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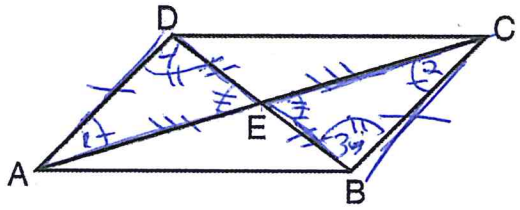
Date _____
Geometry

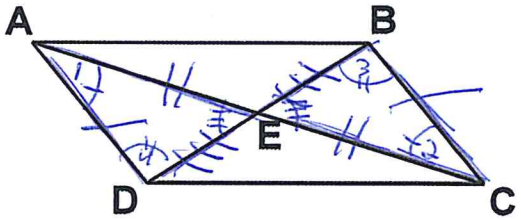
Triangle Proofs Given Parallelograms

1. Given: Parallelogram *ABCD*.
Prove: $\Delta AED \cong \Delta CEB$



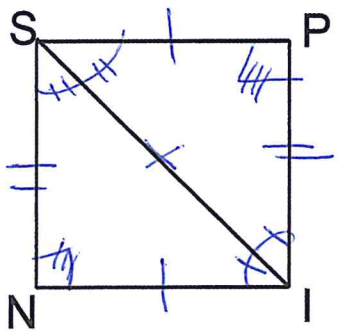
Statements	Reasons
(1) Parallelogram ABCD	(1) Given
(2) $\overline{AD} \cong \overline{CB}$	(2) A Parallelogram has 2 pairs of opposite sides congruent
(3) $\overline{DE} \cong \overline{EB}$, $\overline{AE} \cong \overline{EC}$	(3) A Parallelogram has diagonals that bisect each other
(4) $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$	(4) A Parallelogram has parallel lines cut by a transversal forming $\cong$ alt int angles
(5) $\angle DEA \cong \angle CEB$	(5) Vertical angles are congruent
(6) $\Delta AED \cong \Delta CEB$	(6) SSS, SAS, ASA, AAS

2. Given: ABCD is a parallelogram
Prove: $\Delta AED \cong \Delta CEB$



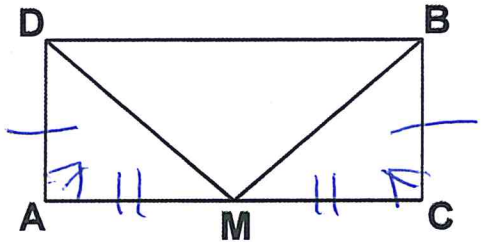
Statements	Reasons
(1) ABCD is a parallelogram	(1) Given
(2) $\overline{AD} \cong \overline{BC}$	(2) A Parallelogram has 2 pairs of opposite sides $\cong$
(3) $\overline{AE} \cong \overline{EC}$, $\overline{BE} \cong \overline{ED}$	(3) A Parallelogram has diagonals that bisect each other.
(4) $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$	(4) A Parallelogram has parallel lines cut by a transversal forming $\cong$ alt int angles
(5) $\angle AED \cong \angle BEC$	(5) Vertical angles are congruent
(6) $\Delta AED \cong \Delta CEB$	(6) SSS, SAS, ASA, AAS

3. Given: SPIN is a square
Prove: $\Delta SNI \cong \Delta SPI$



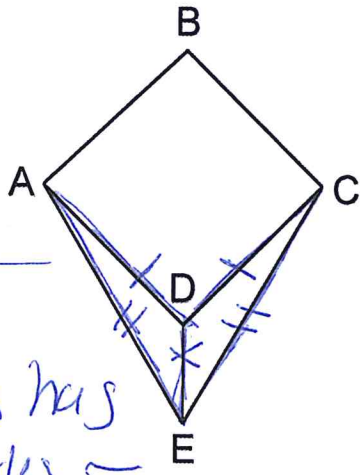
Statements	Reasons
① SPIN is a square	① given
② $\overline{SN} \cong \overline{PI}$, $\overline{SP} \cong \overline{NI}$	② A square has 2 pairs of opposite sides $\cong$
③ $\overline{SI} \cong \overline{SI}$	③ reflexive property
④ $\angle PSI \cong \angle NIS$, $\angle NSI \cong \angle PIS$	④ A square has diagonals that bisect the angles
⑤ $\angle N \cong \angle P$	⑤ A square has $\cong$ right angles (or) opposite angles $\cong$
⑥ $\Delta SNI \cong \Delta SPI$	⑥ SSS, SAS, ASA, AAS, HC

4. Given: ABCD is a rectangle, M is the midpoint of $\overline{AC}$
Prove: $\overline{DM} \cong \overline{BM}$



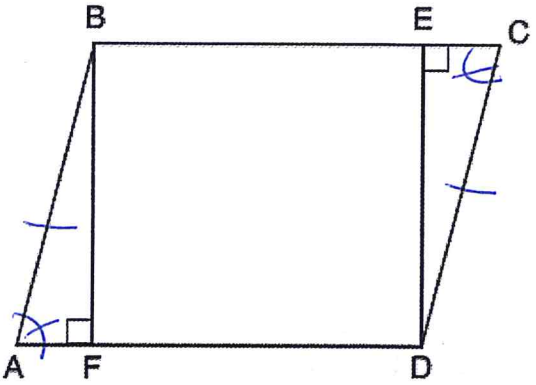
Statements	Reasons
① ABCD is a rectangle	① given
② $\angle A \cong \angle C$	② A rectangle has $\cong$ right angles
③ $\overline{AD} \cong \overline{BC}$	③ A rectangle has opposite sides $\cong$
④ M is the midpoint of $\overline{AC}$	④ given
⑤ $\overline{AM} \cong \overline{MC}$	⑤ A midpoint creates 2 $\cong$ segments
⑥ $\Delta DAM \cong \Delta BCM$	⑥ SAS $\cong$ SAS
⑦ $\overline{DM} \cong \overline{BM}$	⑦ CPCTC

5. Given: ABCD is a rhombus, $\overline{AE} \cong \overline{CE}$
Prove: $\angle ADE \cong \angle CDE$



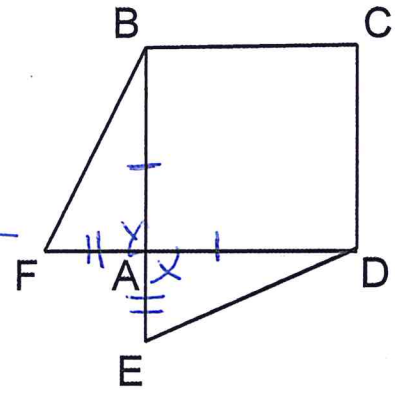
Statements	Reasons
(1) ABCD is a rhombus	(1) given
(2) $\overline{AD} \cong \overline{DC}$	(2) A rhombus has consecutive sides $\cong$
(3) $\overline{AE} \cong \overline{CE}$	(3) given
(4) $\overline{DE} \cong \overline{DE}$	(4) Reflexive Property
(5) $\triangle ADE \cong \triangle CDE$	(5) SSS
(6) $\angle ADE \cong \angle CDE$	(6) CPCTC

6. Given: Parallelogram $ABCD$, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$
Prove: $\overline{AF} \cong \overline{EC}$



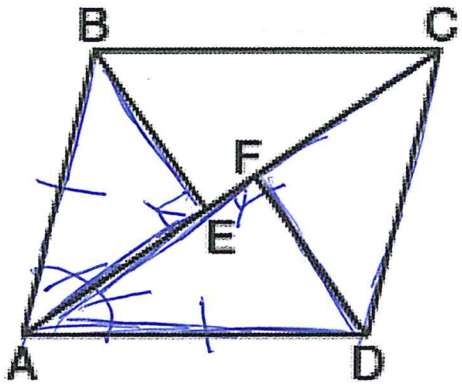
Statements	Reasons
(1) Parallelogram ABCD	(1) given
(2) $\overline{AB} \cong \overline{CD}$	(2) A parallelogram has opposite sides $\cong$
(3) $\angle BAF \cong \angle ECD$	(3) A parallelogram has opposite angles $\cong$
(4) $\overline{BF} \perp \overline{AFD}$, $\overline{DE} \perp \overline{BEC}$	(4) given
(5) $\angle BFA \cong \angle CED$	(5) Perpendicular lines create $\cong$ right angles
(6) $\triangle BFA \cong \triangle DEC$	(6) AAS $\cong$ AAS
(7) $\overline{AF} \cong \overline{EC}$	(7) CPCTC

7. Given: ABCD is a square, $\overline{FA} \cong \overline{AE}$
Prove: $\overline{BF} \cong \overline{DE}$



Statements	Reasons
(1) ABCD is a square	(1) given
(2) $\overline{BA} \cong \overline{AD}$	(2) A square has consecutive sides $\cong$
(3) $\overline{FA} \cong \overline{AE}$	(3) given
(4) $\angle FAB \cong \angle EAD$	(4) Vertical angles are congruent
(5) $\triangle BAF \cong \triangle DAE$	(5) SAS $\cong$ SAS
(6) $\overline{BF} \cong \overline{DE}$	(6) CPCTC

8. Given: ABCD is a rhombus, $\overline{BE} \perp \overline{AC}$, and $\overline{DF} \perp \overline{AC}$.
Prove: $\Delta ABE \cong \Delta ADF$



Statements	Reasons
(1) ABCD is a rhombus	(1) given
(2) $\overline{BA} \cong \overline{AD}$	(2) A square has consecutive sides $\cong$
(3) $\angle BAE \cong \angle DAE$	(3) A square has diagonals that bisect the angles
(4) $\overline{BE} \perp \overline{AC}, \overline{DF} \perp \overline{AC}$	(4) given
(5) $\angle BEA \cong \angle DFA$	(5) Perpendicular lines create $\cong$ right angles
(6) $\triangle ABE \cong \triangle ADF$	(6) AAS $\cong$ AAS