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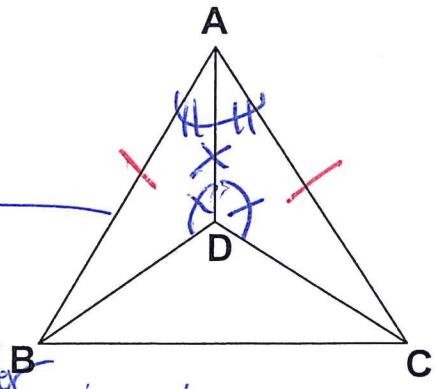
Date _____
Geometry

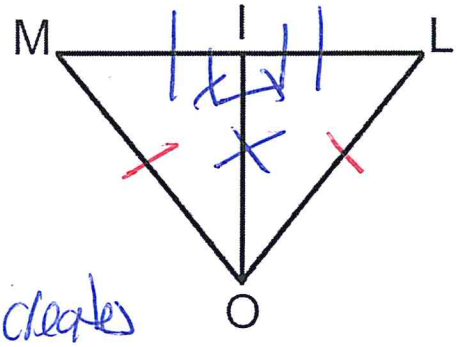
Proving Triangles Are Isosceles

1. Given: $\angle ADB \cong \angle ADC$
   $\overline{AD}$ bisects $\angle BAC$
   Prove: ΔABC is isosceles



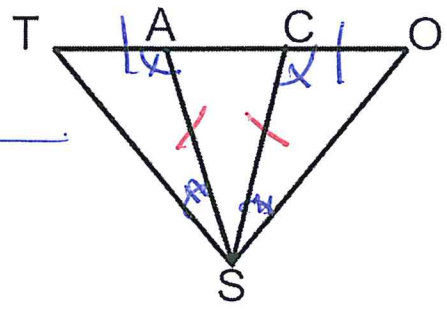
Statements	Reasons
(1) $\angle ADB \cong \angle ADC$	(1) given
(2) $\overline{AD}$ bisects $\angle BAC$	(2) given
(3) $\angle BAD \cong \angle CAD$	(3) An angle bisector creates two congruent angles
(4) $\overline{AD} \cong \overline{AD}$	(4) Reflexive Property
(5) $\Delta ADB \cong \Delta ADC$	(5) ASA
(6) $\overline{AB} \cong \overline{AC}$	(6) CPCTC
(7) ΔABC is isosceles	(7) Isosceles Triangle Theorem

2. Given: $\overline{OI}$ is the perpendicular bisector of $\overline{ML}$
   Prove: ΔMLO is isosceles



Statements	Reasons
(1) $\overline{OI}$ is the perpendicular bisector of $\overline{ML}$	(1) given
(2) $\overline{MI} \cong \overline{IL}$	(2) A line bisector creates two congruent segments.
(3) $\angle MIO \cong \angle LIO$	(3) Perpendicular lines create two congruent right angles
(4) $\overline{IO} \cong \overline{IO}$	(4) Reflexive Property
(5) $\Delta MIO \cong \Delta LIO$	(5) SAS
(6) $\overline{MO} \cong \overline{LO}$	(6) CPCTC
(7) ΔMLO is isosceles	(7) Isosceles Triangle Theorem

3. Given: $\overline{TA} \cong \overline{CO}$, $\angle TAS \cong \angle OCS$, $\angle TSA \cong \angle OSC$
Prove: ΔACS is isosceles



Statements	Reasons
① $\overline{TA} \cong \overline{CO}$	① given
② $\angle TAS \cong \angle OCS$	② given
③ $\angle TSA \cong \angle OSC$	③ given
④ $\Delta TAS \cong \Delta OCS$	④ AAS
⑤ $\overline{AS} \cong \overline{CS}$	⑤ CPCTC
⑥ ΔACS is isosceles	⑥ Isosceles Triangle Theorem

4. Given: $\overline{FD} \perp \overline{BA}$, $\overline{FE} \perp \overline{BC}$, F is the midpoint of $\overline{AC}$, $\angle DFA \cong \angle EFC$
Prove: ΔABC is isosceles

Statements	Reasons
① $\overline{FD} \perp \overline{BA}$, $\overline{FE} \perp \overline{BC}$	① given
② $\angle FDA \cong \angle FEC$	② Perpendicular lines create congruent right angles.
③ F is the midpoint of $\overline{AC}$	③ given
④ $\overline{AF} \cong \overline{FC}$	④ A midpoint creates two congruent segments.
⑤ $\angle DFA \cong \angle EFC$	⑤ given
⑥ $\Delta ADF \cong \Delta CEF$	⑥ AAS
⑦ $\angle DAF \cong \angle ECF$	⑦ CPCTC
⑧ ΔABC is isosceles	⑧ Isosceles Triangle Theorem