

Name _____

Geometry

Polygons

Sum of the interior angles of a polygon	$(n - 2)180$
Sum of the exterior angles of a polygon	360°
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.

	<i># Sides</i>	<i>Interior Angle Sum</i>	<i>Measure of ONE INTERIOR Angle (Regular Polygon)</i>	<i>Exterior Angle Sum</i>	<i>Measure of ONE EXTERIOR Angle (Regular Polygon)</i>
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°

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°
 - b) 40°

- 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.

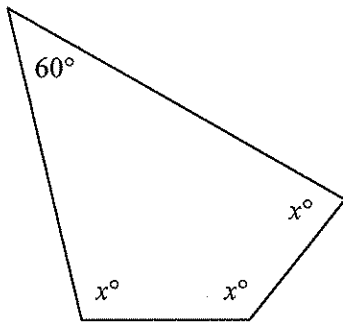
 - c) Find the number of sides in the polygon and the type of polygon.

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

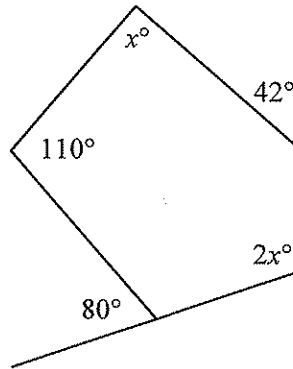
- 5) Five angles of a hexagon have measures 100° , 110° , 120° , 130° , and 140° .
What is the measure of the sixth angle?

6) Find the value of x .

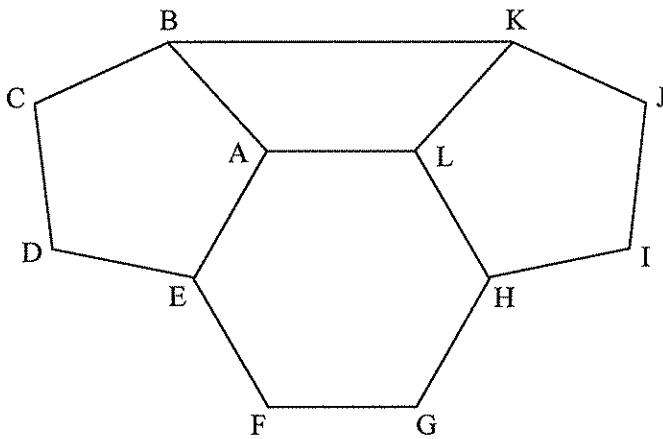
a)



b)



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



4

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:

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

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° ?

From above:

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

What is the value of n ?

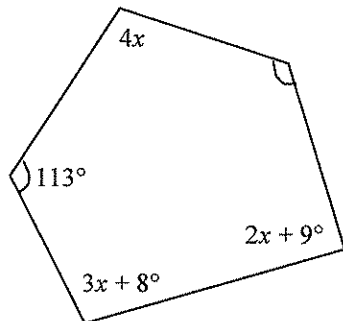
PRACTICE... *Show all work required to complete each of the following.*

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



Name _____

Geometry

- Polygons

Sketch each:

1. Concave pentagon

2. Convex septagon

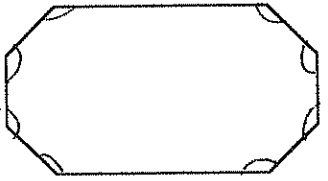
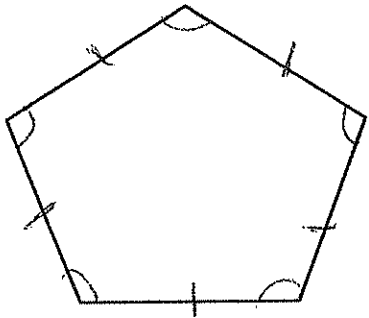
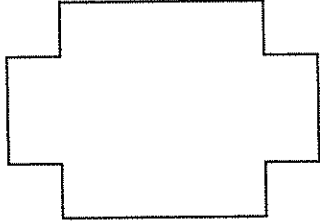
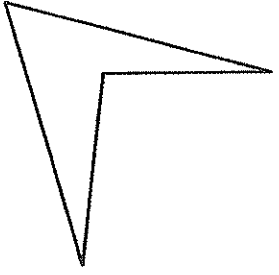
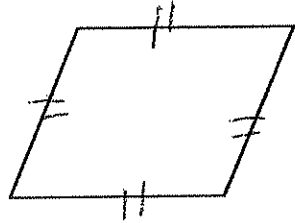
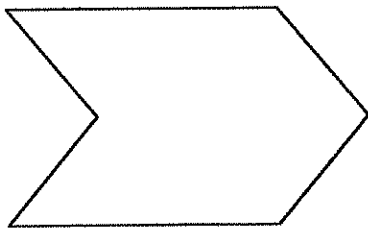
3. Concave octagon

4. Concave equilateral quadrilateral

5. Convex equiangular hexagon

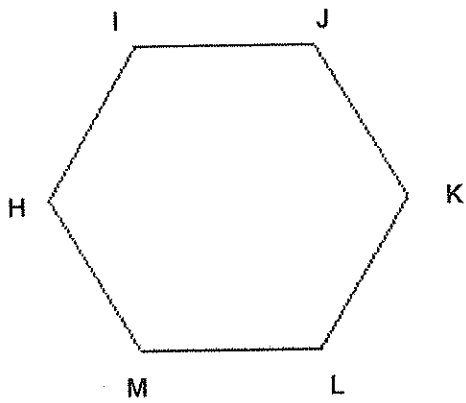
6. Convex regular decagon

Classify each diagram:

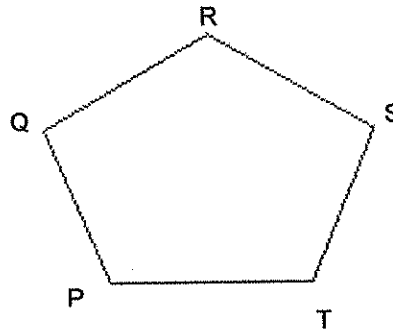
Concave Convex Triangle decagon	Equiangular Equilateral Regular nonagon	Hexagon Octagon dodecagon	Septagon Pentagon Quadrilateral
7. _____ 	8. _____ 		
9. _____ 	10. _____ 		
11. _____ 	13. _____ 		

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

14.

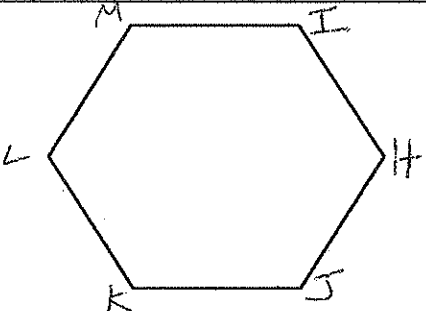
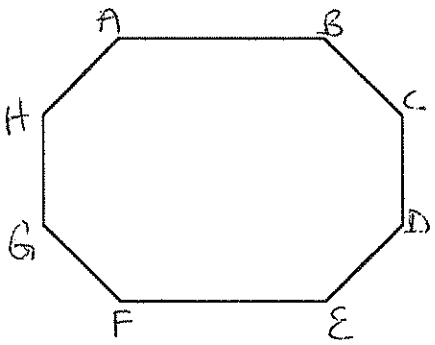
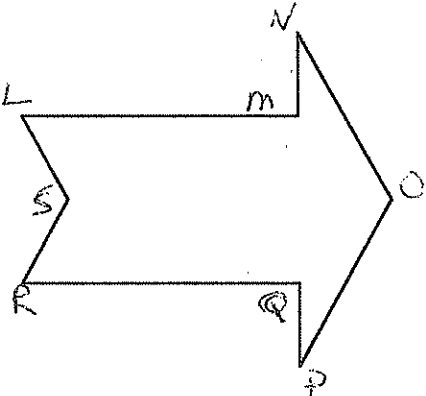


15.



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

<p>25. Name all angles consecutive to $\angle H$</p> <p>_____</p>	<p>25.</p> 
<p>26. Name two diagonals.</p> <p>_____ & _____</p>	<p>26.</p> 
<p>27. Name two consecutive sides.</p> <p>_____ & _____</p>	<p>27.</p> 

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

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

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 _____

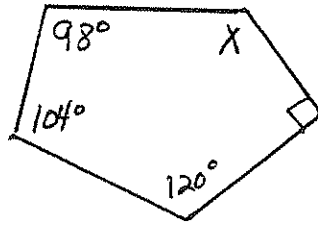


Find the measure of the variables.

a)

$x =$ _____

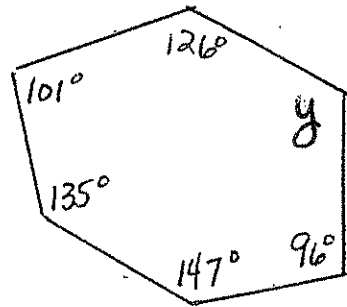
a)



b)

$y =$ _____

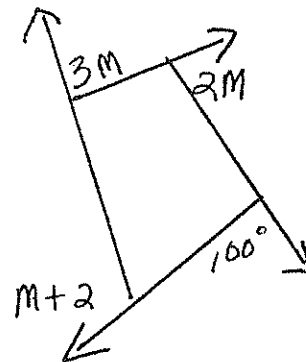
b)



c)

$m =$ _____

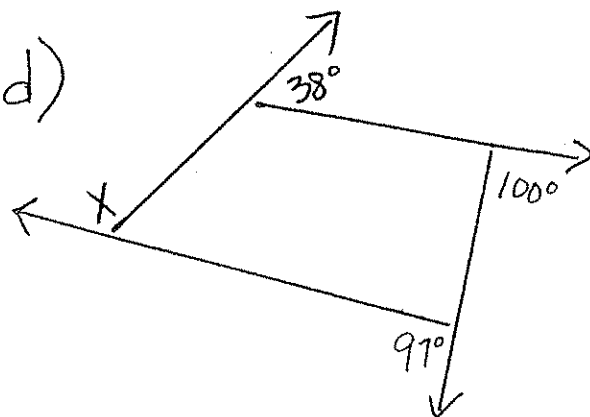
c)



d)

$x =$ _____

d)



Find the measure of the variables.

e)

$x =$ _____

f)

$x =$ _____

$y =$ _____

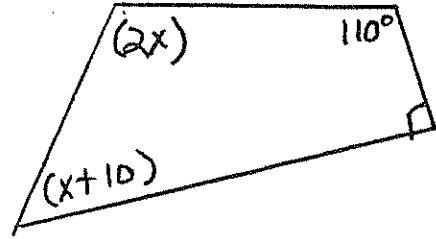
g)

$x =$ _____

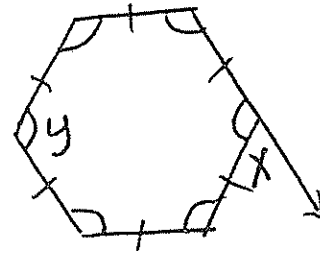
h)

$x =$ _____

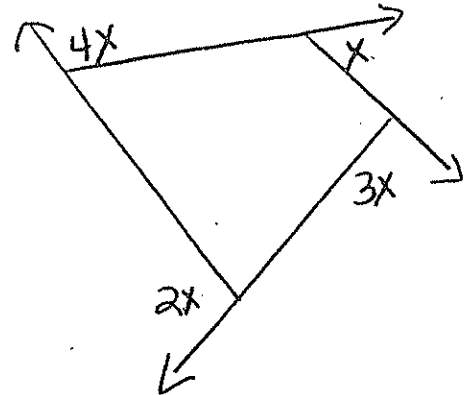
e)



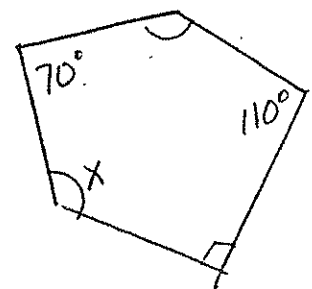
f)



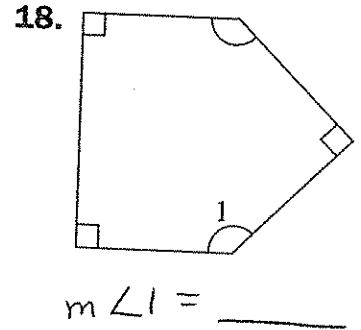
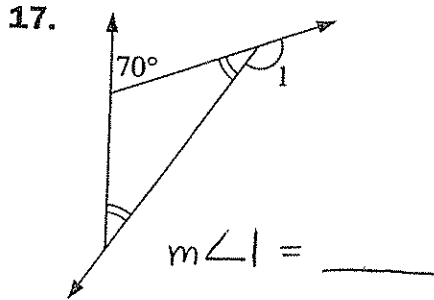
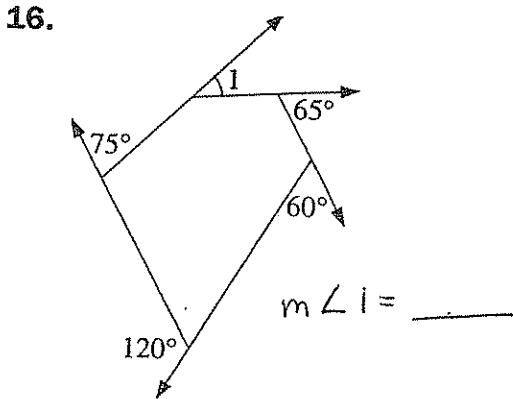
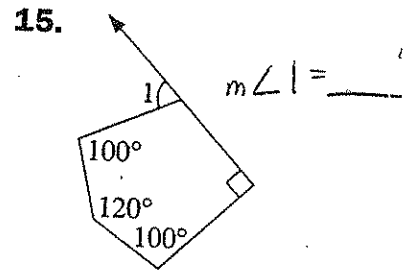
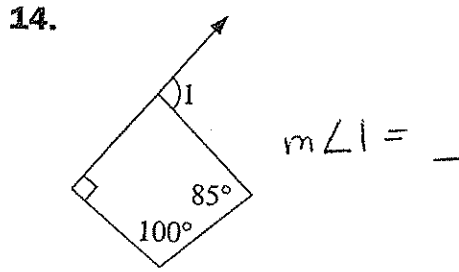
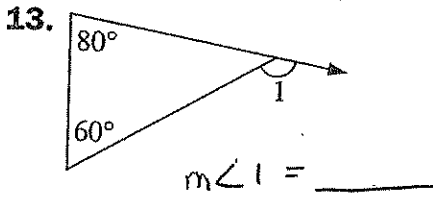
g)



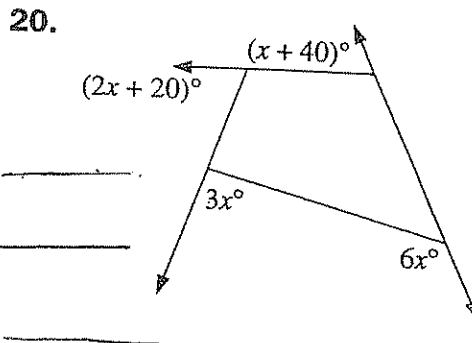
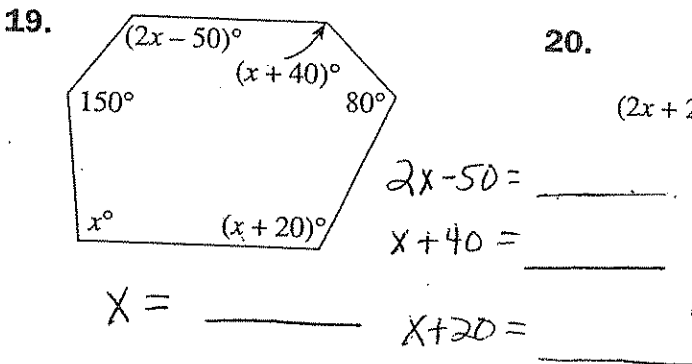
h)



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

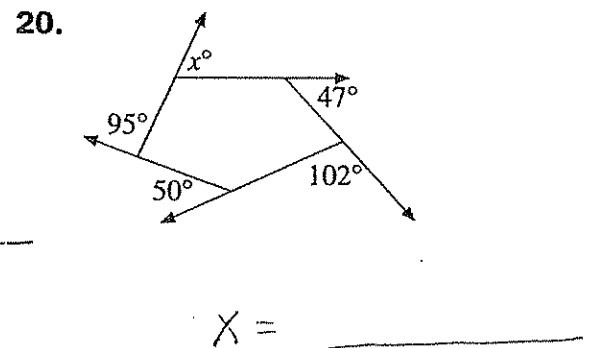
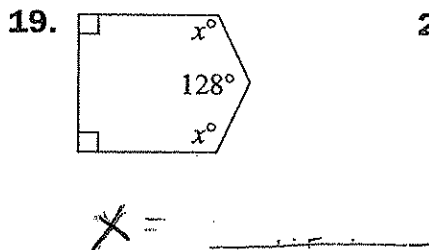
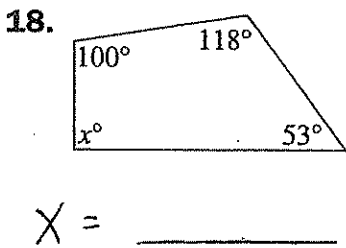


Find the measure of each angle.



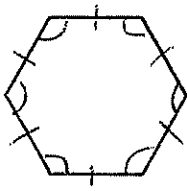
$x = \underline{\hspace{2cm}}$
 $x + 40 = \underline{\hspace{2cm}}$
 $2x + 20 = \underline{\hspace{2cm}}$
 $3x = \underline{\hspace{2cm}}$
 $6x = \underline{\hspace{2cm}}$

Find each unknown angle measure.

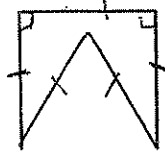


For questions 1 - 4, classify each polygon. Be as specific as possible.

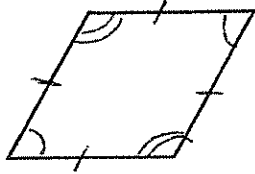
21.



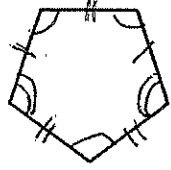
22.



23.

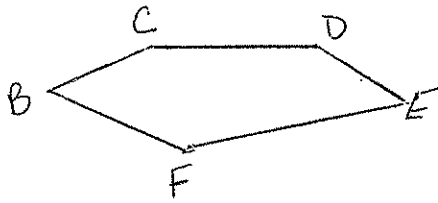


24.



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°
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. Find the measure of each interior angle of a regular hexagon. _____

EXTRA CREDIT

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° . How many sides does the polygon have? _____

36. Two interior angles of a pentagon measure 80° and 100° . The other three angles are congruent. Find the measure of each of the three angles. _____

Name _____

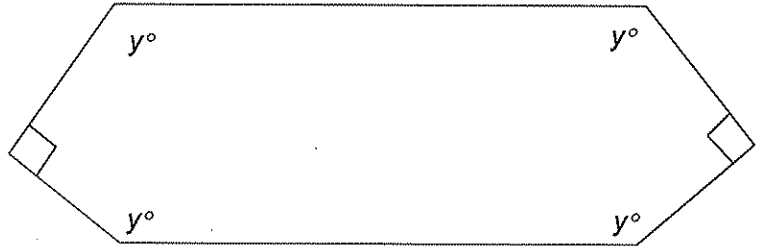
Geometry

Interior Angles

Find the value for each variable.

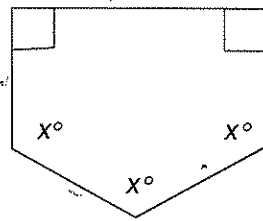
1.

$y =$ _____



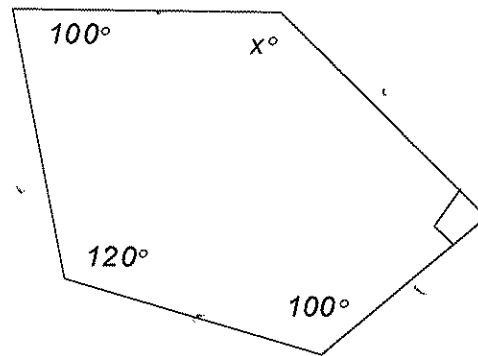
2.

$x =$ _____



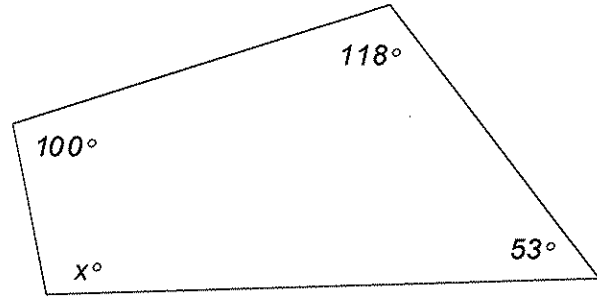
3.

$x =$ _____



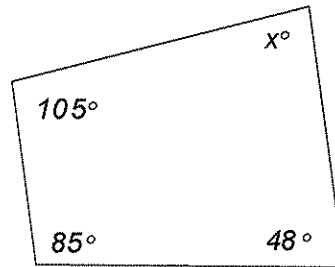
4.

$x =$ _____



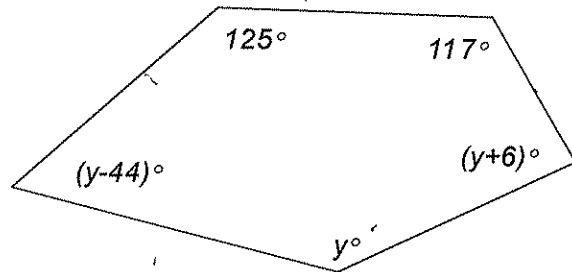
5.

$x =$ _____



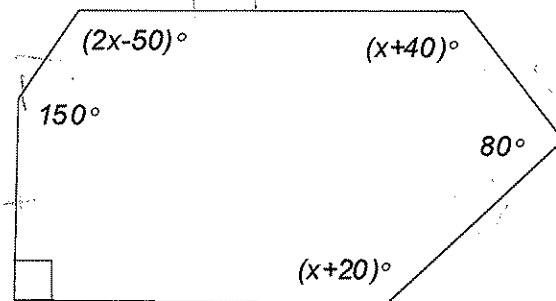
6.

$y =$ _____



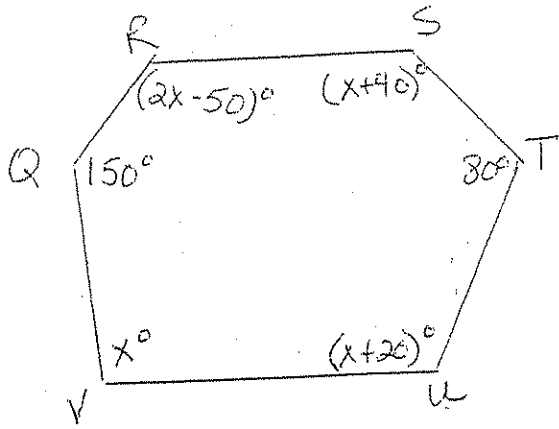
7.

$x =$ _____



①

NAME _____



$x =$ _____

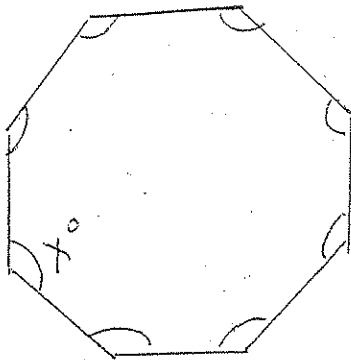
$m\angle R =$ _____

$m\angle S =$ _____

$m\angle U =$ _____

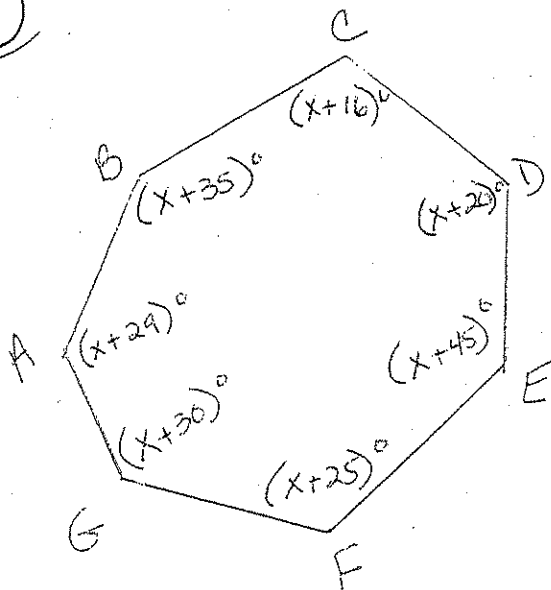
$m\angle V =$ _____

②



$x =$ _____

③



Name the figure

$x =$ _____

$m\angle A =$ _____

$m\angle B =$ _____

$m\angle C =$ _____

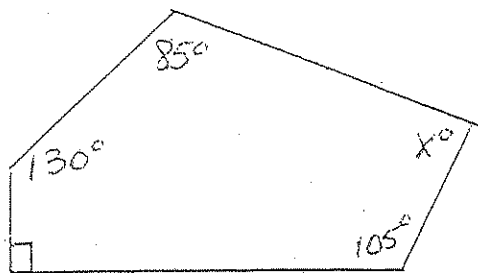
$m\angle D =$ _____

$m\angle E =$ _____

$m\angle F =$ _____

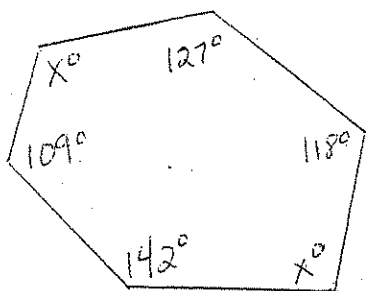
$m\angle G =$ _____

4



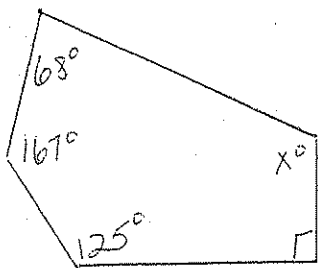
$x =$ _____

5



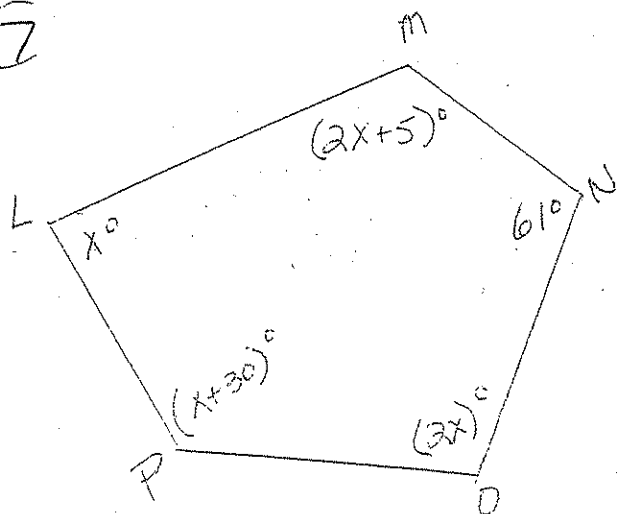
$x =$ _____

6



$x =$ _____

7



$x =$ _____

$m < L$ _____

$m < M$ _____

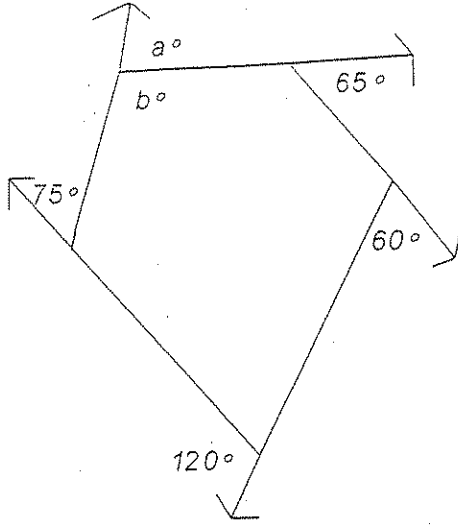
$m < O$ _____

$m < P$ _____

8

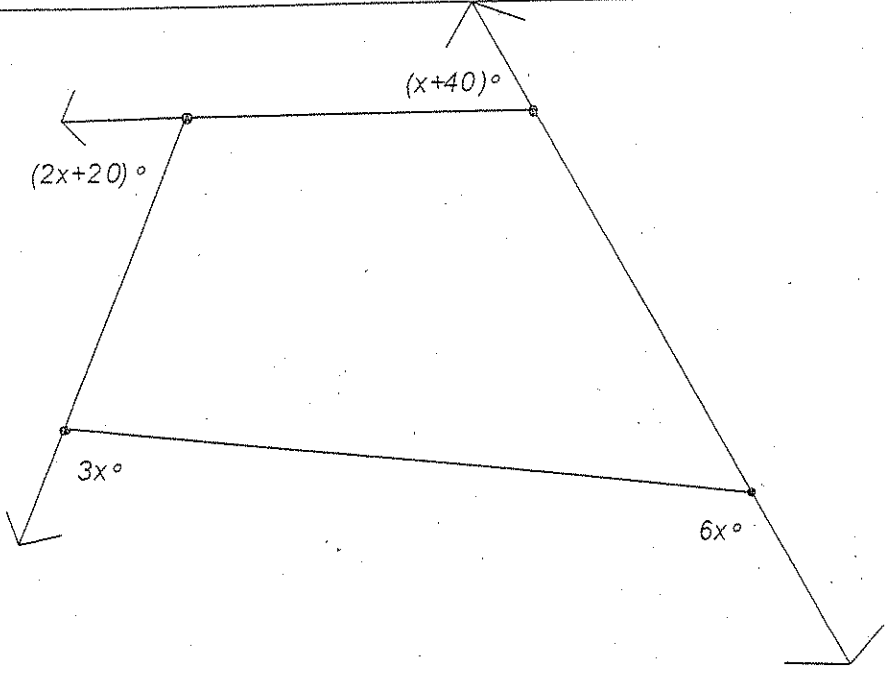
a = _____

b = _____



9

x = _____



Find the measure of each angle.

10

z = _____

$m\angle ABD =$ _____

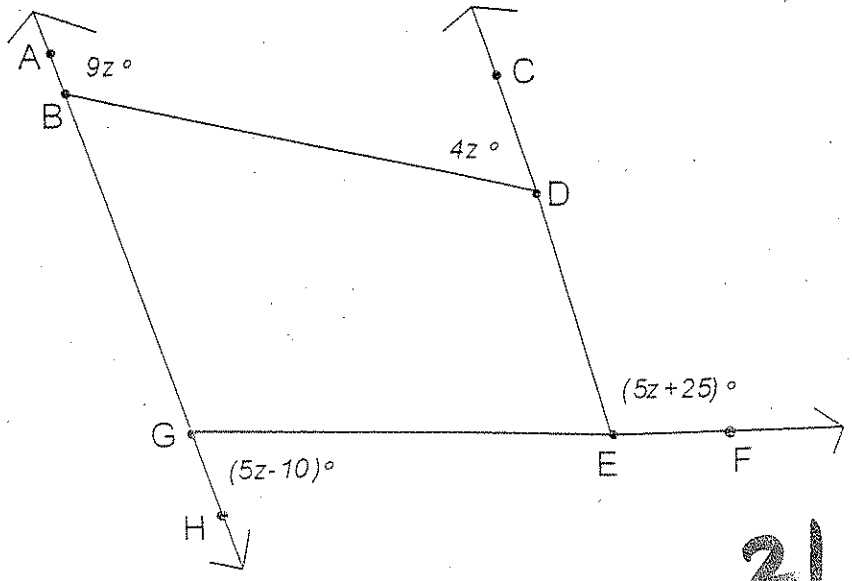
$m\angle DBG =$ _____

$m\angle DEG =$ _____

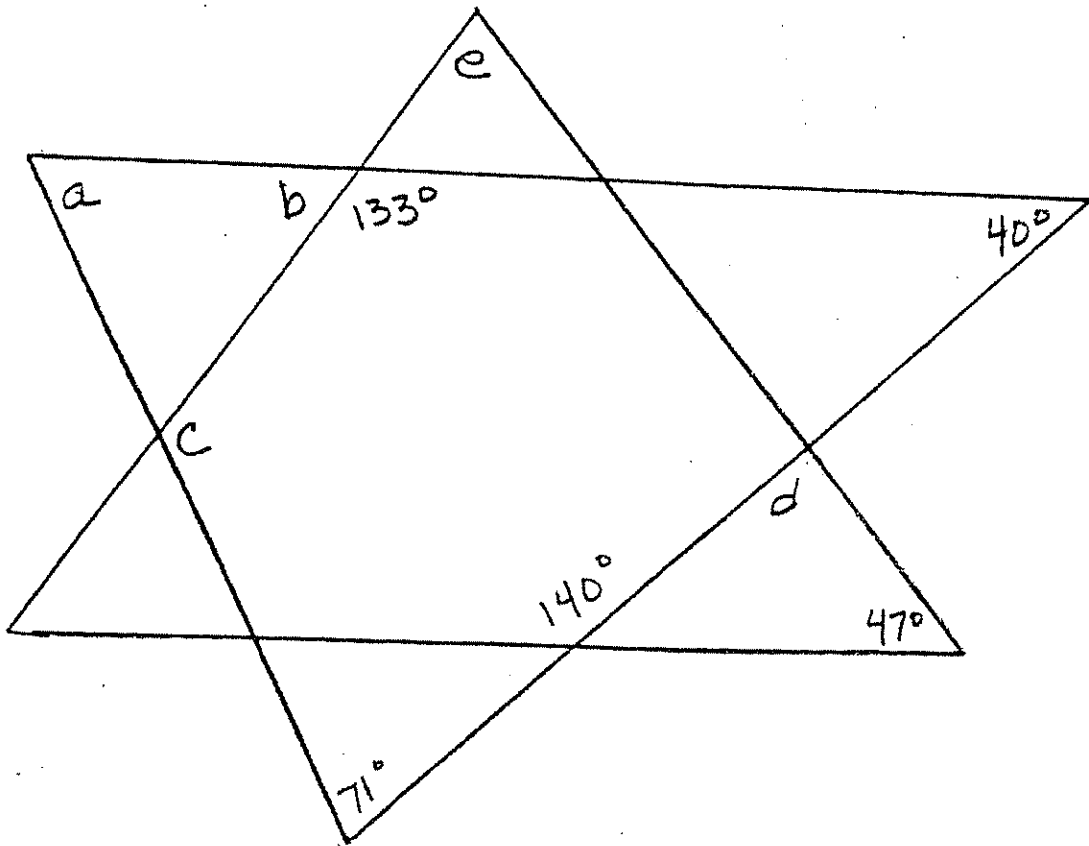
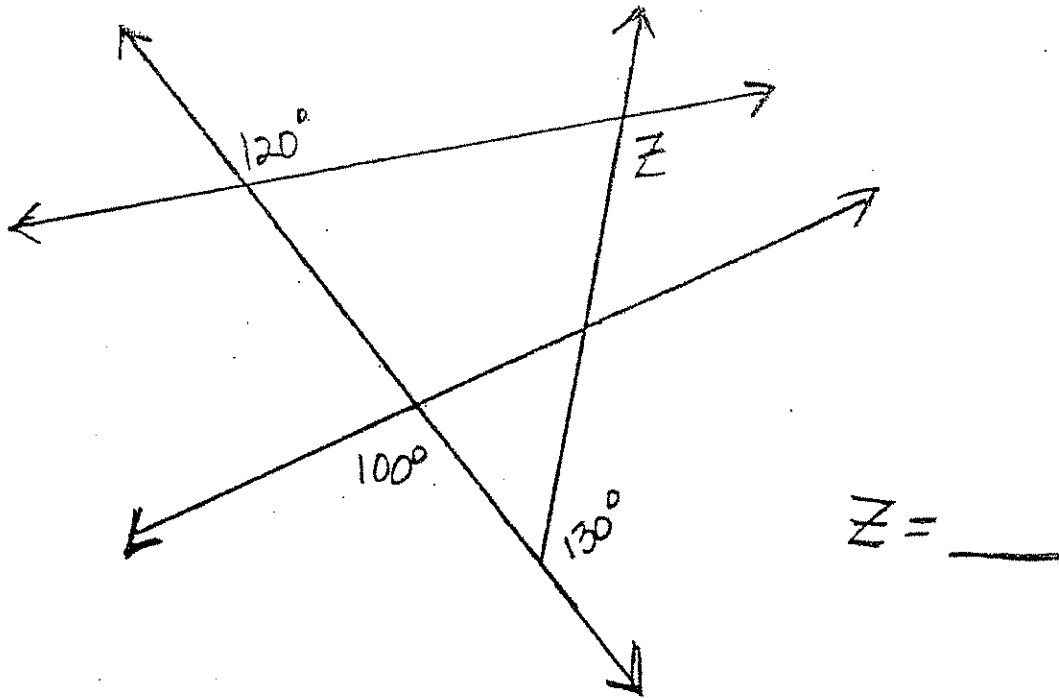
$m\angle CDB =$ _____

$m\angle HGE =$ _____

$m\angle EGB =$ _____



Name _____



$a = \underline{\hspace{1cm}}$ $b = \underline{\hspace{1cm}}$ $c = \underline{\hspace{1cm}}$ $d = \underline{\hspace{1cm}}$ $e = \underline{\hspace{1cm}}$

22