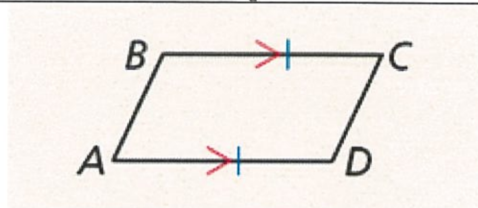
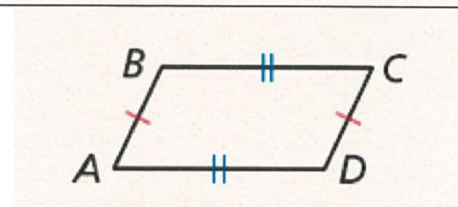
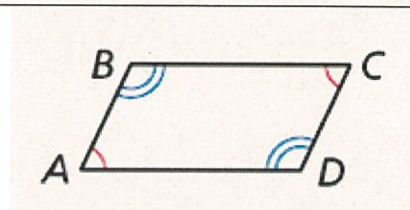
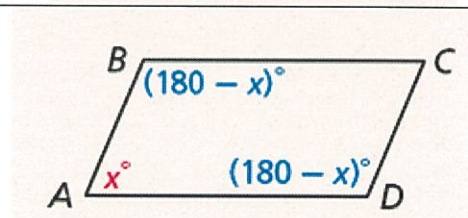
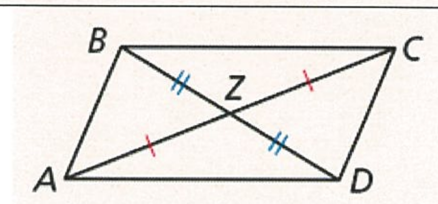
Honors Geometry
Notes – Section 6.3 Conditions for Parallelograms

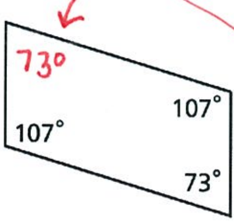
Name ______________________________
Date ________________________ Period _____

I. Conditions for Parallelograms

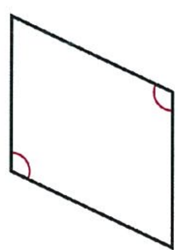
Theorem	Example
If one pair of opposite sides of a quadrilateral are parallel and congruent, then the quadrilateral is a parallelogram.	
If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.	
If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram.	
If an angle of a quadrilateral is supplementary to both of its consecutive angles, then the quadrilateral is a parallelogram.	
If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.	

<u>Example #1</u>: Determine if each quadrilateral must be a parallelogram. Justify your answer.

A.



B.



$360 - 107 - 107 - 73 = 73°$

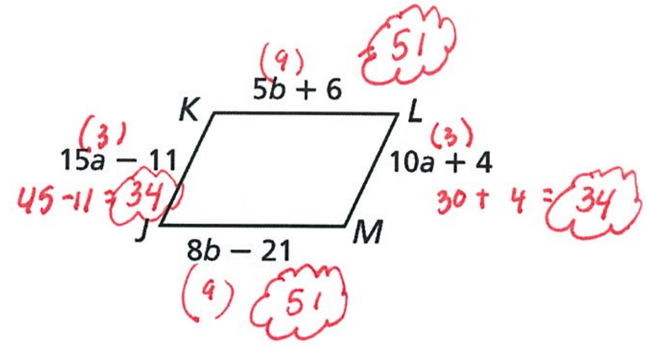
yes → both pairs of opp. ∠'s are ≅ / or cons. ∠'s are supp.

No → only 1 pair of opp. sides are ≅

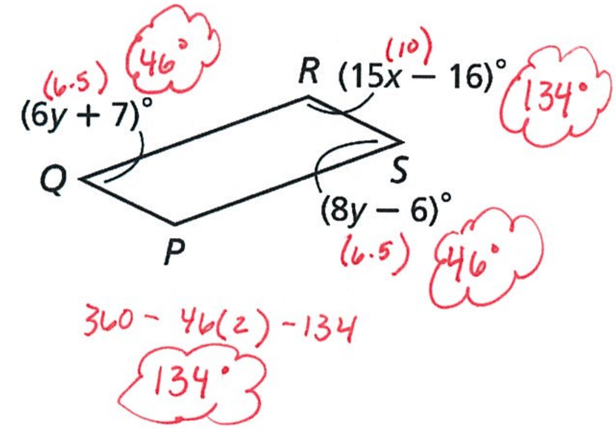
II. Verifying Figures are Parallelograms

A. Show that JKLM is a parallelogram for $a = 3$ and $b = 9$.

both pairs of opp. sides are $\cong$



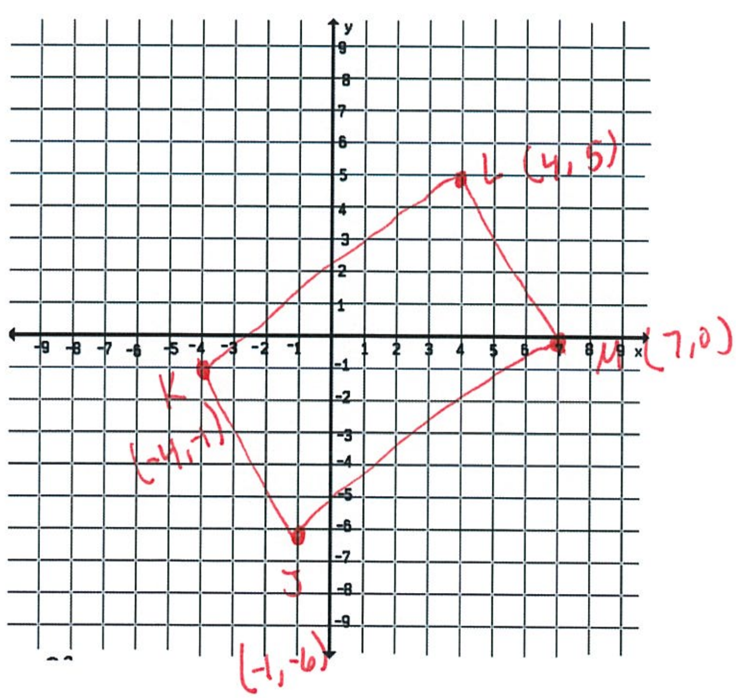
B. Show that *PQRS* is a parallelogram for $x = 10$ and $y = 6.5$.



III. Proving Parallelograms in the Coordinate Plane

A. Show that quadrilateral *JKLM* is a parallelogram by using the definition of parallelogram.

$$J(-1, -6),\ K(-4, -1),\ L(4, 5),\ M(7, 0)$$



discuss options →

SUMMARY: Conditions for Parallelograms

- Both pairs of opposite sides are parallel.
- One pair of opposite sides are parallel and congruent.
- Both pairs of opposite sides are congruent.
- Both pairs of opposite angles are congruent.
- One angle is supplementary to both of its consecutive angles.
- The diagonals bisect each other.

VI. Application

The legs of a keyboard tray are connected by a bolt at their midpoints, which allows the tray to be raised or lowered. Why is *PQRS* always a parallelogram?