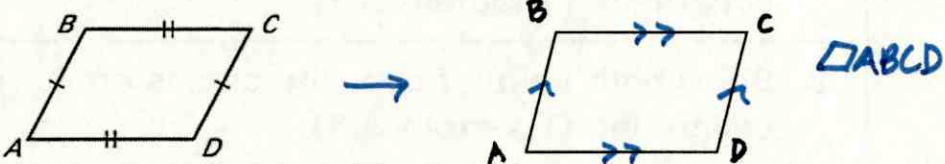
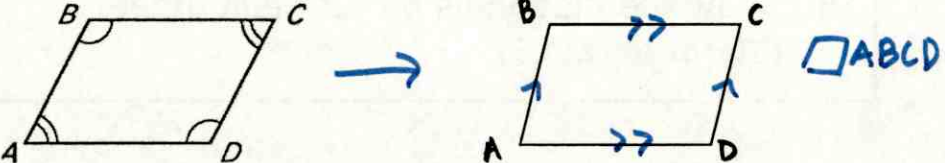
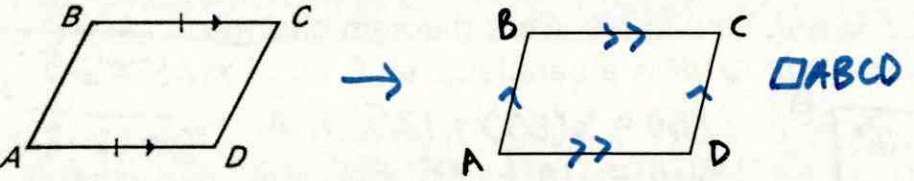
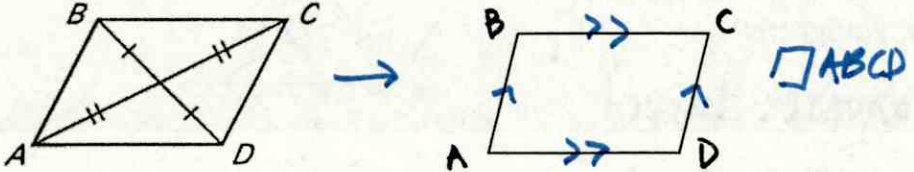


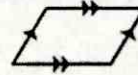
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Show that a Quadrilateral is a Parallelogram

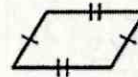
Vocabulary	Definition	Example
THEOREM 8.7	If <u>both</u> pairs of opposite <u>sides</u> of a quadrilateral are congruent, then the quadrilateral is a parallelogram.	If $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$, then $ABCD$ is a parallelogram. 
THEOREM 8.8	If both pairs of opposite <u>angles</u> of a quadrilateral are congruent, then the quadrilateral is a parallelogram.	If $\angle A \cong \angle C$ and $\angle B \cong \angle D$, then $ABCD$ is a parallelogram. 
THEOREM 8.9	If <u>one pair</u> of opposite sides of a quadrilateral are <u>congruent</u> and <u>parallel</u> , then the quadrilateral is a parallelogram.	If $\overline{BC} \cong \overline{AD}$ and $\overline{BC} \parallel \overline{AD}$, then $ABCD$ is a parallelogram. 
THEOREM 8.10	If the diagonals of a quadrilateral <u>bisect</u> each other, then the quadrilateral is a parallelogram.	If \overline{BD} and \overline{AC} <u>bisect</u> each other, then $ABCD$ is a parallelogram. 

CONCEPT SUMMARY: WAYS TO PROVE A QUADRILATERAL IS A PARALLELOGRAM

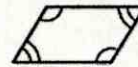
1. Show both pairs of opposite sides are parallel. (Definition)



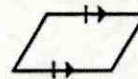
2. Show both pairs of opposite sides are congruent. (Theorem 8.7)



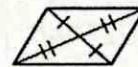
3. Show both pairs of opposite angles are congruent. (Theorem 8.8)



4. Show one pair of opposite sides are congruent and parallel. (Theorem 8.9)

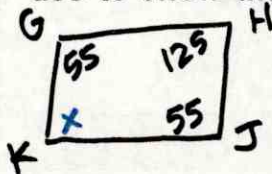


5. Show the diagonals bisect each other. (Theorem 8.10)



Examples:

In quadrilateral $GHJK$, $m\angle G = 55^\circ$, $m\angle H = 125^\circ$, and $m\angle J = 55^\circ$. Find $m\angle K$. What theorem can you use to show that $GHJK$ is a parallelogram?



$$360 = 2(55) + 125 + x$$

$$360 = 110 + 125 + x$$

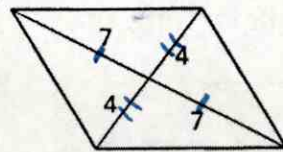
$$360 = 235 + x$$

$$x = 125$$

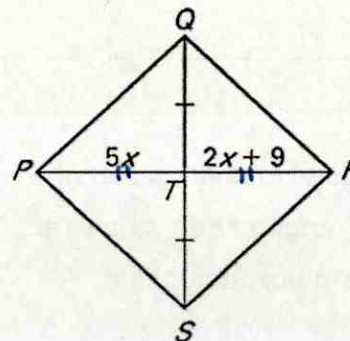
$m\angle K = 125^\circ$
Thm. 8.8
opp. $\angle s \cong$

What theorem can you use to show that the quadrilateral is a parallelogram?

diagonals bisect
Thm. 8.10



For what value of x is quadrilateral $PQRS$ a parallelogram?



$$5x = 2x + 9$$

$$3x = 9$$

$$x = 3$$