

DO NOW

Which statement is *not* always true about a parallelogram?

- (1) The opposite angles are congruent.
- (2) The opposite sides are congruent.
- (3) The diagonals are congruent.
- (4) The opposite sides are parallel.

↪ Diagonals bisect each other

Proving a Quadrilateral is a Parallelogram

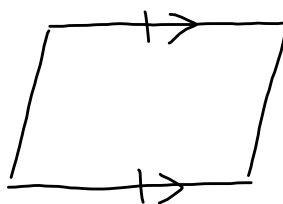
BOTH pairs of opposite sides \parallel

OR

BOTH pairs of opposite sides \cong

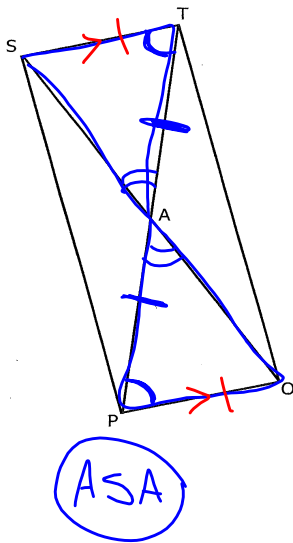
OR

ONE pair of opposite sides parallel AND \cong



1) Given: Quadrilateral STOP
 \overline{SO} bisects \overline{PT} at A
 $\angle OPT \cong \angle STP$

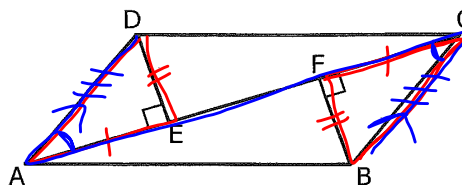
Prove: Stop is a parallelogram



Statement	Reason
1. Quad. STOP, \overline{SO} bisects \overline{PT} at A, $\angle OPT \cong \angle STP$	1. Given
2. A is the midpoint of \overline{PT}	2. Def. of line segment bisector
3. $\overline{PA} \cong \overline{TA}$	3. Def. of midpoint <i>seg bisector creates 2 \cong segments</i>
4. $\angle SAT \cong \angle OAP$	4. Vertical angles are \cong
5. $\triangle SAT \cong \triangle OAP$	5. ASA
6. $\overline{ST} \cong \overline{OP}$	6. CPCTC
7. $\overline{ST} \parallel \overline{OP}$	7. \cong alternate interior angles create \parallel lines
8. STOP is a parallelogram	8. A parallelogram is a quadrilateral with one pair of opposite sides \parallel and \cong

1) Given: $\overline{DE} \perp \overline{AC}$
 $\overline{BF} \perp \overline{AC}$
 $\overline{AE} \cong \overline{FC}$
 $\overline{DE} \cong \overline{FB}$

(SAS)



Prove: ABCD is a parallelogram

Statement	Reason
1. $\overline{DE} \perp \overline{AC}$, $\overline{BF} \perp \overline{AC}$, $\overline{AE} \cong \overline{FC}$, $\overline{DE} \cong \overline{FB}$	1. Given
2. $\angle DEA$ and $\angle BFC$ are right angles	2. \perp lines form right angles
3. $\angle DEA \cong \angle BFC$	3. Right angles are \cong
4. $\triangle DEA \cong \triangle BFC$	4. SAS
5. $\overline{AD} \cong \overline{CB}$, $\angle DAE \cong \angle BCF$	5. CPCTC
6. $\overline{AD} \parallel \overline{CB}$	6. \cong alternate interior angles create \parallel lines
7. ABCD is a parallelogram	7. A parallelogram is a quad. with one pair of sides both \cong and \parallel