

Sec 1.6 CC Geometry – Triangle Proofs

Name: _____

POTENTIAL REASONS:

Definition of Congruence: Having the exact same size and shape and there by having the exact same measures.

Definition of Midpoint: The point that divides a segment into two congruent segments.

Definition of Angle Bisector: The ray that divides an angle into two congruent angles.

Definition of Perpendicular Lines: Lines that intersect to form right angles or 90°

Definition of Supplementary Angles: Any two angles that have a sum of 180°

Definition of a Straight Line: An undefined term in geometry, a line is a straight path that has no thickness and extends forever. It also forms a straight angle which measures 180°

Reflexive Property of Equality: any measure is equal to itself ($a = a$)

Reflexive Property of Congruence: any figure is congruent to itself ($Figure A \cong Figure A$)

Addition Property of Equality if $a = b$, then $a + c = b + c$

Subtraction Property of Equality: if $a = b$, then $a - c = b - c$

Multiplication Property of Equality: if $a = b$, then $ac = bc$

Division Property of Equality if $a = b$, then $\frac{a}{c} = \frac{b}{c}$

Segment Addition Postulate: If point B is between Point A and C then $AB + BC = AC$

Angle Addition Postulate: If point S is in the interior of $\angle PQR$, then $m\angle PQS + m\angle SQR = m\angle PQR$

Side – Side – Side Postulate (SSS) : If three sides of one triangle are congruent to three sides of another triangle, then the triangles are congruent.

Side – Angle – Side Postulate (SAS) If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.

Angle – Side – Angle Postulate (ASA): If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent.

Angle – Angle – Side Postulate (AAS) : If two angles and the non-included side of one triangle are congruent to two angles and the non-included side of another triangle, then the triangles are congruent

Hypotenuse – Leg Postulate (HL): If a hypotenuse and a leg of one right triangle are congruent to a hypotenuse and a leg of another right triangle, then the triangles are congruent

Right Angle Theorem (R.A.T.): All right angles are congruent.

Vertical Angle Theorem (V.A.T.): Vertical angles are congruent.

Triangle Sum Theorem: The three angles of a triangle sum to 180°

Linear Pair Theorem: If two angles form a linear pair then they are adjacent and are supplementary.

Third Angle Theorem: If two angles of one triangle are congruent to two angles of another triangle, then the third pair of angles are congruent.

Alternate Interior Angle Theorem (and converse): Alternate interior angles are congruent if and only if the transversal that passes through two lines that are parallel.

Alternate Exterior Angle Theorem (and converse): Alternate exterior angles are congruent if and only if the transversal that passes through two lines that are parallel.

Corresponding Angle Theorem (and converse) : Corresponding angles are congruent if and only if the transversal that passes through two lines that are parallel.

Same-Side Interior Angles Theorem (and converse) : Same Side Interior Angles are supplementary if and only if the transversal that passes through two lines that are parallel.

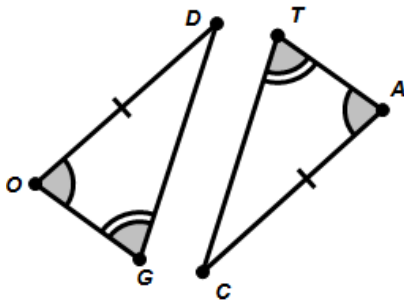
Pythagorean Theorem (and converse): A triangle is right triangle if and only if the given the length of the legs a and b and hypotenuse c have the relationship $a^2 + b^2 = c^2$

Isosceles Triangle Theorem (and converse): A triangle is isosceles if and only if its base angles are congruent.

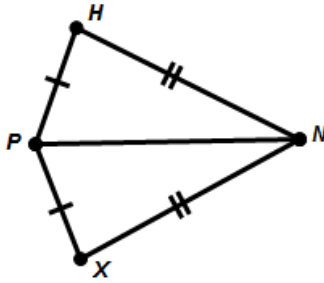
Triangle Mid-segment Theorem: A mid-segment of a triangle is parallel to a side of the triangle, and its length is half the length of that side.

CPCTC: Corresponding Parts of Congruent Triangles are Congruent by definition of congruence.

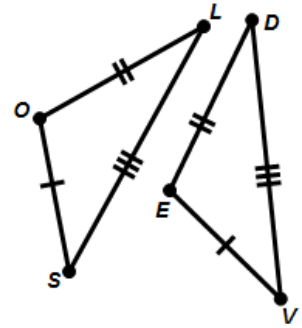
1. Tell which of the following triangle provide enough information to show that they must be congruent. If they are congruent, state which theorem suggests they are congruent (SAS, ASA, SSS, AAS, HL) and write a congruence statement.



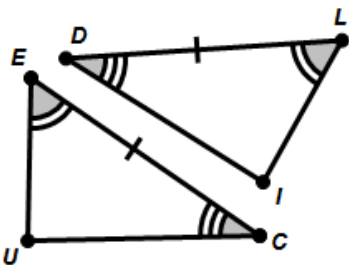
Circle one of the following: **SSS SAS ASA AAS HL** Not Enough Information
 Congruence Statement if necessary:



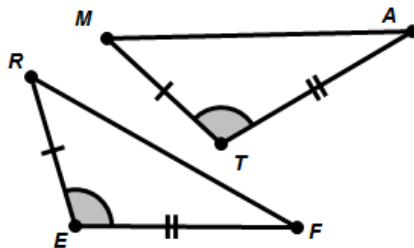
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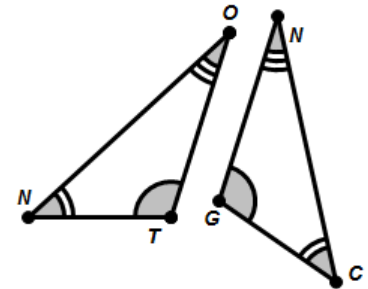
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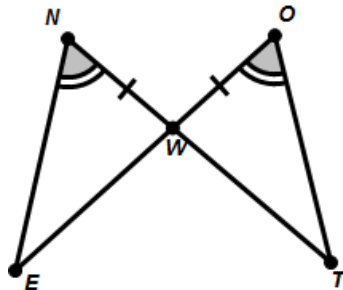
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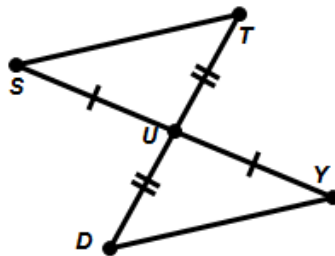
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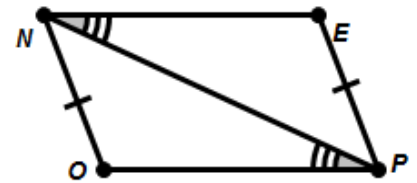
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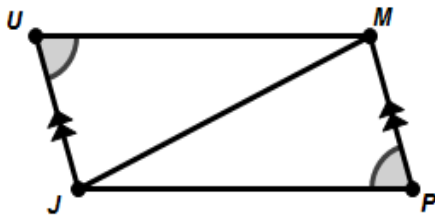
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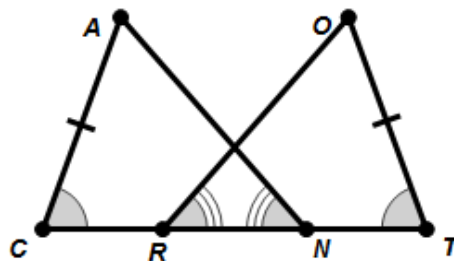
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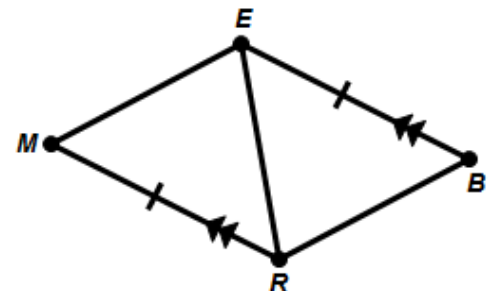
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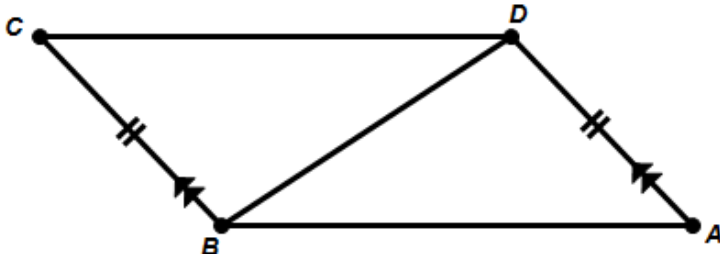
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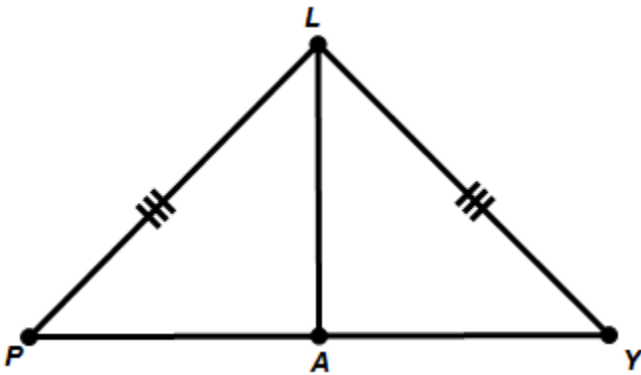
2. Prove which of the following triangles congruent if possible by filling in the missing blanks:

a. Given $\overline{CB} \cong \overline{AD}$ and $\overline{CB} \parallel \overline{AD}$



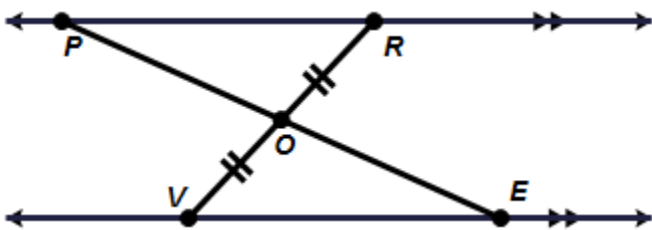
Statements	Reasons
1. $\overline{CB} \cong \overline{AD}$	
2. $\overline{CB} \parallel \overline{AD}$	
3. $\angle CBD \cong \angle ADB$	
4. $\overline{BD} \cong \overline{BD}$	
5. $\triangle CBD \cong \triangle ADB$	

b. Given $\overline{PL} \cong \overline{YL}$ and Point A is the midpoint of \overline{PY}



Statements	Reasons
1.	Given
2.	Given
3.	Definition of Midpoint
4.	Reflexive property of congruence
5.	By steps 1,3,4 and SSS

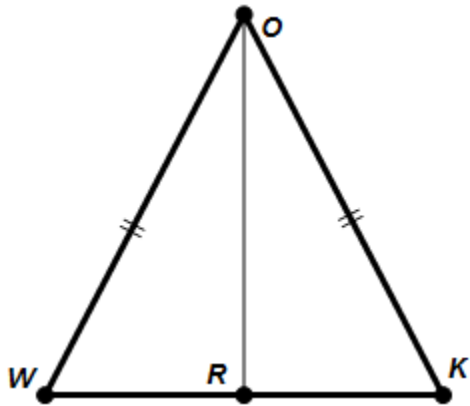
c. Given $\overline{VO} \cong \overline{RO}$ and $\overline{PR} \parallel \overline{VE}$



Statements	Reasons
1.	Given
2.	Given
3.	
4.	
5. $\triangle PRO \cong \triangle EVO$	

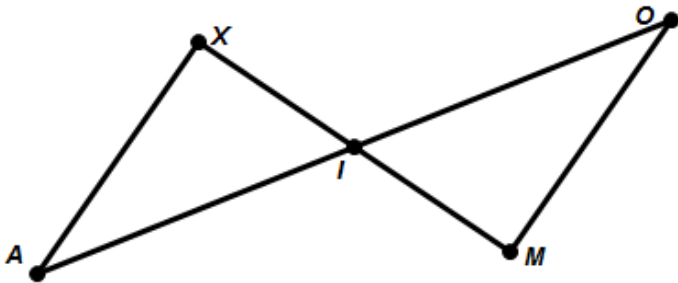
Prove the Isosceles Triangle Theorem and the rest of the suggested proofs.

d. Given $\triangle WOK$ is isosceles and point R is the midpoint of \overline{WK}



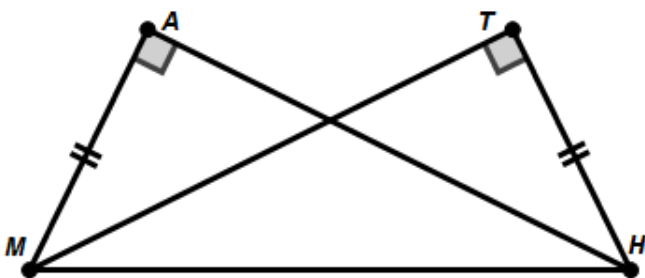
Statements	Reasons
1. $\triangle WOK$ is isosceles	
2. $\overline{WO} \cong \overline{KO}$	
3. R is the midpoint of \overline{WK}	
4. $\overline{WR} \cong \overline{KR}$	
5. $\overline{OR} \cong \overline{OR}$	
6. $\triangle WRO \cong \triangle KRO$	
7. $\angle OWR \cong \angle OKR$	

e. Given point I is the midpoint of \overline{XM} and point I is the midpoint of \overline{AO}



Statements	Reasons
1. I is the midpoint of \overline{XM}	
2.	Definition of Midpoint
3. I is the midpoint of \overline{AO}	
4.	
5. $\angle AIX \cong \angle OIM$	
6. $\triangle AXI \cong \triangle OMI$	

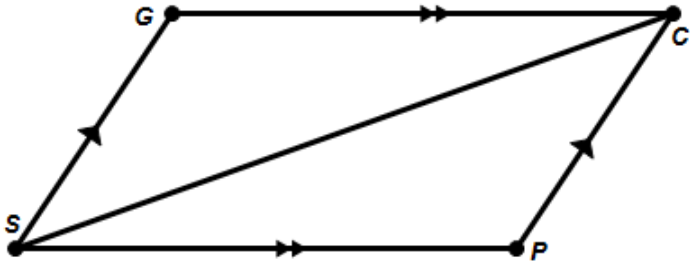
f. Given $\angle MAH$ and $\angle HTM$ are right angles and $\overline{MA} \cong \overline{TH}$



Statements	Reasons
1. $\angle MAH$ & $\angle HTM$ are right angles	
2. $\overline{MA} \cong \overline{TH}$	
3. $\overline{MH} \cong \overline{MH}$	
4. $\triangle MAH \cong \triangle HTM$	

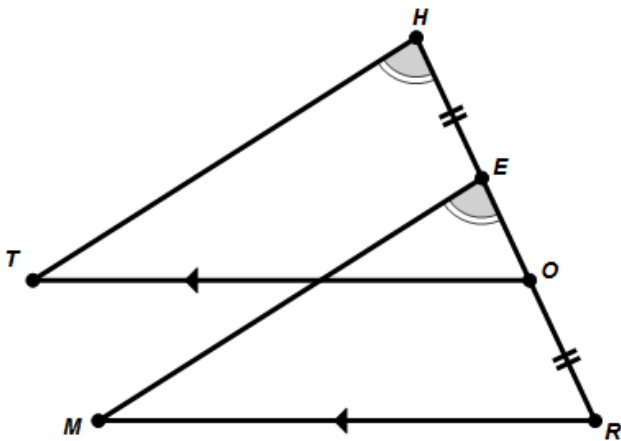
Prove the suggested proofs by filling in the missing blanks.

g. Given $\overleftrightarrow{GC} \parallel \overleftrightarrow{PS}$ and $\overleftrightarrow{GS} \parallel \overleftrightarrow{CP}$



Statements	Reasons
1. $\overleftrightarrow{GC} \parallel \overleftrightarrow{PS}$	
2.	
3. $\overleftrightarrow{GS} \parallel \overleftrightarrow{CP}$	
4.	
5.	
6. $\triangle GCS \cong \triangle PSC$	

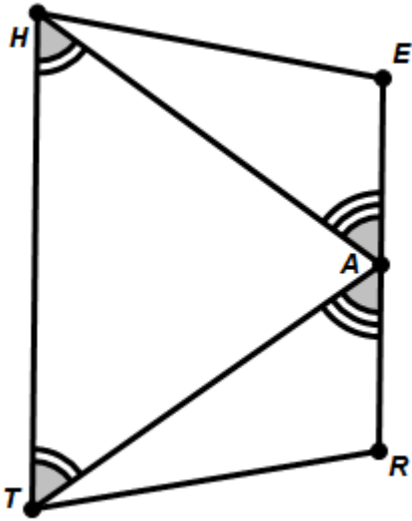
h. Given $\overline{RO} \cong \overline{HE}$, $\angle THO \cong \angle MER$ and $\overline{TO} \parallel \overline{MR}$



Statements	Reasons
1. $\overline{HE} \cong \overline{OR}$	
2. $RO = HE$	
3. $RO + OE = HE + EO$	
4. $RO + OE = RE$ and $HE + EO = HO$	
5. $RE = HO$	Substitution Property
6. $\overline{RE} \cong \overline{OR}$	
7. $\overline{TO} \parallel \overline{MR}$	
8. $\angle MRE \cong \angle TOH$	
9. $\angle THO \cong \angle MER$	
10. $\triangle THO \cong \triangle MER$	

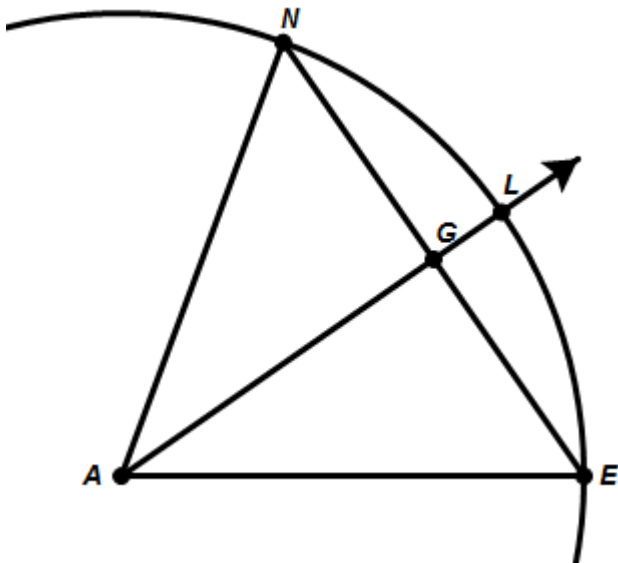
Prove the suggested proofs by filling in the missing blanks.

- i. Given $\angle HTA \cong \angle THA$, $\angle TAR \cong \angle HAE$,
and Point A is the midpoint of \overline{ER}



Statements	Reasons
1. $\angle THA \cong \angle HTA$	
2. $\triangle HAT$ is an isosceles triangle	
3. $\overline{HA} \cong \overline{TA}$	
4. A is the midpoint of \overline{ER}	
5. $\overline{EA} \cong \overline{AR}$	
6. $\angle TAR \cong \angle HAE$	
7. $\triangle TAR \cong \triangle HAE$	

- j. Given that \overrightarrow{AG} bisects $\angle NAE$.
Also, \overline{AN} and \overline{AE} are radii of the same circle with center A.



Statements	Reasons
1. \overrightarrow{AG} bisects $\angle NAE$	
2.	Definition of Angle Bisector
3.	Radii of the same circle are congruent.
4.	Reflexive property of congruence
5. $\triangle ANG \cong \triangle AEG$	