

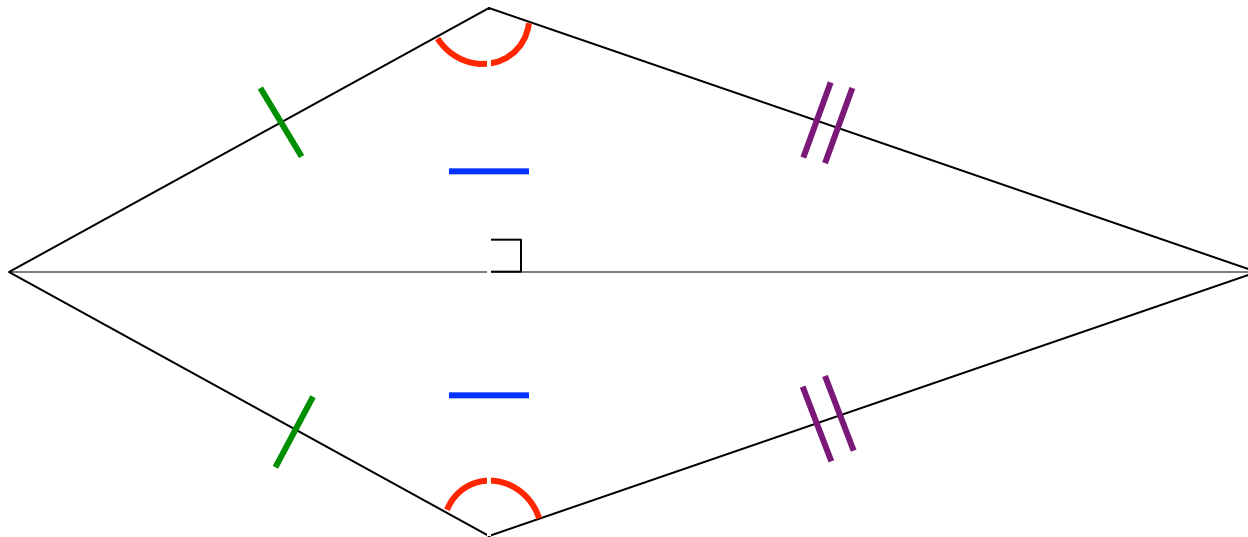
# Special Quadrilaterals

Properties of Kites & Trapezoids

# Kites

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

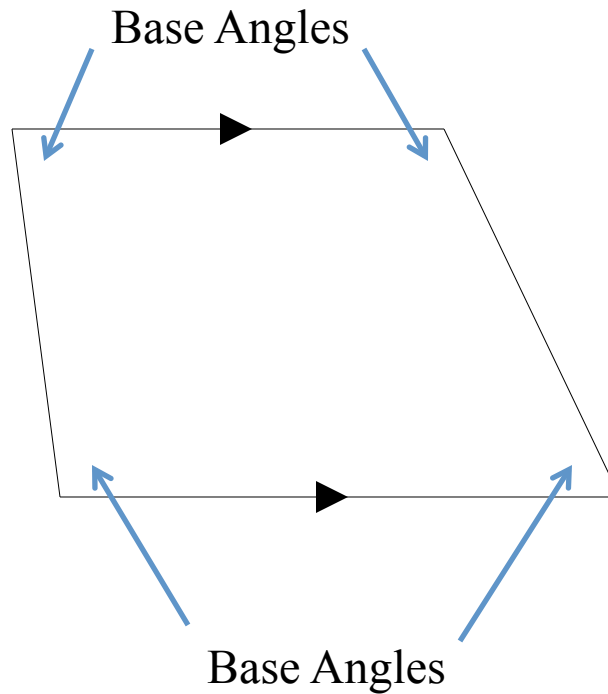
- In a kite, the diagonals are perpendicular.
- In a kite, exactly one pair of opposite angles is congruent.
- In a kite, the diagonal connecting the congruent angles is always bisected by the other diagonal.



# Trapezoids

...are quadrilaterals with exactly one pair of parallel sides

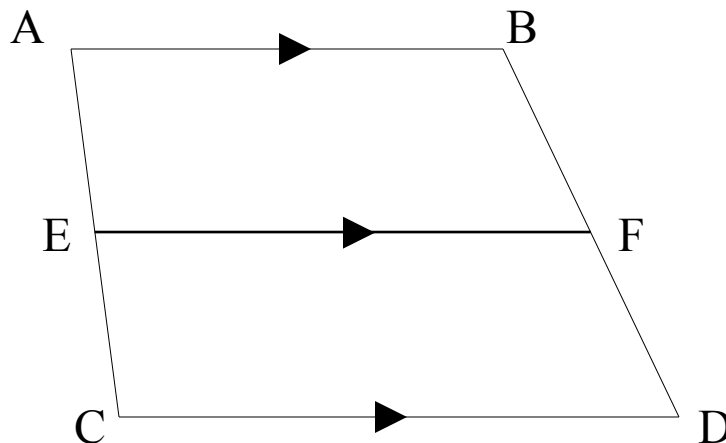
- The parallel sides are called **bases** and the non-parallel sides are called **legs**
- **Base angles** are the consecutive angles that have a base as a common side.



# 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



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

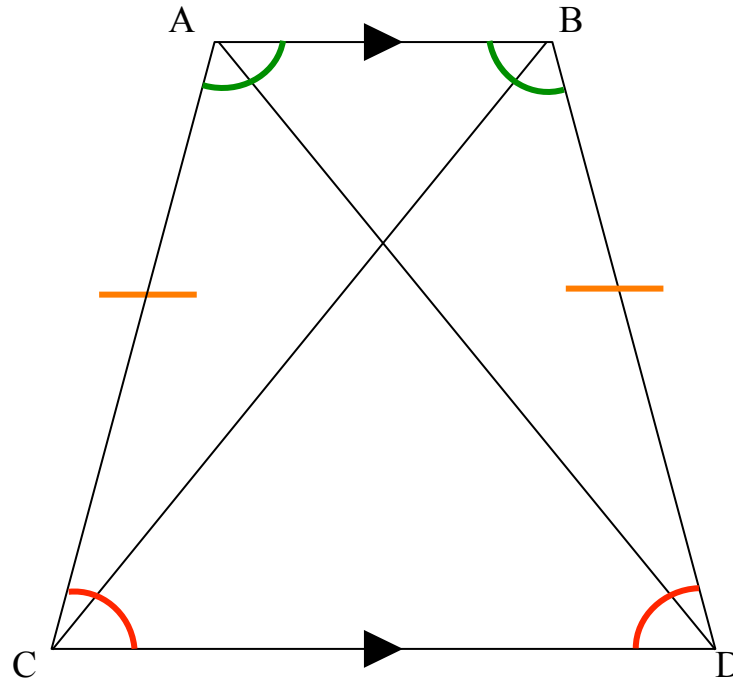
$$\overline{BF} \cong \overline{FD}$$

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

## 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



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

# Isosceles Trapezoids

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We can further say that since

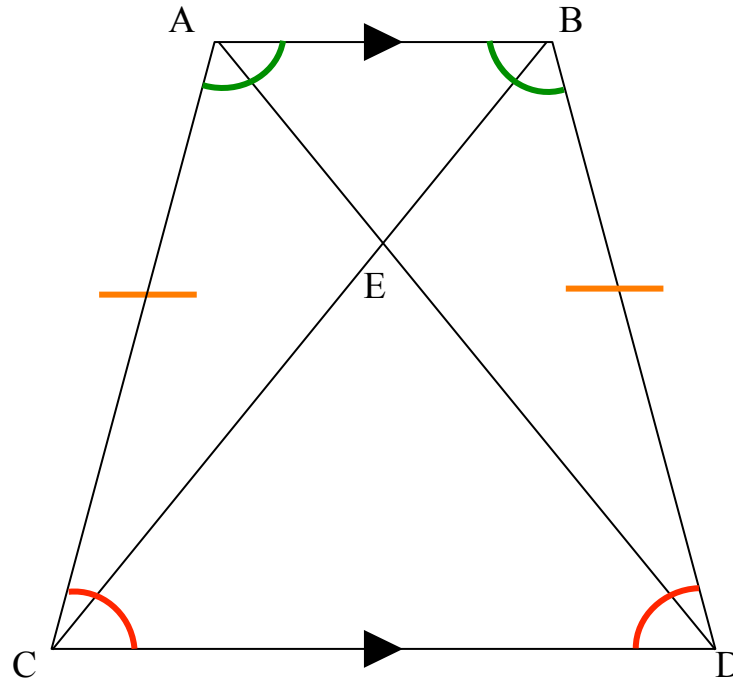
$$\overline{AB} \cong \overline{AB}$$

$$\angle CAB \cong \angle DBA$$

$$\overline{AC} \cong \overline{BD}$$

$$\triangle ABD \cong \triangle BAC$$

Side-Angle-Side



...so by CPCTC

$$\angle EDB \cong \angle ECA$$

$$\angle EAB \cong \angle EBA$$

$$\overline{AE} \cong \overline{BE}$$

$\triangle ABE$  is an isosceles triangle

$$\angle ECD \cong \angle EDC$$

$$\angle CAE \cong \angle DBE$$

$$\overline{CE} \cong \overline{DE}$$

$\triangle CDE$  is an isosceles triangle

# Quadrilateral Family Tree

