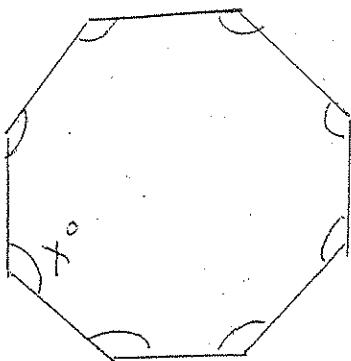
$$m\angle R = \underline{\quad}$$

$$m\angle S = \underline{\quad}$$

$$m\angle U = \underline{\quad}$$

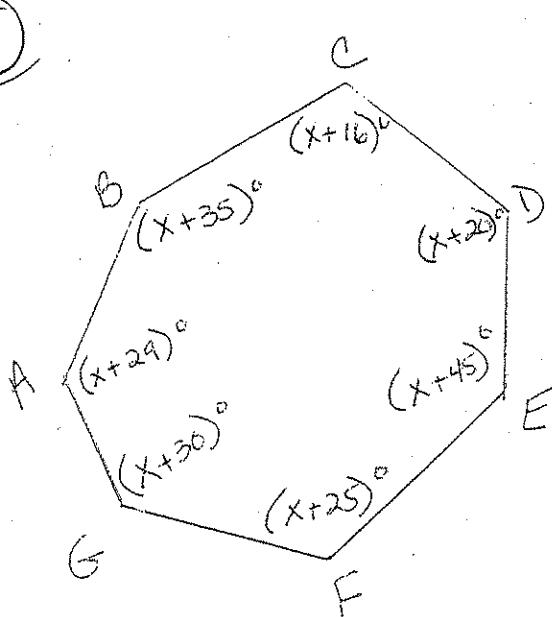
$$m\angle V = \underline{\quad}$$

②



$$x = \underline{\quad}$$

③



Name the figure

$$x = \underline{\quad}$$

$$m\angle A = \underline{\quad}$$

$$m\angle B = \underline{\quad}$$

$$m\angle C = \underline{\quad}$$

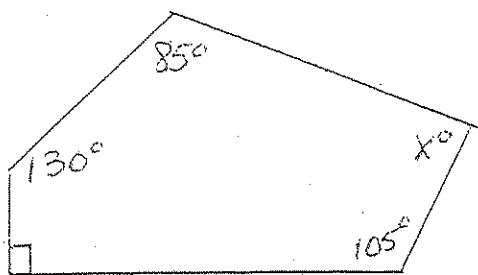
$$m\angle D = \underline{\quad}$$

$$m\angle E = \underline{\quad}$$

$$m\angle F = \underline{\quad}$$

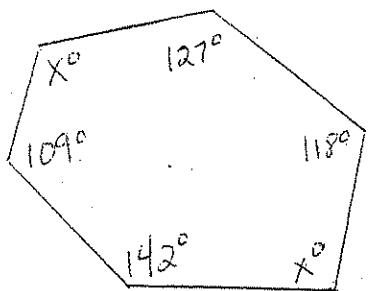
$$m\angle G = \underline{\quad}$$

(4)



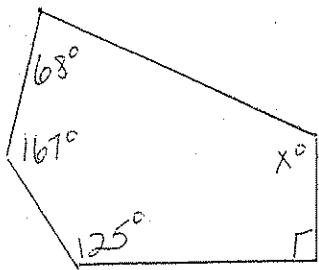
$$x = \underline{\hspace{2cm}}$$

(5)



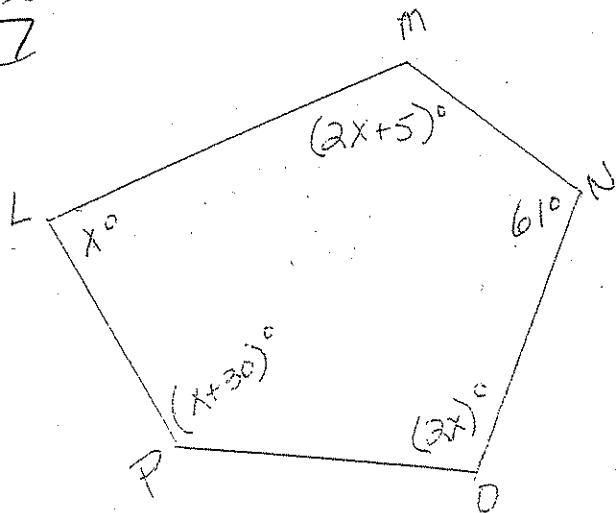
$$x = \underline{\hspace{2cm}}$$

(6)



$$x = \underline{\hspace{2cm}}$$

(7)



$$x = \underline{\hspace{2cm}}$$

$$m < L \underline{\hspace{2cm}}$$

$$m < M \underline{\hspace{2cm}}$$

$$m < O \underline{\hspace{2cm}}$$

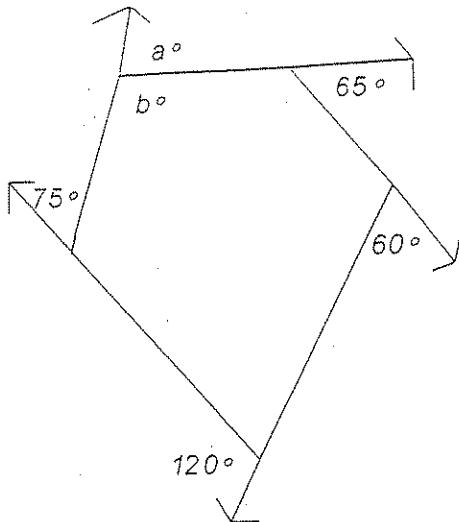
$$m < P \underline{\hspace{2cm}}$$

20

8

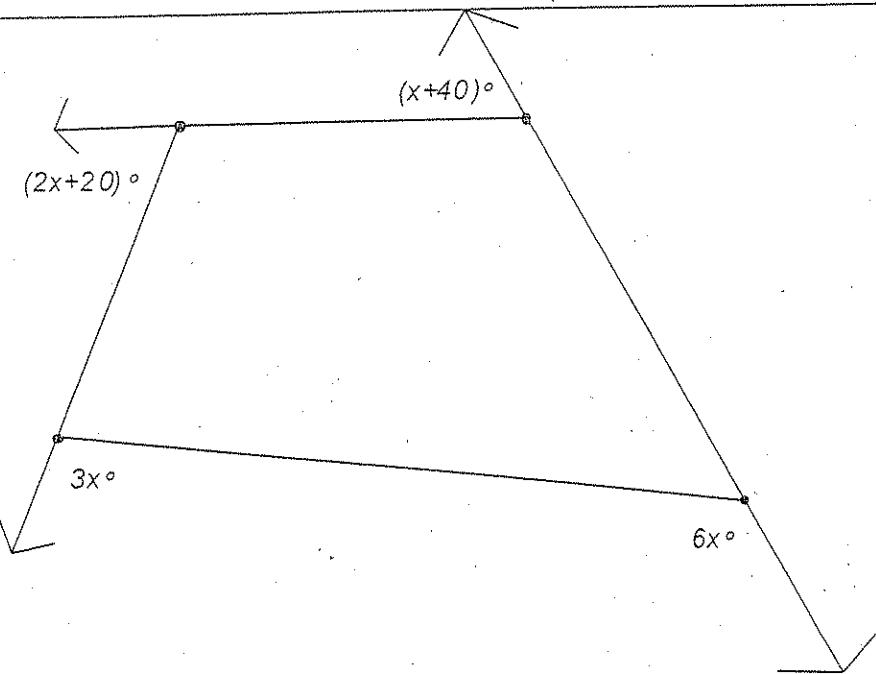
$$a = \underline{\hspace{2cm}}$$

$$b = \underline{\hspace{2cm}}$$



9

$$x = \underline{\hspace{2cm}}$$



Find the measure of each angle.

10

$$z = \underline{\hspace{2cm}}$$

$$m\angle ABD = \underline{\hspace{2cm}}$$

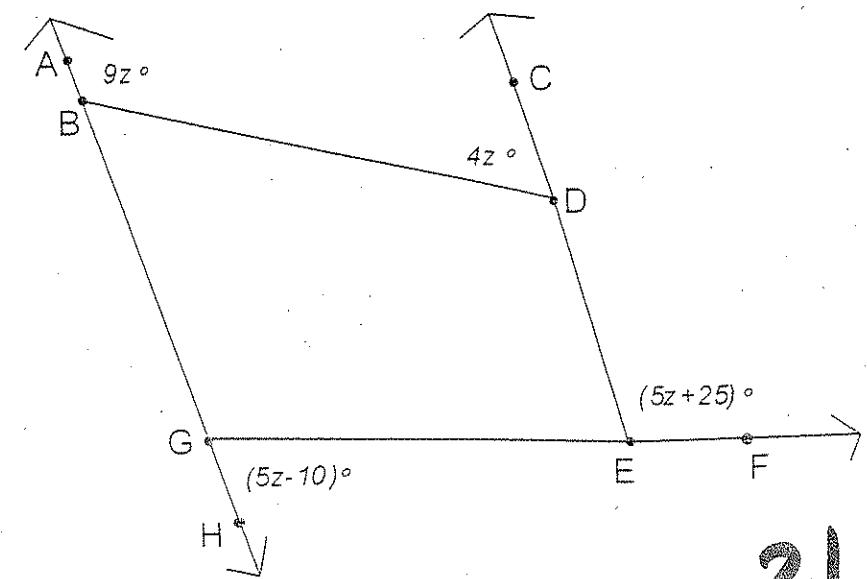
$$m\angle DBG = \underline{\hspace{2cm}}$$

$$m\angle DEG = \underline{\hspace{2cm}}$$

$$m\angle CDB = \underline{\hspace{2cm}}$$

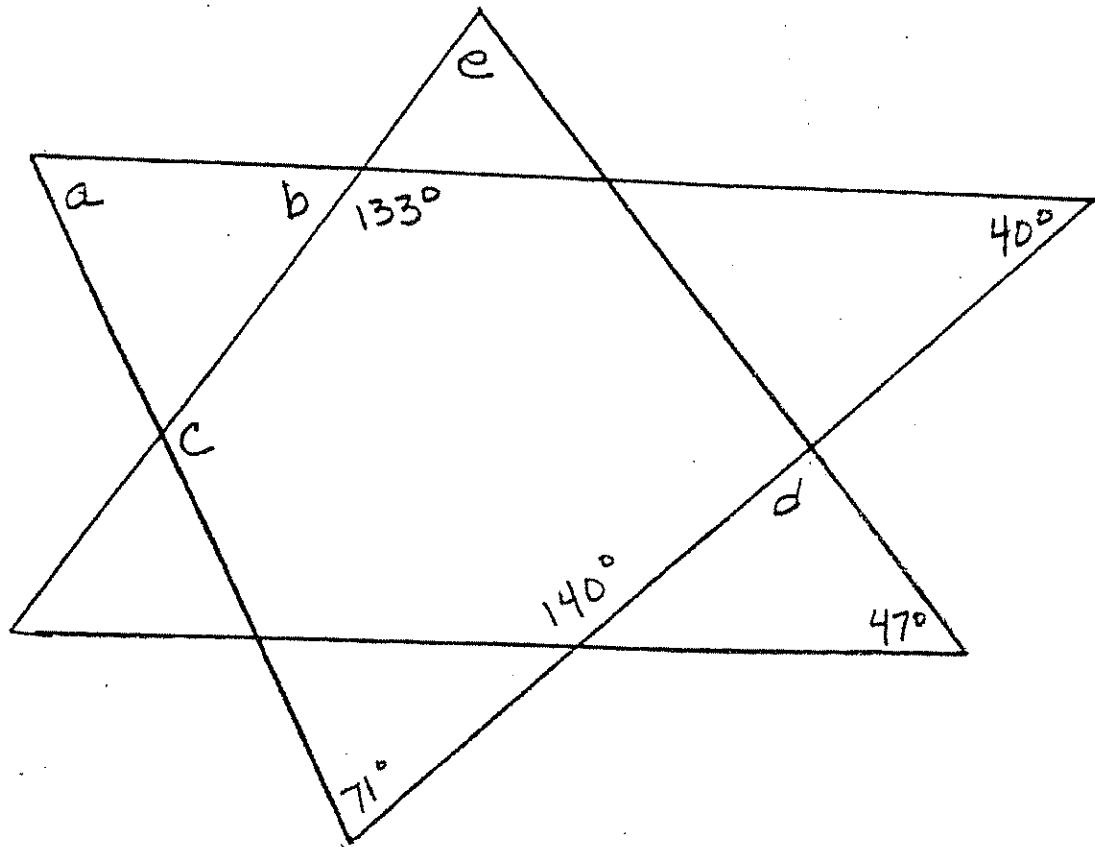
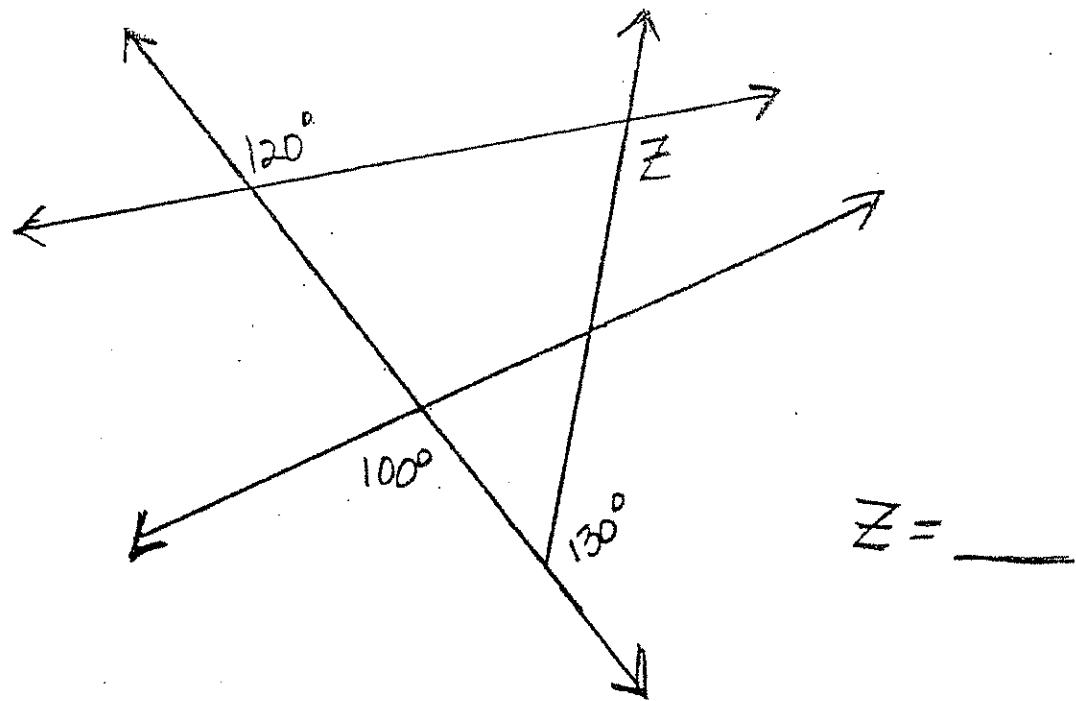
$$m\angle HGE = \underline{\hspace{2cm}}$$

$$m\angle EGB = \underline{\hspace{2cm}}$$



21

Name \_\_\_\_\_



a = \_\_\_ b = \_\_\_ c = \_\_\_ d = \_\_\_ e = \_\_\_ *check*