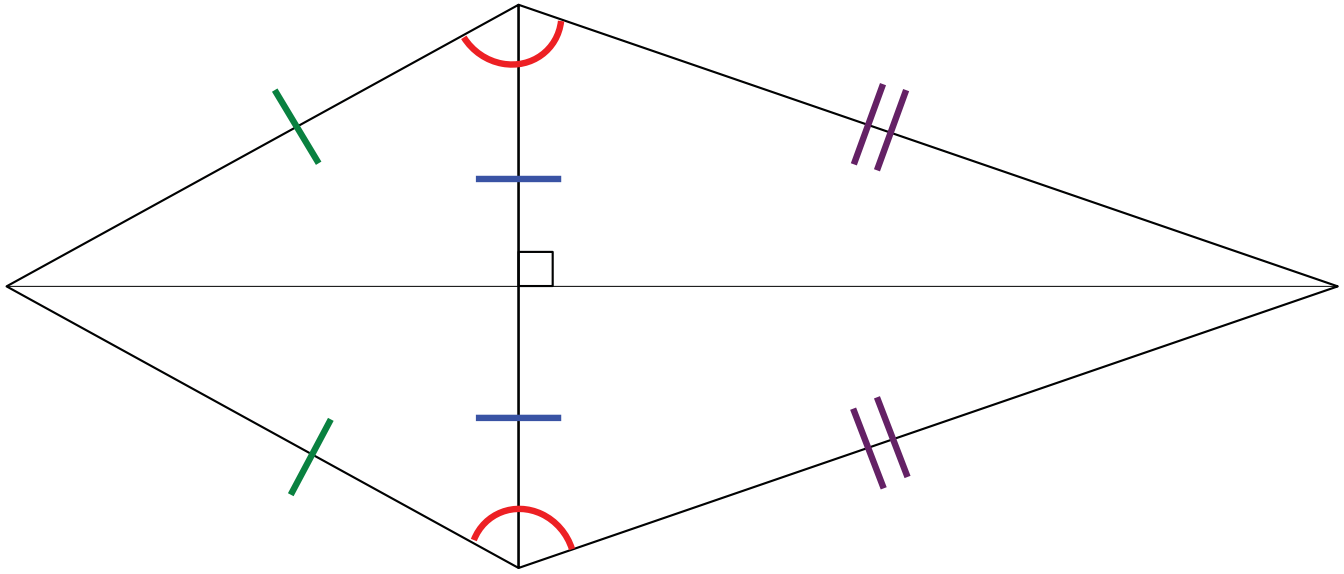
Special Quadrilaterals

Properties of Kites & Trapezoids

Kites

…are quadrilaterals (not parallelograms) that have exactly two pairs of congruent, adjacent sides

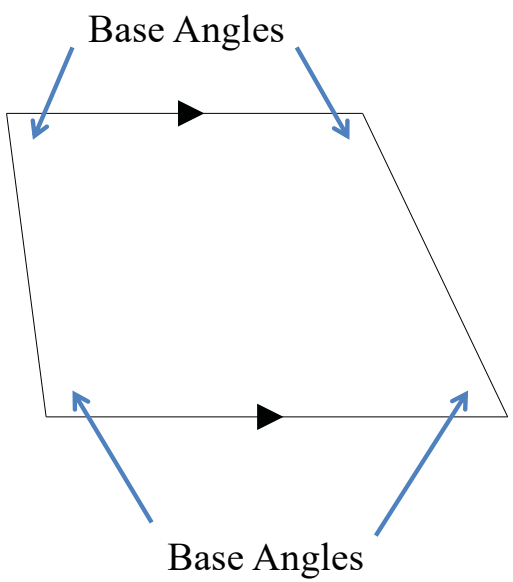
- In a kite, the diagonals are perpendicular.
- In a kite, exactly one pair of opposite angles is congruent.
- In a kite, the diagonal connecting the congruent angles is always bisected by the other diagonal.



Trapezoids

…are quadrilaterals with exactly one pair of parallel sides

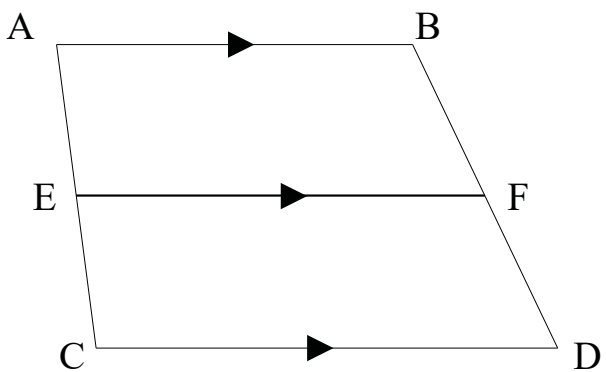
- The parallel sides are called **bases** and the non-parallel sides are called **legs**
- **Base angles** are the consecutive angles that have a base as a common side.



Trapezoids

…are quadrilaterals with exactly one pair of parallel sides

- The **midsegment** of a trapezoid connects the midpoints of each leg and is parallel to the bases
- **The length of the midsegment** is the average of the lengths of the two bases



$\overline{AE} \cong \overline{EC}$

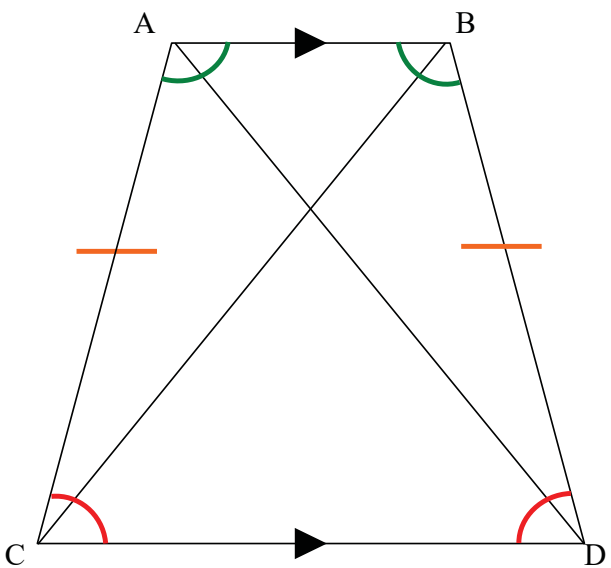
$\overline{BF} \cong \overline{FD}$

$$EF = \frac{1}{2}\left(AB + CD\right)$$

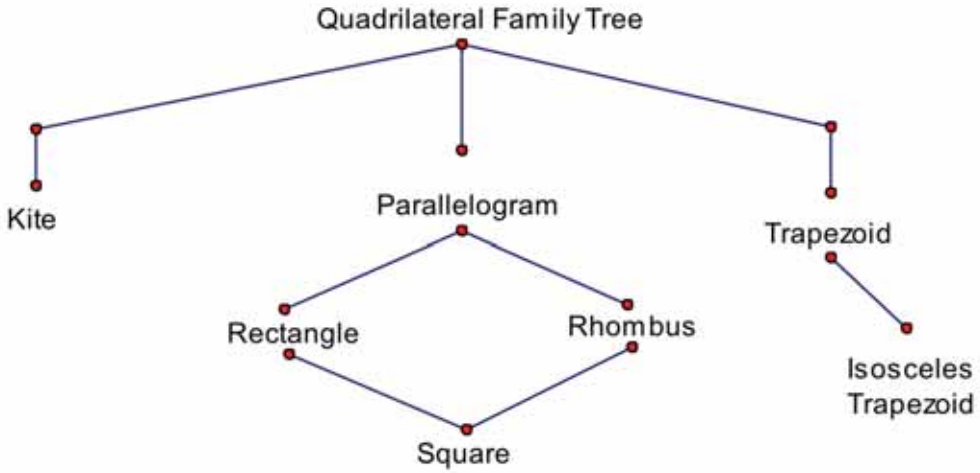
Isosceles Trapezoids

…are trapezoids in which the legs are congruent

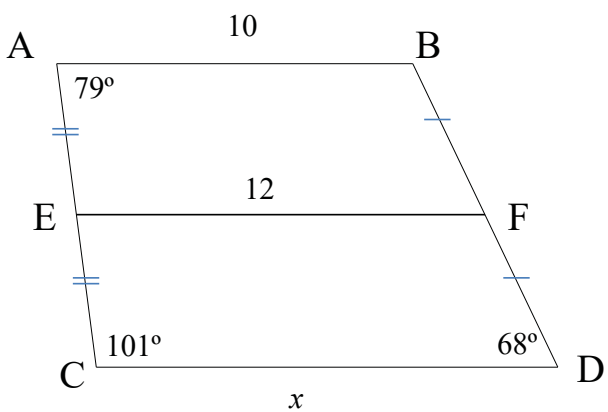
- A trapezoid is isosceles if and only if both pairs of base angles are congruent
- A trapezoid is isosceles if and only if the diagonals are congruent



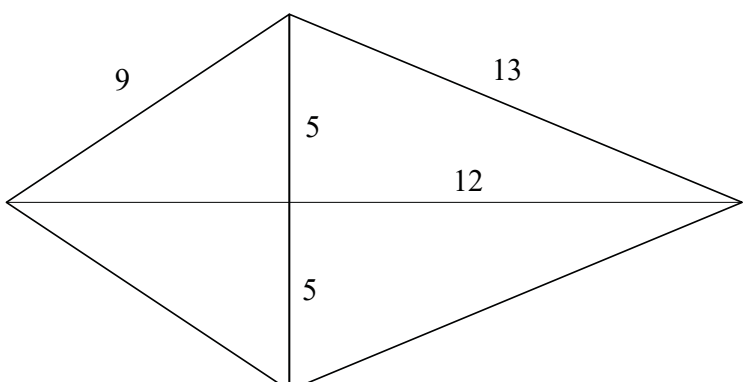
$\overline{AD} \cong \overline{BC}$



For our next class meeting



Show that *ABCD* is a trapezoid and solve for *x*



Is this a kite? Explain.

$\angle A$ is supplementary to $\angle C$ so $\overline{AB} \parallel \overline{CD}$

$\angle C$ is not supplementary to $\angle D$ so

$\overline{AC}$ is not parallel to $\overline{BD}$

Exactly one pair of parallel sides shows that

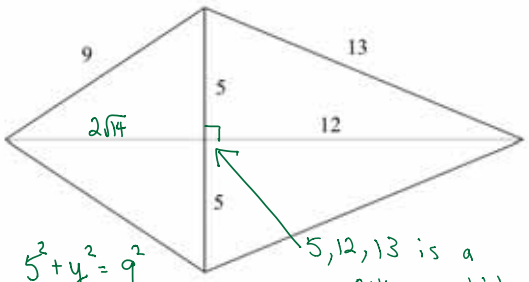
ABCD is a trapezoid

$\frac{1}{2}(10+x) = 12$

$5 + \frac{1}{2}x = 12$

$\frac{1}{2}x = 7$

$x = 14$



$5^2 + y^2 = 9^2$

$y^2 = 56$

$y = \sqrt{56}$

$= \sqrt{4 \cdot 14}$

$= 2\sqrt{14} \neq 12$

5, 12, 13 is a pythagorean triple, therefore this is a right angle

Therefore only one diagonal bisects the other and they are perpendicular. It is a Kite