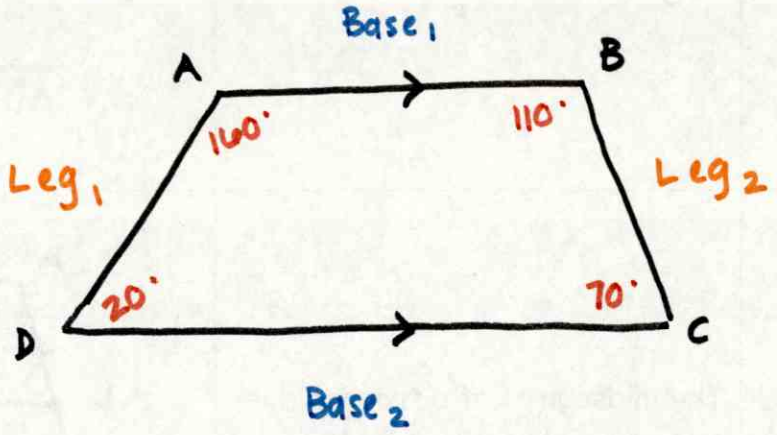
Section 8.5 Date

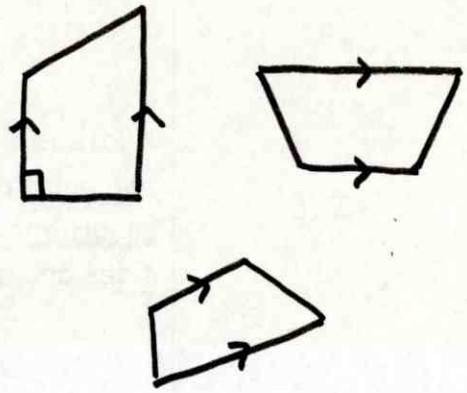
Use Properties of Trapezoids and Kites

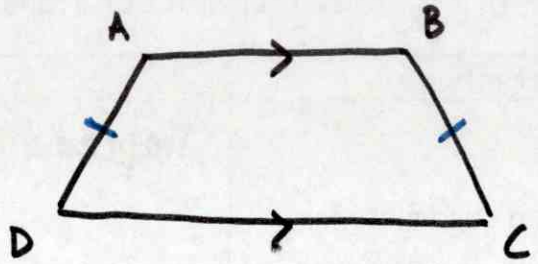
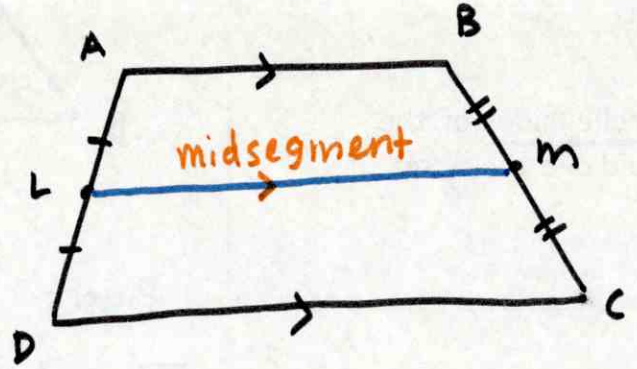
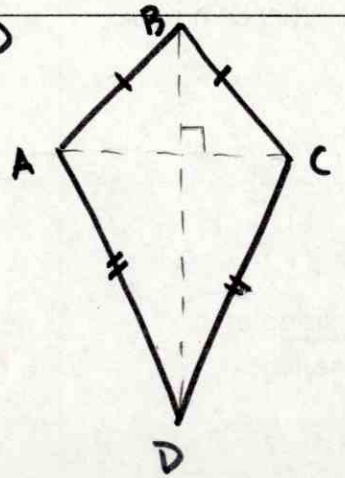
Vocabulary	Definition	Example
TRAPEZOID	A trapezoid is a quadrilateral with exactly one pair of opposite sides parallel.	Trapezoid ABCD where $\overline{AB} \parallel \overline{CD}$
BASES of TRAPEZOID	The parallel sides of the trapezoid are the bases.	Bases $\overline{AB}$ and $\overline{DC}$
BASE ANGLES of a TRAPEZOID	A trapezoid has two pair of base angles. Each pair shares a base as a side.	Base Angles: $\overline{AB}$: $\angle A$ and $\angle B$; $\overline{DC}$: $\angle D$ and $\angle C$
LEGS of a TRAPEZOID	The nonparallel sides of a trapezoid are the legs.	Legs $\overline{AD}$ and $\overline{BC}$

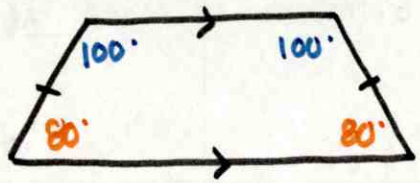
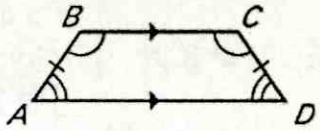
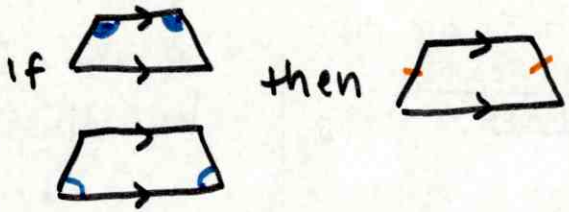
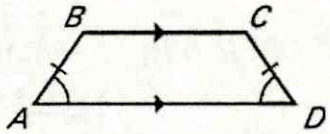
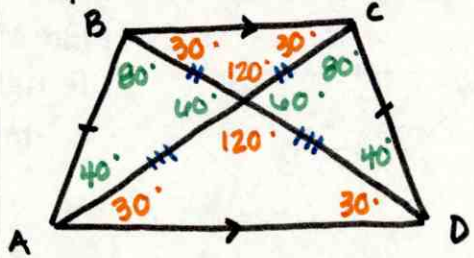
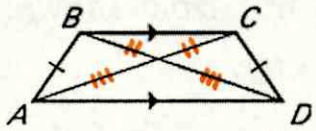
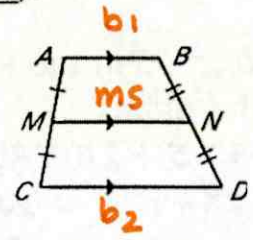


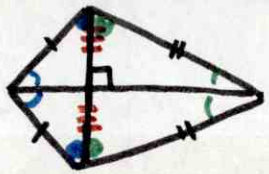
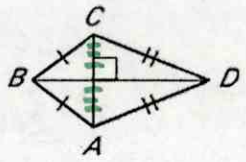
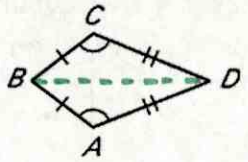
$\angle A + \angle D = 180°$

$\angle B + \angle C = 180°$



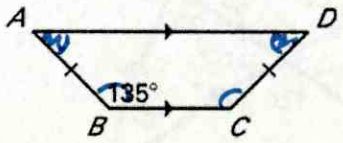
ISOSCELES TRAPEZOID	An isosceles trapezoid is a trapezoid in which the legs are congruent.	 $\overline{AD} \cong \overline{BC}$
MIDSEGMENT of a TRAPEZOID	The midsegmet of a trapezoid is a segment that connects the midpoints if its legs.	 $\overline{LM}$ is a midsegment
KITE	A kite is a quadrilateral (next to each other) that has two pairs of consecutive congruent sides, but opposite sides are not congruent.	Kite ABCD  $\overline{AB} \cong \overline{BC}$ and $\overline{AD} \cong \overline{CD}$ * formed by 2 isosceles Δs

THEOREM 8.14	If a trapezoid is isosceles, then each pair of base angles is/are congruent.	If trapezoid *ABCD* is isosceles, then $\angle A \cong \angle$ D and $\angle$ B $\cong \angle C$.  
THEOREM 8.15	If a trapezoid has a pair of congruent base angles, then it is an isosceles trapezoid.	If $\angle A \cong \angle D$ (or if $\angle B \cong \angle C$), then trapezoid *ABCD* is isosceles.  
THEOREM 8.16	A trapezoid is isosceles if and only if its diagonals are congruent.	Trapezoid *ABCD* is isosceles if and only if $\overline{BD} \cong \overline{AC}$.  
THEOREM 8.17	The midsegment of a trapezoid is parallel to each base and its length is one half the sum of the lengths of the bases. midsegment = $\frac{1}{2}$(base$_1$ + base$_2$)	If $\overline{MN}$ is the midsegment of trapezoid *ABCD*, then $\overline{MN} \parallel \overline{AB}$, $\overline{MN} \parallel \overline{CD}$, and $MN = \frac{1}{2}$ (AB + CD). midsegment = $\frac{(\text{base}_1 + \text{base}_2)}{2}$ 2(midsegment) = base$_1$ + base$_2$ 

THEOREM 8.18	If a quadrilateral is a kite, then its diagonals are perpendicular.	If quadrilateral *ABCD* is a kite, then $\overline{AC} \perp \overline{BD}$.   $\overline{AC}$ is bisected by $\overline{BD}$
THEOREM 8.19	If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.	If quadrilateral *ABCD* is a kite and $\overline{BC} \cong \overline{BA}$, then $\angle A \cong \angle C$ and $\angle B \not\cong \angle D$. $\angle B$ and $\angle D$ are bisected by diagonal $\overline{BD}$. 

Examples:

Find $m\angle C$, $m\angle A$, and $m\angle D$ in the trapezoid shown.



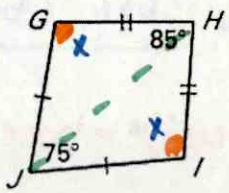
$m\angle C = 135°$

$m\angle A = 180 - 135$ (consecutive)

$m\angle A = 45°$

$m\angle D = 45°$

Find $m\angle G$ in the kite shown at the right.



$2x + 75 + 85 = 360$

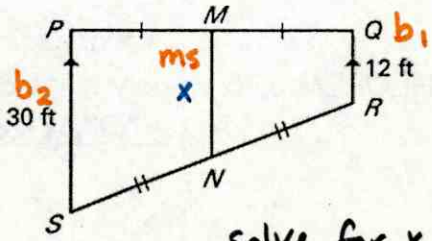
$2x + 160 = 360$

$2x = 200$

$x = 100$

$m\angle G = 100°$

Find *MN* in the trapezoid at the right.

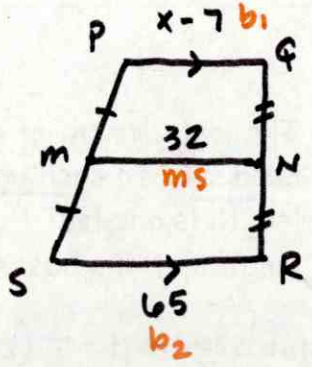


$ms = \frac{(b_1 + b_2)}{2}$

$x = \frac{(12 + 30)}{2}$

$x = \frac{42}{2}$

$MN = 21$



Solve for x.

$32 = \frac{(x - 7 + 65)}{2}$

$64 = x - 7 + 65$

$64 = x + 58$

$x = 6$