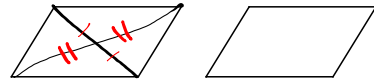
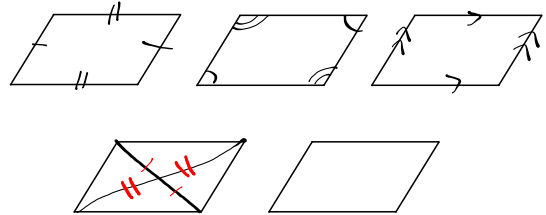


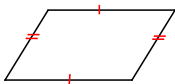
### 3-4 Special Parallelograms

Quadrilaterals  
 ↓  
 parallelograms  
 ↓ ↓ ↓  
 Rhombus square Rectangles

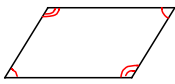
What do we know about Parallelograms?



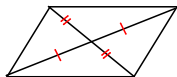
Also remember from last time:



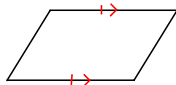
If opposite sides are congruent...



If opposite angles are congruent...



If the diagonals bisect each other...



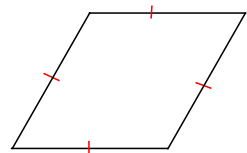
If opposite sides are congruent and parallel...

...then the quadrilateral is a parallelogram.

These will make things easy today

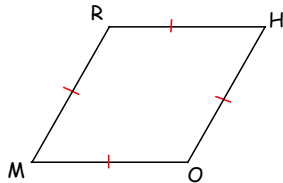
Definition:

Rhombus - a quadrilateral with all sides congruent.

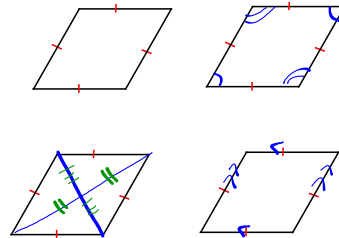


Prove that rhombus RHOM is a parallelogram. (if you remember last time this should take one statement)

Because opposite sides of RHOM are congruent, RHOM is a parallelogram.



Since a rhombus is a parallelogram, what properties hold true for all rhombi?

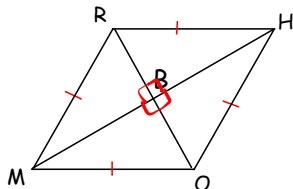


The next theorem for Rhombi is:

The diagonals of a Rhombi are Perpendicular.

What does this mean?

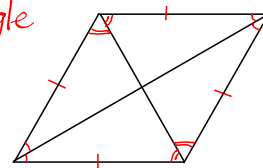
Interior angles around bisection are  $90^\circ$ .



We also can prove that the diagonals of a rhombus bisect the vertex angles. What does that mean?

cut each vertex angle in half.

cut into half



Use what we know about Rhombi to

find the following:

$$\overline{AB} = 242$$

$$\overline{BC} = 242$$

$$\overline{CD} = 242$$

$$\overline{DA} = 242$$

$$\overline{AE} = 11$$

$$\overline{BE} = 86$$

$$\overline{DE} = 86$$

$$\overline{EC} = 11$$

$$3(14) + 12$$

$$\begin{aligned} 13x + 8 &= 10y + 62 \\ -10y &\quad -10y \\ \hline 3y + 8 &= 62 \\ -8 &\quad -8 \\ \hline 3y &= 54 \\ \div 3 &\quad \div 3 \\ y &= 18 \end{aligned}$$

$$\begin{aligned} 4x - 2 &= 3x + 12 \\ -3x &\quad -3x \\ \hline x - 2 &= 12 \\ +2 &\quad +2 \\ \hline x &= 14 \end{aligned}$$

$$\begin{aligned} \angle DAB &= 105^\circ \\ \angle ABC &= 75^\circ \\ \angle BCD &= 105^\circ \\ \angle CDA &= 75^\circ \\ \angle DEA &= 90^\circ \\ \angle DEC &= 90^\circ \\ \angle CEB &= 90^\circ \\ \angle BEA &= 90^\circ \end{aligned}$$

$$\begin{aligned} \angle EBC &= 37.5^\circ \\ \angle DAE &= 52.5^\circ \\ \angle EAB &= 52.5^\circ \\ \angle ABE &= 37.5^\circ \\ \angle ECB &= 52.5^\circ \\ \angle ECD &= 52.5^\circ \\ \angle EDC &= 37.5^\circ \\ \angle ADE &= 37.5^\circ \end{aligned}$$

Definition:

Rectangle - A quadrilateral with all angles congruent.



Prove that rectangle RECT is a parallelogram.

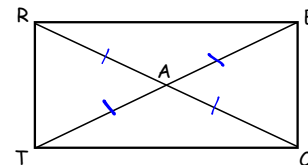
Because  
opposite  
angles are  
congruent  
RECT is a parallelogram.



Rectangle Theorem:

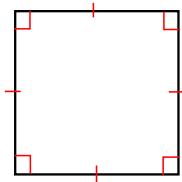
Diagonals bisect each other.

All sections are congruent.



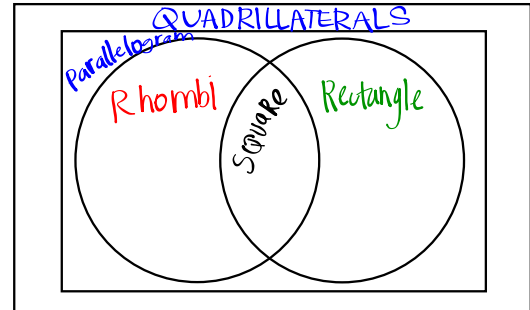
Definition:

Square - A quadrilateral with all four sides and all four angles congruent.

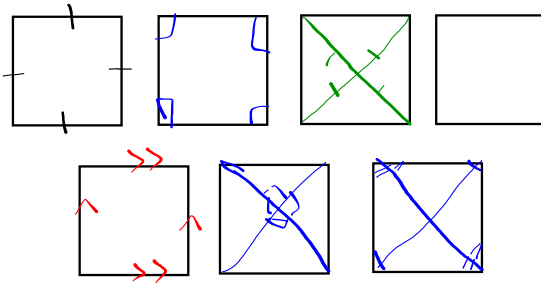


Venn Diagram: Put all the quadrilaterals we learned so far in the appropriate place in the venn diagram

Quadrilaterals    Parallelograms    Rectangles    Squares    Rhombi



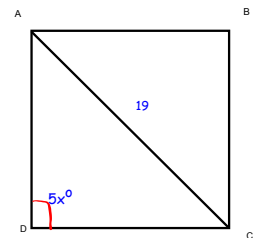
Now that we know that a square is a parallelogram, a rhombus, and a rectangle, what properties does a square have?



ABCD is a square solve for x

$$\frac{5x}{5} = \frac{90}{5}$$

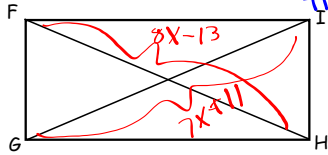
$$x = 18$$



FGHI is a Rectangle. Solve for x.

$$FH = 8x - 13$$

$$GI = 7x + 11$$



$$\begin{aligned} 8x - 13 &= 7x + 11 \\ -7x &\quad -7x \\ x - 13 &= 11 \\ +13 &\quad +13 \\ x &= 24 \end{aligned}$$