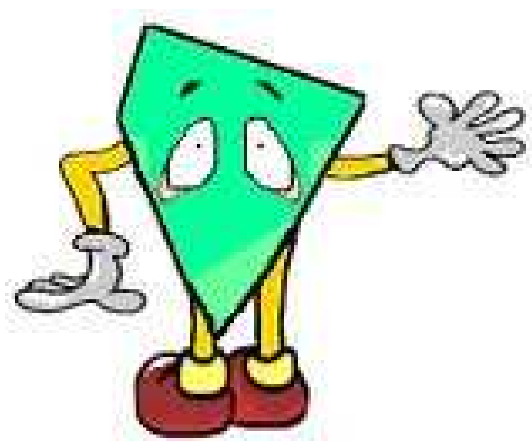
Unit 8 – Geometry
QUADRILATERALS



NAME ______________________________

Period _____________

Geometry
Chapter 8 – Quadrilaterals

******In order to get full credit for your assignments they must me done on time and you must SHOW ALL WORK. ******

1.____ (**8-1) Angles of Polygons – Day 1-** Pages 407-408 13-16, 20-22, 27-32, 35-43 odd

2. ____ (8-2) Parallelograms – Day 1- Pages 415 16-31, 37-39

3. ____ (8-3) Test for Parallelograms – Day 1- Pages 421-422 13-23 odd, 25 -31 odd

4. ____ (8-4) Rectangles – Day 1- Pages 428-429 10, 11, 13, 16-26, 30-32, 36

5. ____ (8-5) Rhombi and Squares – Day 1 – Pages 434-435 12-19, 20, 22, 26 - 31

6.____ (8-6) Trapezoids – Day 1– Pages 10, 13-19, 22-25

7. _____ Chapter 8 Review

(Reminder!) A little background…

Polygon is the generic term for ____. Depending on the number, the first part of the word - "Poly" - is replaced by a prefix. The prefix used is from Greek. The Greek term for 5 is Penta, so a 5-sided figure is called a ______________. We can draw figures with as many sides as we want, but most of us don't remember all that Greek, so when the number is over 12, or if we are talking about a general polygon, many mathematicians call the figure an "n-gon." So a figure with 46 sides would be called a "46-gon."

Vocabulary – Types of Polygons

Regular - ____

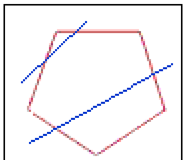
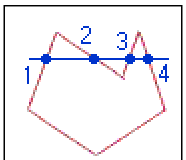
____

Irregular – ____

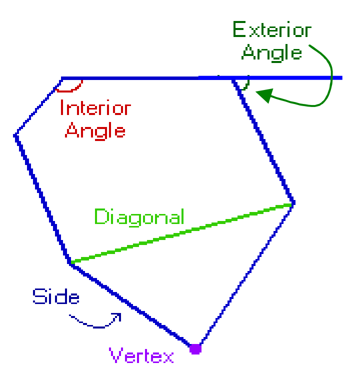
____

Equiangular - ____

Equilateral - ____

	**Convex** - a straight line drawn through a convex polygon **crosses at most two sides**. Every interior angle is ___________________________.
	**Concave** - you can draw at least one straight line through a concave polygon that **crosses more than two sides**. At least one interior angle is ____.

Polygon Parts

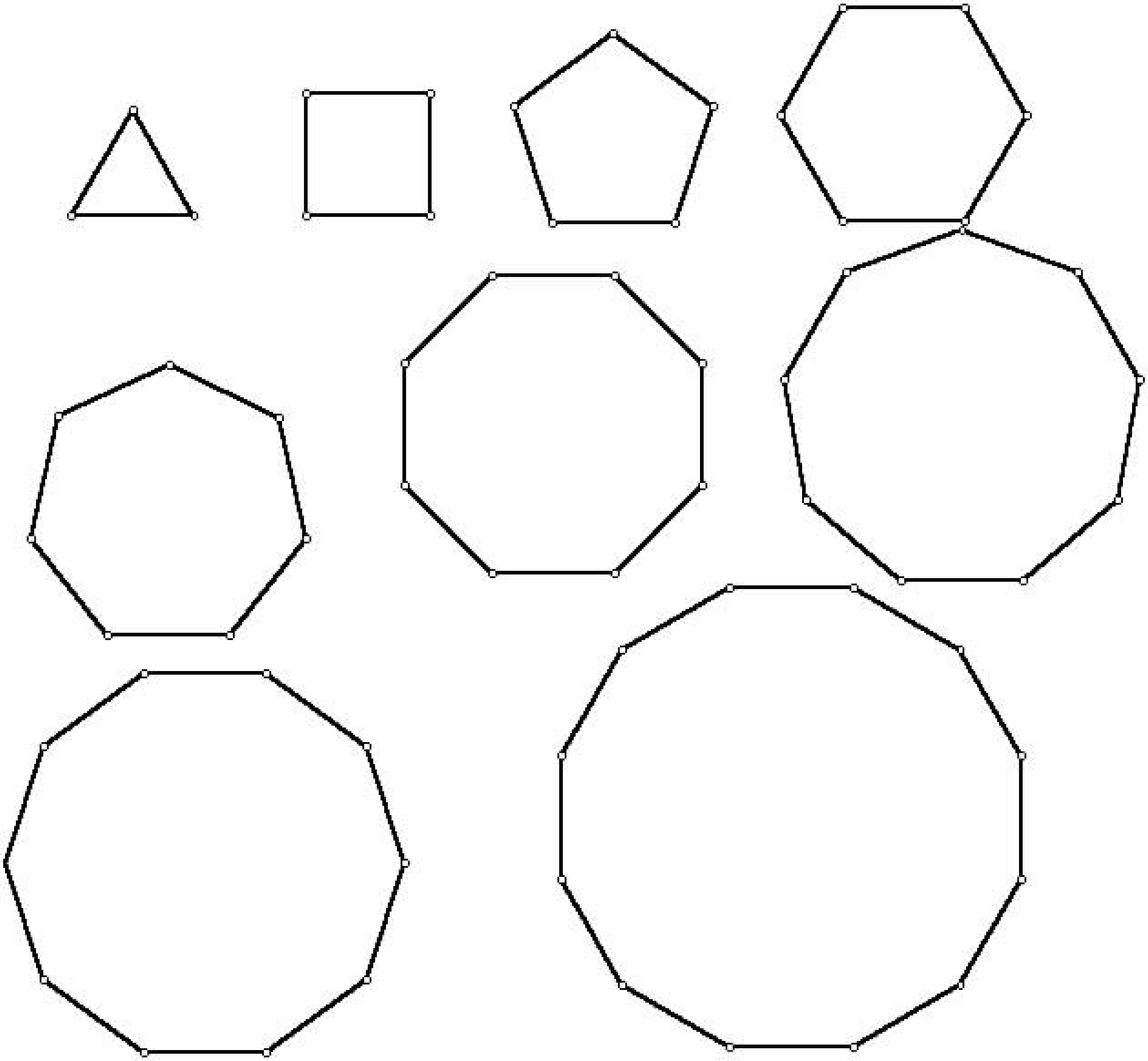
	**Side** – **Vertex** – **Diagonal** - **Interior Angle** - **Exterior Angle** -

Number of sides of the polygon	Name of the polygon	Number of interior angles	Number of diagonals possible from one vertex point	Number of triangles formed from one vertex point	Sum of the measures of interior angles	One interior angle measure (regular polygon)	One exterior angle measure (regular polygon	Sum of the exterior angles measures
3		3	0	1				
4								
5		5	2	3	540°			
6								
7								
8								
9								
10								
11								
12					1800°			
n								

a.) Compare the number of triangle to the number of sides. Do you see a pattern?

b.) How can you use the number of triangles formed by the diagonals to figure out the sum of all the interior angles of a polygon?

c.) Write an expression for the sum of the interior angles of an n-gon, using n and the patterns you found from the table.



Date: ______________________

Section 8 – 1: Angles of Polygons
Notes

Diagonal of a Polygon: A segment that ____

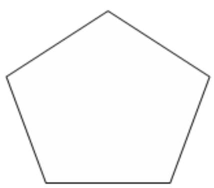
____

Theorem 8.1: Interior Angle Sum Theorem:

If a convex polygon has n sides and S is the sum of the measures of its interior angles, then

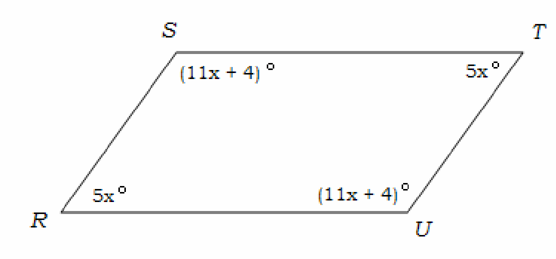
S =

Example #1: Find the sum of the measures of the interior angles of the regular pentagon below.



Example #2: The measure of an interior angle of a regular polygon is 135. Find the number of sides in the polygon.

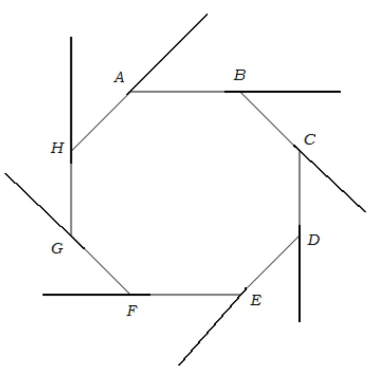
Example #3: Find the measure of each interior angle.



<u>Theorem 8.2: Exterior Angle Sum Theorem</u>:

If a polygon is convex, then the sum of the measures of the exterior angles, one at ____ .

Example #4: Find the measures of an exterior angle and an interior angle of convex regular nonagon *ABCDEFGHJ*.

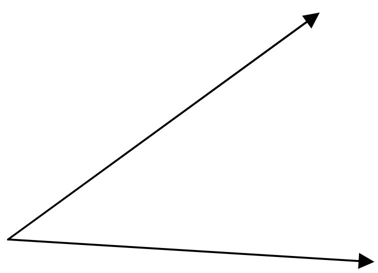


<u>CRITICAL THINKING</u>

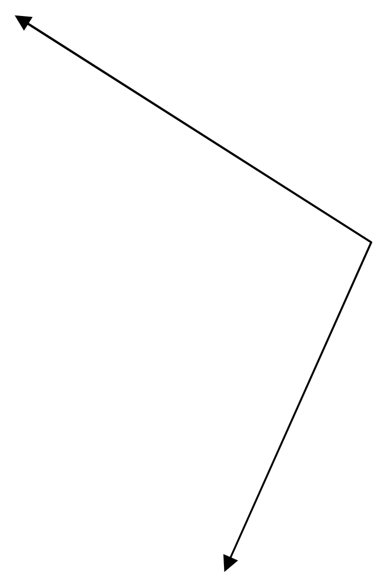
Find the measure of each interior angle in a quadrilateral in which the measure of each consecutive angle increases by 10.

Warm Up:
Measure the following angles with a protractor

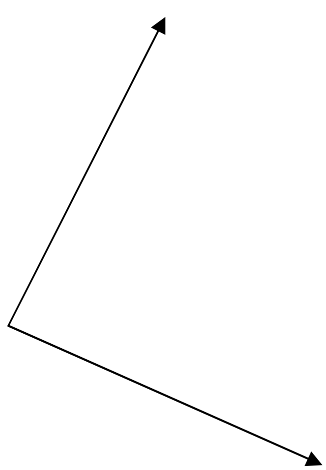
1.



2.



3.



Properties of Parallelograms Activity

Step 1 Using the lines on a piece of graph paper as a guide, draw a pair of parallel lines that are at least 10 cm long and at least 6 cm apart. Using the parallel edges of your straightedge, make a parallelogram. Label your parallelogram *MATH*.

Step 2 Look at the opposite angles. Measure the angles of parallelogram *MATH*. Compare a pair of opposite angles using your protractor.

The opposite angles of a parallelogram are ___________________.

Step 3 Two angles that share a common side in a polygon are consecutive angles. In parallelogram *MATH*, $\angle MAT$ and $\angle HTA$ are a pair of consecutive angles. The consecutive angles of a parallelogram are also related.

Find the sum of the measures of each pair of consecutive angles in parallelogram *MATH*.

The consecutive angles of a parallelogram are ________________________.

Step 4 Next look at the opposite sides of a parallelogram. With your ruler, compare the lengths of the opposite sides of the parallelogram you made.

The opposite sides of a parallelogram are ______________________.

Step 5 Finally, consider the diagonals of a parallelogram. Construct the diagonals $\overline{MT}$ and $\overline{HA}$. Label the point where the two diagonals intersect point *B*.

Step 6 Measure *MB* and *TB*. What can you conclude about point *B*? Is this conclusion also true for diagonal $\overline{HA}$? How do the diagonals relate?

The diagonals of a parallelogram _________________________.

Date: ______________________

Section 8 – 2: Parallelograms
Notes

Key Concept (Parallelogram):

A parallelogram is a ____

____

Ex: **Symbols:**

Theorem 8.3: Opposite sides of a parallelogram are _________________.

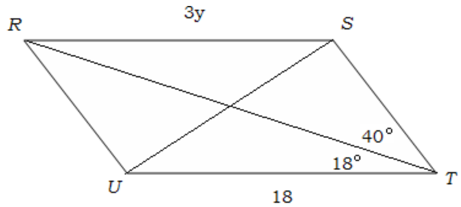
Theorem 8.4: Opposite angles in a parallelogram are _______________________ .

Theorem 8.5: Consecutive angles in a parallelogram are ___________________.

Theorem 8.6: If a parallelogram has one right angle, ______________________________ .

Theorem 8.7: The diagonals of a parallelogram ________________________________.

Example #1: *RSTU* is a parallelogram. Find $m\angle URT$, $m\angle RST$, and y.

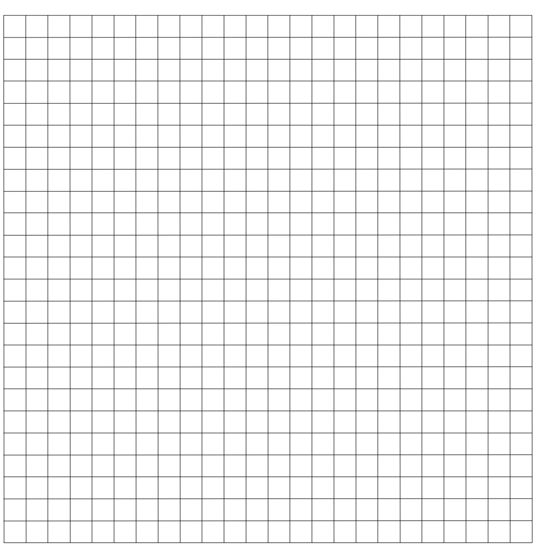


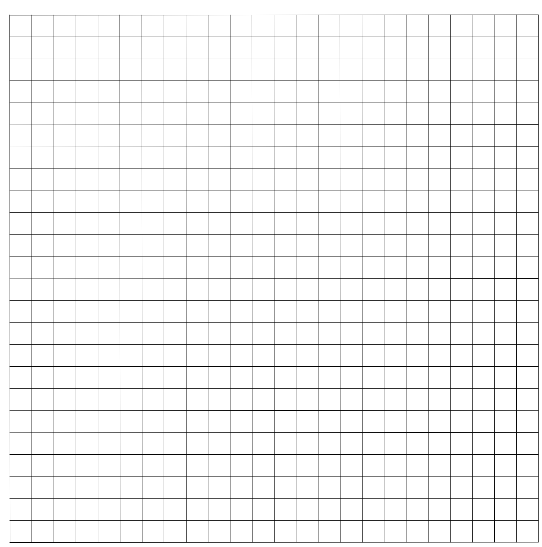
Theorem 8.8: Each diagonal of a parallelogram ___________________________________

____

CRITICAL THINKING

Draw a parallelogram on one of the graphs below. Prove that it's a parallelogram. You must use distance, midpoint, and a protractor.





Date: ____________________

<u>Section 8 – 3: Tests for Parallelograms</u>
Notes

<u>Conditions for a Parallelogram</u>: By definition, the opposite sides of a parallelogram are parallel. So, ____

<u>Key Concept (Proving Parallelograms)</u>:

<u>Theorem 8.9</u>: If ____ then the quadrilateral is a parallelogram.

Ex:

<u>Theorem 8.10</u>: If ____ then the quadrilateral is a parallelogram.

Ex:

<u>Theorem 8.11</u>: If ____ then the quadrilateral is a parallelogram.

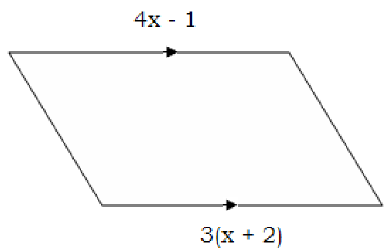
Ex:

<u>Theorem 8.12</u>: ____ then the quadrilateral is a parallelogram.

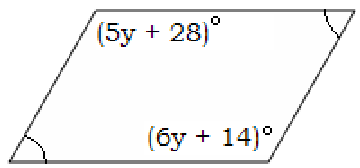
Ex:

Example #1: Find *x* and *y* so that each quadrilateral is a parallelogram and justify your reasoning.

a.)

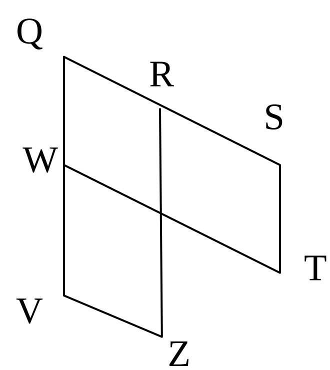


b.)



Given: ▱VZRQ and ▱WQST

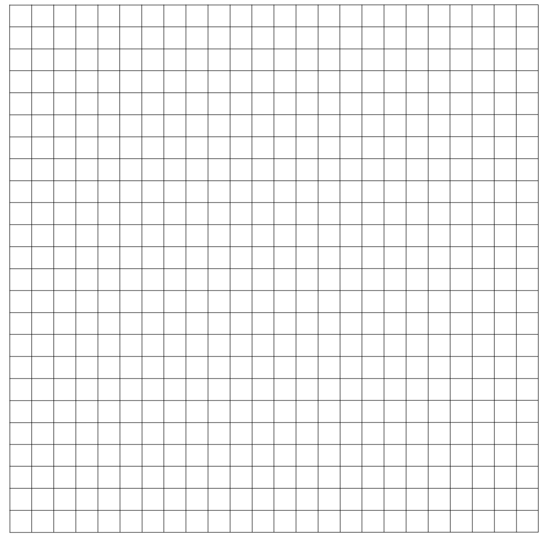
Prove: $\angle Z \cong \angle T$



Statements	Reasons
1. ▱ VZRQ	1.
2. $\angle Z \cong \angle Q$	2.
3. ▱ WQST	3.
4. $\angle Q \cong \angle T$	4.
5. $\angle Z \cong \angle T$	5.

CRITICAL THINKING

Is quadrilateral BCDE a parallelogram?
Why or why not?
B (0, 0), C (4, 1), D (6, 5), E (2, 4)



Date: ______________________

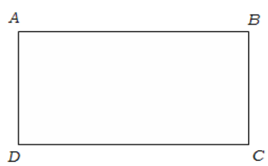
<u>Section 8 – 4: Rectangles</u>
Notes

<u>Rectangle</u>:

- ✓ A quadrilateral with ____
- ✓ Both pairs of opposite angles are ________________
- ✓ A rectangle has ____

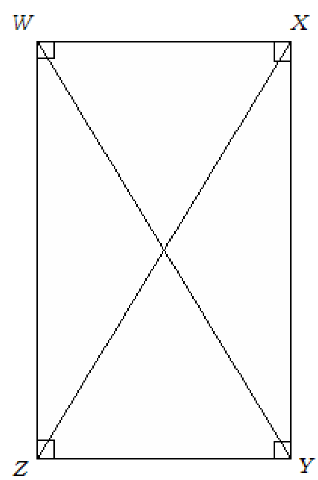
<u>Theorem 8.13</u>: If a parallelogram is a rectangle, then _________________________________

Ex:



<u>Key Concept (Rectangle)</u>:

Properties:



- ➢ Opposite sides are ____________________________.

  Ex:

- ➢ Opposite angles are ____________________________.

  Ex:

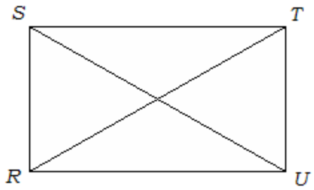
- ➢ Consecutive angles are ____________________________.

  Ex:

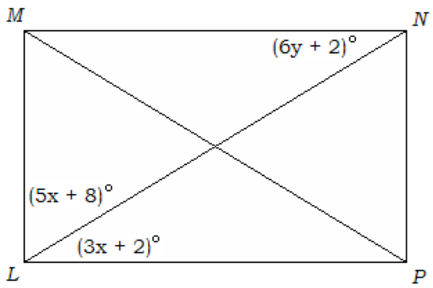
- ➢ All four angles are ____________________________.

  Ex:

Example #1: Quadrilateral $RSTU$ is a rectangle. If $RT = 6x + 4$ and $SU = 7x - 4$, find x.



Example #2: Quadrilateral $LMNP$ is a rectangle.

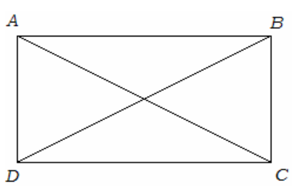


a.) Find x.

b.) Find y.

<u>Theorem 8.14</u>: If the diagonals of a parallelogram are congruent, then ____

Ex:



CRITICAL THINKING

Compare and contrast parallelograms and rectangles. What is the same? What is different?

Date: ______________________

Section 8 – 5: Rhombi and Squares
Notes

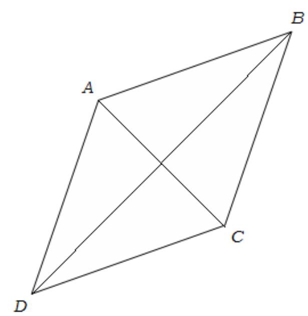
Rhombus:

- A ________________ is a special type of parallelogram called a ____________________.
- A rhombus is a quadrilateral ____.
- All of the properties of _________________________ can be applied to rhombi.

Key Concept (Rhombus):

Theorem 8.15: The diagonals of a rhombus are ________________________.

Ex:



Theorem 8.16: If the diagonals of a parallelogram are perpendicular , then ____.

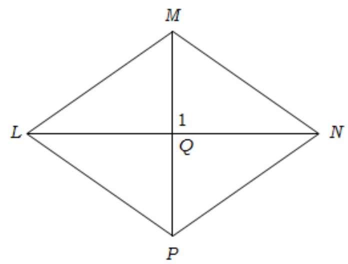
Ex:

Theorem 8.17: Each diagonal of a rhombus____

____

Ex:

Example #1: Use rhombus *LMNP* and the given information to find the value of each variable.



a.) Find y if $m\angle 1 = y - 54$

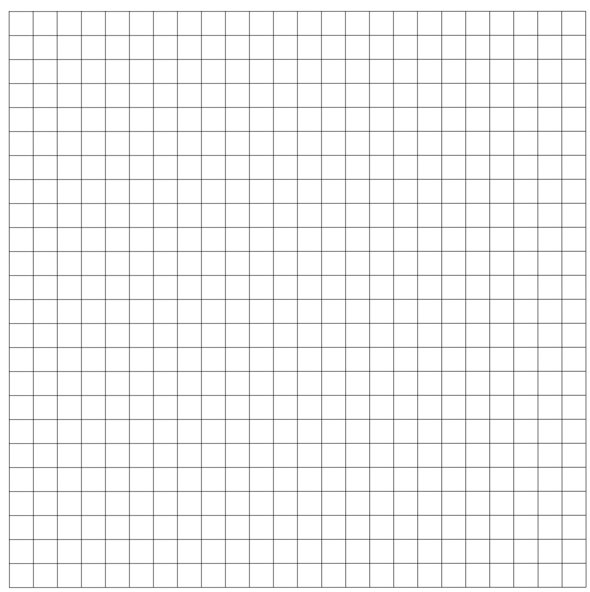
b.) Find $m\angle PNL$ if $m\angle MLP = 64$.

<u>Square</u>:

- If a quadrilateral is both a ______________ and a _________________, then it is a _________________________.
- All of the properties of ___________________ and __________________ can be applied to ________________.

<u>CRITICAL THINKING</u>

Construct a rhombus. Prove it's a rhombus as many ways as possible.



Date: ______________________

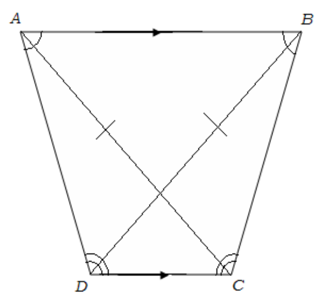
<u>Section 8 – 6: Trapezoids</u>
Notes

<u>Trapezoid</u>:

- A quadrilateral with exactly ____.
- The parallel sides are called ___________.
- The base angles are formed by ____
- The nonparallel sides are called __________.

<u>Isosceles Trapezoid</u>:

- A trapezoid that has ________________________________.



- **<u>Theorem 8.18</u>:** Both pairs of base _____________ of an isosceles trapezoid are ___________________.

  Ex:

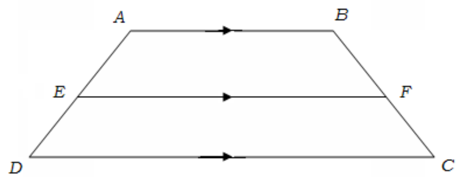
- **<u>Theorem 8.19</u>:** The diagonals of an isosceles trapezoid are _____________________.

  Ex:

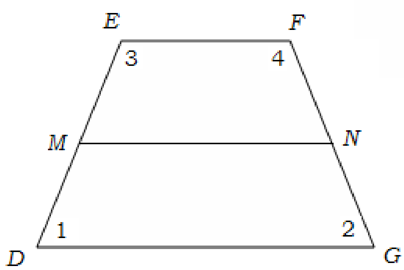
Median: The segment that ____

Theorem 8.20: The median of a trapezoid is _______________ to the bases, and its measure is _______________ the sum of the measures of the bases.

Ex:



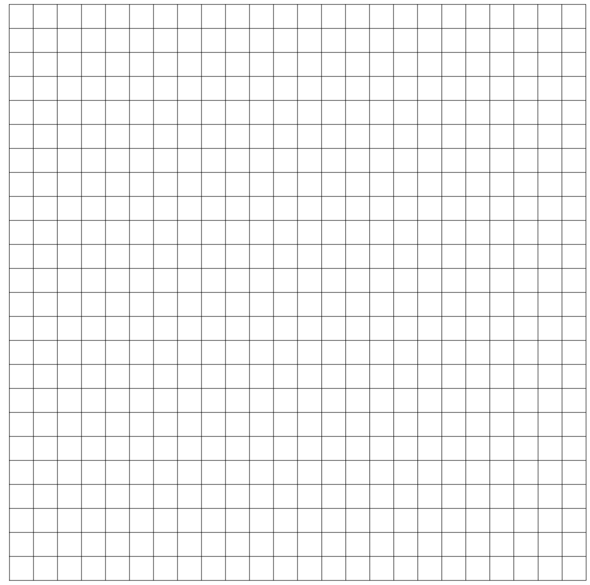
Example #1: *DEFG* is an isosceles trapezoid with median $\overline{MN}$.



a.) Find *DG* if *EF* = 20 and *MN* = 30.

b.) Find $m\angle 1$, $m\angle 2$, $m\angle 3$, and $m\angle 4$ if $m\angle 1 = 3x + 5$ and $m\angle 3 = 6x - 5$.

CRITICAL THINKING



Construct a trapezoid whose bases are not horizontal segments.

Type of Figure	Draw an Example	Special Characteristics
(Some things to ask yourself: diagonals equal, diagonals bisect each other, diagonals bisect angle, diagonals perpendicular, angle measures equal, angle measures supplementary, sides equal, sides parallel, etc…)		
1. Quadrilateral		
2. Parallelogram		
3. Square		
4. Rectangle		
5. Rhombus		
6. Trapezoid		
7. Isosceles Trapezoid		

Property	Parallelogram	Rectangle	Rhombus	Square	Trapezoid	Isosceles Trapezoid
Diagram of the figure						
Both pairs of opposite sides are $\parallel$						
Exactly 1 pair of opposite sides are $\parallel$						
Diagonals are $\perp$						
Diagonals are $\cong$						
Diagonals bisect each other						
Diagonals bisect pair of opposite $\angle$s						
Both pairs of opposite sides are $\cong$						
Exactly 1 pair of opposite sides are $\cong$						
Exactly 1 pair of consecutive sides are $\cong$						
All sides are $\cong$						
Both pairs of opposite $\angle$s are $\cong$						
Exactly 1 pair of opposite $\angle$s are $\cong$						
All $\angle$s are $\cong$						
All $\angle$s are supplementary to 2 consecutive $\angle$s