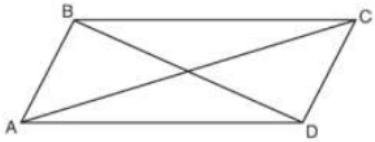
Name:_____ Date:_____

Period:_____

Aim: How can we prove quadrilaterals are parallelograms?

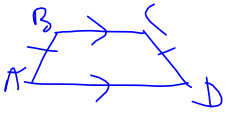
Do Now:

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

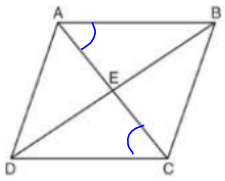


Which information is *not* enough to prove $ABCD$ is a parallelogram?

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 $\overline{BC} \parallel \overline{AD}$



2. 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) $\angle DAE \cong \angle CBE$

How can we prove a quadrilateral is a parallelogram?

Show...

1. Show that any one of the 5 properties of a ▱ is true

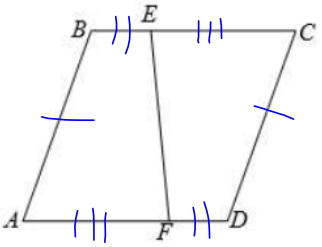
OR

Show...

2. that one pair of opposite sides is both $\cong$ and //.

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

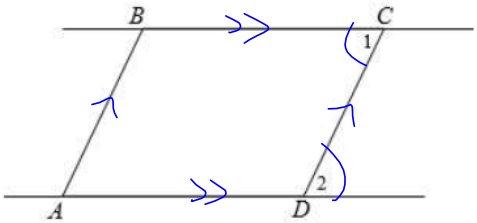
Prove: $ABCD$ is a parallelogram.



S	R
1) $\overline{AB} \cong \overline{CD}$	1) Given
2) $\overline{BE} \cong \overline{FD}$	2) Given
3) $\overline{EC} \cong \overline{AF}$	3) Given
4) $\overline{BE} + \overline{EC} \cong \overline{FD} + \overline{AF}$ or $\overline{BC} \cong \overline{DA}$	4) Addition Postulate
5) ABCD is a ▱	5) If both pairs of opposite sides of a quad are ≅, then it is a ▱

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

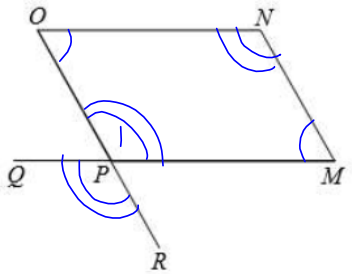
Prove: $ABCD$ is a parallelogram.



S	R
1) $\overline{AB} \parallel \overline{CD}$	1) Given
2) $\angle 1 \cong \angle 2$	2) Given
3) $\overline{BC} \parallel \overline{AD}$	3) If 2 lines are cut by a trans and the alt. int. ∠s are ≅, then the lines are ∥.
4) ABCD is a ▱	4) If both pairs of opp sides of a quad are ∥, then it is a ▱.

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

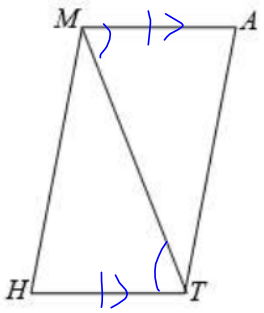
Prove: $MNOP$ is a parallelogram.



S	R
1) $\angle O \cong \angle M$	1) Given
2) $\angle QPR \cong \angle ONM$	2) Given
3) $\angle QPR \cong \angle 1$	3) Vertical $\angle$'s are $\cong$.
4) $\angle ONM \cong \angle 1$	4) Substitution
5) MNOP is a $\boxed{p}$	5) If both pairs of opp $\angle$'s in a quad are $\cong$, then it is a $\boxed{p}$.

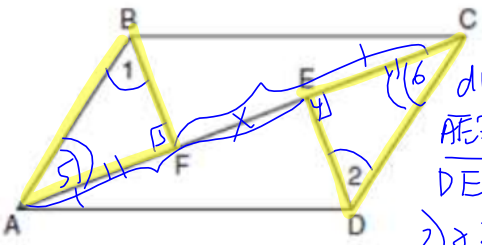
4) Given: $\overline{MA} \cong \overline{HT}$,
$\angle AMT \cong \angle HTM$

Prove: $MATH$ is a parallelogram.



S	R
1) $\overline{MA} \cong \overline{HT}$	1) Given
2) $\angle AMT \cong \angle HTM$	2) Given
3) $\overline{MA} \parallel \overline{HT}$	3) If 2 lines are cut by a trans and the alt. int $\angle$'s are $\cong$, then the lines are $\parallel$.
4) MATH is a $\boxed{p}$	4) If one pair of opp sides of a quad is both $\cong$ and $\parallel$, then it is a $\boxed{p}$

5) 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.



S	R
1) Quad ABCD diag AFEC, $\overline{AE} \cong \overline{FC}$, $\overline{BF} \perp \overline{AC}$, $\overline{DE} \perp \overline{AC}$, $\angle 1 \cong \angle 2$	1) Given
2) $\angle 3$ and $\angle 4$ are right $\angle$'s	2) $\perp$ lines form right $\angle$'s
3) $\angle 3 \cong \angle 4$	3) all right $\angle$'s are $\cong$
4) $\overline{FE} \cong \overline{FE}$	4) Reflexive prop
5) $AE - FE \cong FC - FE$ or $AF \cong CE$	5) Subtraction post

6) $\triangle ABF \cong \triangle CDE$ — 6) AAS $\cong$ AAS
7) $\overline{AB} \cong \overline{CD}$ — 7) CPCTC
8) $\angle 5 \cong \angle 6$ — 8) CPCTC
9) $\overline{AB} \parallel \overline{CD}$ — 9) If 2 lines are cut by a trans and the alt. int $\angle$'s are $\cong$, then the lines are $\parallel$
10) ABCD is a $\boxed{\text{p}}$ — 10) If one pair of opp sides of a quad is both $\cong$ and $\parallel$, then it is a $\boxed{\text{p}}$