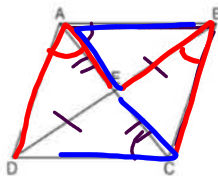Geometry CC – Mr. Valentino   Name: _____

Unit 9 Lesson 6 – Proofs with Parallelograms   Date: _____ Per: _____

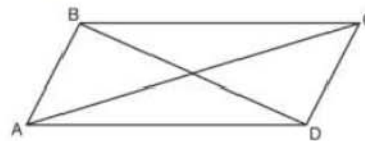Aim: How can we prove quadrilaterals are parallelograms?

Do Now:

1. Parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E is shown below.

Which statement must be true?

1) $\overline{BE} \cong \overline{CE}$
2) $\angle BAE \cong \angle DCE$
3) $\overline{AB} \cong \overline{BC}$
4) $\angle DAE \cong \angle CBE$

2. Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ is shown in the diagram below.

Which information is *not* enough to prove $ABCD$ is a parallelogram?

1) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{DC}$
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$
4) $\overline{AB} \parallel \overline{DC}$ and $\overline{BC} \parallel \overline{AD}$

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How can we prove a quadrilateral is a parallelogram?

Show...

1. Both pairs of opposite sides of a quadrilateral are → congruent. → parallel.

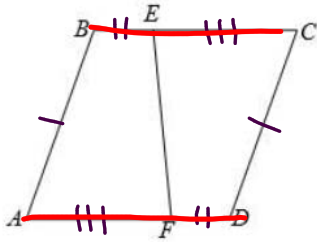OR

Show...

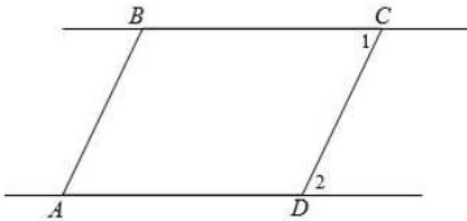2. One pair of opposite sides of a quadrilateral are BOTH congruent AND parallel.

1) Given: $\overline{AB} \cong \overline{CD}$,
$\overline{BE} \cong \overline{FD}$,
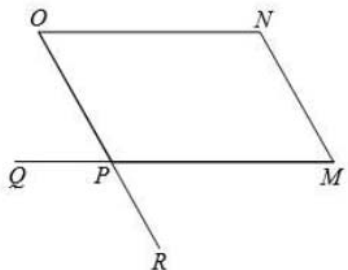$\overline{EC} \cong \overline{AF}$

Prove: $ABCD$ is a parallelogram.

statement	reason
① $\overline{AB} \cong \overline{CD}$ $\overline{BE} \cong \overline{FD}$ $\overline{EC} \cong \overline{AF}$	① Given
② $\overline{BC} \cong \overline{AD}$	✶ ② Addition Postulate
③ $ABCD$ is a parallelogram	③ If both pairs of opposite sides of a quadrilateral are $\cong$, the quadrilateral is a parallelogram.

2) Given: $\overline{AB} \parallel \overline{CD}$,
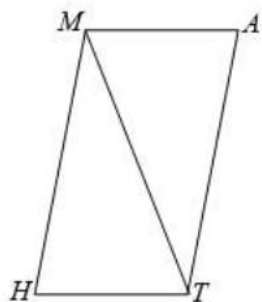$\angle 1 \cong \angle 2$

Prove: $ABCD$ is a parallelogram.

3) Given: $\angle O \cong \angle M$,
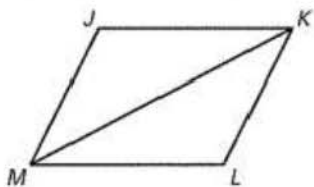 $\angle QPR \cong \angle ONM$

Prove: *MNOP* is a parallelogram.

4) Given: $\overline{MA} \cong \overline{HT}$,
   $\angle AMT \cong \angle HTM$

Prove: *MATH* is a parallelogram.

5) **Given:** $\triangle MJK \cong \triangle KLM$

Prove: $MJKL$ is a parallelogram.

CHALLENGE

Given: Quadrilateral $ABCD$, diagonal $\overline{AFEC}$,
$\overline{AE} \cong \overline{FC}$, $\overline{BF} \perp \overline{AC}$, $\overline{DE} \perp \overline{AC}$, $\angle 1 \cong \angle 2$
Prove: $ABCD$ is a parallelogram.