

## NOTES 7.4: SQUARES & RHOMBI

Objective: I can use properties of squares & rhombi to find measures & side lengths.

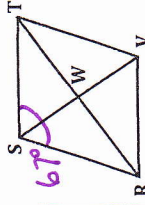
**RHOMBUS:** A parallelogram with 4  $\cong$  sides

Because a rhombus is a special type of parallelogram, it has all the properties of a parallelogram. In addition to all of the properties of a parallelogram, a rhombus has three additional special properties. They are:

- 1) Opposite sides are  $\parallel$ .
- 2) Opposite sides are  $\cong$ .
- 3) Opposite  $\angle$ s are  $\cong$ .
- 4) Consecutive  $\angle$ s are supplementary.
- 5) Diagonals bisect each other.
- 6) 4  $\cong$  sides.
- 7) Diagonals are  $\perp$ .
- 8) Diagonals bisect opposite  $\angle$ s.

### EXAMPLE 1:

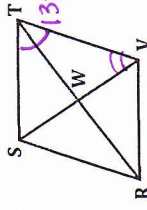
If RSTV is a rhombus and  $m\angle RST = 67^\circ$ , find  $m\angle RSW$ .



Diagonals bisect opposite  $\angle$ s!  
 $m\angle RSW = \frac{67}{2} = 33.5^\circ$

### EXAMPLE 2:

Find  $m\angle SVT$  if RSTV is a rhombus and  $m\angle STV = 135^\circ$ .



Consecutive  $\angle$ s supplementary!  
 $m\angle STV + m\angle RVT = 180$   
 $135 + m\angle RVT = 180$   
 $m\angle RVT = 45^\circ$

Diagonals bisect opposite  $\angle$ s!

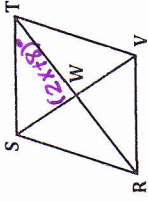
$$\frac{m\angle RVT}{2} = m\angle SVT$$

$$\frac{45}{2} = m\angle SVT$$

$$22.5^\circ = m\angle SVT$$

### EXAMPLE 3:

If RSTV is a rhombus and  $m\angle SWT = (2x + 8)^\circ$ , find 'x'.

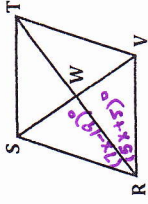


Diagonals are  $\perp$ !  
 $2x + 8 = 90$   
 $2x = 82$   
 $x = 41$

### EXAMPLE 4:

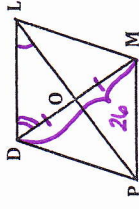
What is the value of 'x' if RSTV is a rhombus,  $m\angle WRV = (5x + 5)^\circ$ , and  $m\angle WRS = (7x - 19)^\circ$ ?

Diagonals bisect opposite  $\angle$ s!  
 $7x - 19 = 5x + 5$   
 $2x = 24$   
 $x = 12$



### EXAMPLE 5:

Use rhombus DLMP with  $DM = 26$  to determine whether each statement is true or false. Justify your answers.



a)  $OM = 13$

True - Diagonals bisect each other!

b)  $\overline{MD} \cong \overline{PL}$

False - Diagonals not  $\cong$ !

c)  $m\angle DLO = m\angle LDO$

False - Since diagonals are  $\perp$ , these are complementary!

Notes 7.4 - Squares & Rhombi (Continued)

**SQUARE:** A parallelogram that is both a rectangle & a rhombus

Because a square is a special type of parallelogram, it has all of the properties of a parallelogram, in addition to those of a rectangle and a square. They are...

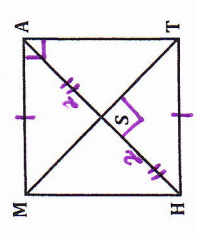
- 1) Opposite sides are  $\parallel$ .
- 2) Opposite sides are  $\cong$ .
- 3) Opposite  $\angle$ s are  $\cong$ .
- 4) Consecutive  $\angle$ s are supplementary.
- 5) Diagonals bisect each other.
- 6) 4 right  $\angle$ s.
- 7) Diagonals are  $\cong$ .
- 8) 4  $\cong$  sides.
- 9) Diagonals are  $\perp$ .
- 10) Diagonals bisect opposite  $\angle$ s.

Parallelogram, Rectangle, Rhombus

**EXAMPLE 1:**

MATH is a square.

- a) If  $MA = 8$ , then  $HT = 8$ .  
Opposite sides are  $\cong$ .
- b)  $m\angle HST = 90^\circ$ .  
Diagonals are  $\perp$ .
- c)  $m\angle MAT = 90^\circ$ .  
4 rt  $\angle$ s.
- d) If  $HS = 2$ , then  $HA = 4$  and  $MT = 4$ .  
Diagonals bisect each other. Diagonals are  $\cong$ .



**EXAMPLE 2:**

Use square ABCD and the given information to find each.

- a) If  $m\angle AED = (5x + 5)^\circ$ , find 'x'. Diagonals are  $\perp$ .  
 $5x + 5 = 90$   
 $5x = 85$   
 $x = 17$
- b) If  $m\angle BAC = (5x)^\circ$ , find 'x'. Diagonals bisect opposite  $\angle$ s.  
 $5x = 45$   
 $x = 9$

