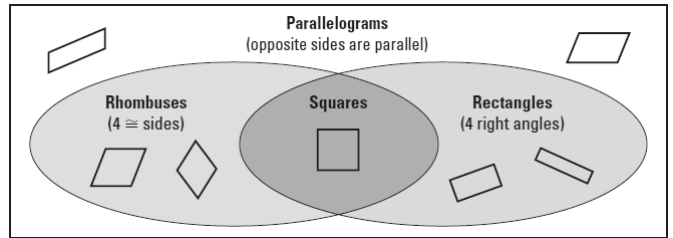


Name: \_\_\_\_\_ Date: \_\_\_\_\_ Block: \_\_\_\_\_

**Rhombuses, Rectangles, Squares**

The Venn diagram below describes the relationship between different kinds of parallelograms:

- A **rhombus** is a parallelogram with four congruent sides
- A **rectangle** is a parallelogram with four right angles
- A **square** is a parallelogram with four congruent sides and four right angles



Corollaries:

- A quadrilateral is a rhombus IFF it has four congruent sides
  - A quadrilateral is a rectangles IFF it has four right angles
  - A quadrilateral is a square IFF it is a rhombus and a rectangle.
- Since rhombuses, squares, and rectangles are parallelograms, they have all the properties of parallelograms (opposite sides parallel, opposite angles congruent, diagonals bisect each other, etc.)
- In addition...

Rhombus	Rectangle	Square
<ul style="list-style-type: none"> <li>• 4 congruent sides</li> <li>• diagonals bisect angles</li> <li>• diagonals perpendicular</li> </ul>	<ul style="list-style-type: none"> <li>• 4 right angles</li> <li>• diagonals congruent</li> </ul>	<ul style="list-style-type: none"> <li>• 4 congruent sides</li> <li>• diagonals bisect each other</li> <li>• diagonals perpendicular</li> <li>• 4 right angles</li> <li>• diagonals congruent</li> </ul>

Theorems:

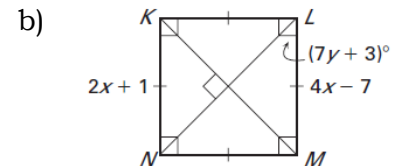
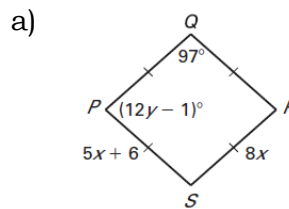
- A parallelogram is a rhombus IFF its diagonals are perpendicular.
- A parallelogram is a rhombus IFF each diagonal bisects a pair of opposite angles.
- A parallelogram is a rectangle IFF its diagonals are congruent.

Examples:

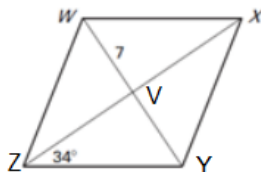
1) Given rhombus *DEFG*, are the statements sometimes, always, or never true:

- a)  $\angle D \cong \angle F$    b)  $\angle D \cong \angle E$    c)  $\overline{DG} \cong \overline{GF}$

2) Classify the parallelogram and find missing values:

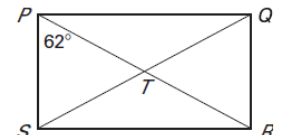


3) Given rhombus *WXYZ* and  $m\angle XZY = 34^\circ$ , find:  
 a)  $m\angle WZV$    b) *WY*   c) *XY*



4) Given rectangle *PQRS* and  $m\angle RPS = 62^\circ$  and  $QS=18$ , find:

- a)  $m\angle QPR$    b)  $m\angle PTQ$    c) *ST*

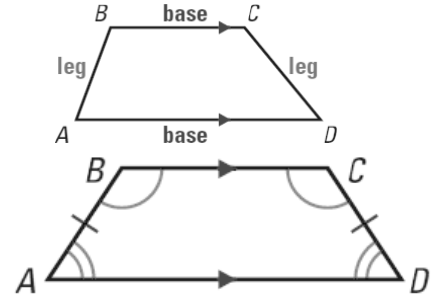


**Trapezoids and Kites**

- A **trapezoid** is a quadrilateral with OAOO pair of parallel sides
- A *midsegment* (also called a median) of a trapezoid connects the midpoints of each leg
- An *isosceles trapezoid* has legs that are congruent

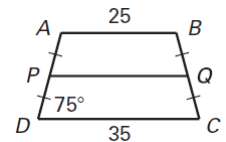
Theorems:

- If a trapezoid is isosceles then each pair of base angles is congruent.
- If a trapezoid has a pair of congruent base angles, then it is isosceles.
- A trapezoid is isosceles IFF its diagonals are congruent.
- The midsegment of a trapezoid is parallel to each base and its length is one half the sum of the lengths of the bases.

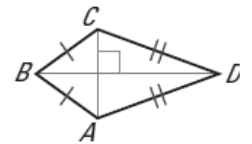


Examples:

- a) The vertices of  $ABCD$  are  $A(-5, 6)$ ,  $B(1,3)$ ,  $C(0, 0)$  and  $D(-7, 0)$ . Show that it is a trapezoid.



- A **kite** is a quadrilateral that has two pairs of consecutive congruent sides, but its opposite sides are not congruent.

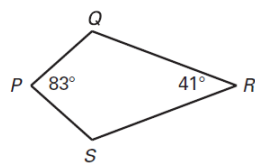


Theorems:

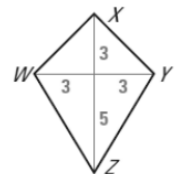
- If a quadrilateral is a kite, then its diagonals are perpendicular.
- If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.

Examples:

- a) Find  $m\angle Q$  and  $m\angle S$  in the kite.

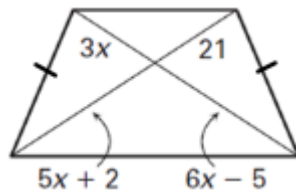


- b) Find the missing side lengths of the kite.

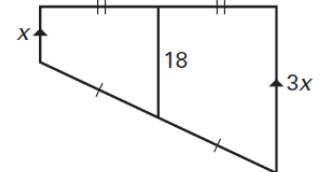


You try...

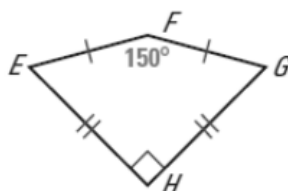
- a) Find the value of  $x$  in the trapezoid



- b) Find the value of  $x$  in the trapezoid



- c) Find the missing angles in the kite



- d) Find the missing side lengths of the kite

