Name:

Common Core Geometry

Unit 3

Triangle Proofs

Mr. Schlansky

2025

Triangle Proofs:

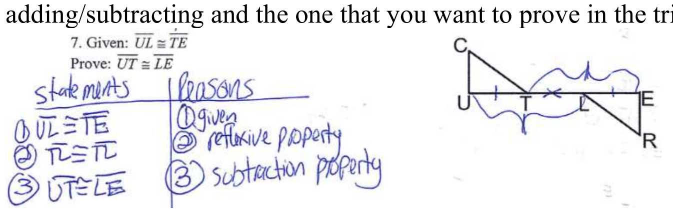
If it is not specified, prove triangles are congruent
To prove triangles are congruent, prove 3 pairs of sides/angles are congruent
To prove segments or angles, use CPCTC
<u>*If you get stuck, make something up and keep on going!</u>

1) Do a mini proof with your givens

Altitude creates two congruent right angles
Median creates two congruent segments
Line bisector creates two congruent segments
Midpoint creates two congruent segments
Angle bisector creates two congruent angles
Perpendicular lines create two congruent right angles
Parallel lines cut by a transversal create
Congruent corresponding angles (1 in, 1 out) OR congruent alternate interior angles (2 out) OR
congruent alternate exterior angles (2 out)
*Perpendicular bisector is perpendicular and line bisector (1 pair of congruent right angles, 1 pair of congruent segs)
*If segments bisect each other, they are both cut in half (2 pairs of congruent segments)

2) Use additional tools:

Vertical Angles are congruent (Look for an X)
Reflexive Property (A side/angle is in both triangles and is congruent to itself)
Isosceles Triangles (In a triangle, congruent angles are opposite congruent sides)
Addition and Subtraction Property (If you need more or less of a shared side)
*You must use three congruent statements to get one congruent statement for the triangles. The two that you are adding/subtracting and the one that you want to prove in the triangle.



To prove a triangle is isosceles:
-Prove the triangles are congruent and then use CPCTC to state two sides/angles of the triangle are congruent.
To prove parallel:
-Prove the triangle are congruent and then use CPCTC to state alternate interior, alternate exterior, or corresponding angles are congruent.

Lesson 1: I can draw conclusions using my 6 definitions.

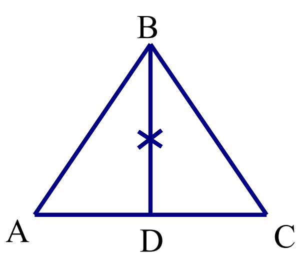
Altitude creates two congruent right angles
Median creates two congruent segments
Line bisector creates two congruent segments
Midpoint creates two congruent segments
Angle bisector creates two congruent angles
Perpendicular lines create two congruent right angles

Lesson 2: I can draw conclusions given parallel lines by extending my parallel lines
Parallel lines cut by a transversal create
Congruent corresponding angles (1 in, 1 out) OR congruent alternate interior angles (2 out) OR congruent alternate exterior angles (2 out)

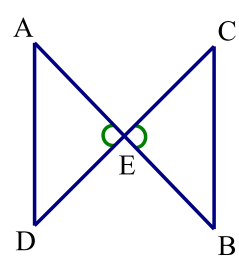
Lesson 3: I can complete mini proofs using my definitions
Same notes as lessons 1 and 2.

Lesson 4: I can complete mini proofs using vertical angles and reflexive property.
Vertical Angles are congruent (Look for an X)
Reflexive Property (A side/angle is in both triangles and is congruent to itself)

$\overline{BD} \cong \overline{BD}$ Reflexive Property



$\angle AED \cong \angle CEB$ Vertical Angles are Congruent



Lesson 5: I can determine which method proves triangles congruent by marking the sides and angles.

Proves Triangles Congruent	**Does Not Prove Triangles Congruent**
SSS	ASS
SAS	AAA
ASA	
AAS	
Hypotenuse Leg (HL) ASS in a Right Triangle	

The difference between ASA and AAS:
Is the side that's marked the side that's between the two angles?
If the side is between the two angles: ASA
If the side is not between the two angles: AA

Lesson 6: I can prove triangles are congruent by proving three pairs of sides/angles are congruent.

To prove triangles are congruent, prove 3 pairs of sides/angles are congruent

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Median creates two congruent segments
Line bisector creates two congruent segments
Midpoint creates two congruent segments
Angle bisector creates two congruent angles
Perpendicular lines create two congruent right angles
Parallel lines cut by a transversal create
Congruent corresponding angles (1 in, 1 out) OR congruent alternate interior angles (2 out) OR congruent alternate exterior angles (2 out)
*Perpendicular bisector is perpendicular and line bisector (1 pair of congruent right angles, 1 pair of congruent segs)
*If segments bisect each other, they are both cut in half (2 pairs of congruent segments)

2) Use additional tools:
Vertical Angles are congruent (Look for an X)
Reflexive Property (A side/angle is in both triangles and is congruent to itself)

Lesson 7: I can prove sides/angles are congruent by proving triangles are congruent and using CPCTC.
To prove segments/angles are congruent:

1) Prove the triangles are congruent using the steps from Lesson 6.
2) State the segments/angles are congruent with reason "CPCTC" (Corresponding Parts of Congruent Triangles are Congruent).

Lesson 8: I can prove a triangle is isosceles by proving triangles are congruent and using CPCTC to prove two congruent sides/angles are congruent (Mini Proofs).

1) Prove triangles are congruent using the steps from Lesson 6.
2) Use CPCTC to prove a pair of sides/angles are congruent in the triangle you are trying to prove.
3) State the triangle is isosceles using reason "Isosceles Triangle Theorem" (In an isosceles triangle, congruent sides are opposite congruent angles.

Lesson 9: I can prove lines are parallel by proving triangles are congruent and using CPCTC to prove alternate interior, alternate exterior, or corresponding angles congruent. (Mini Proofs)

1) Prove triangles are congruent using the steps from Lesson 6.
2) Use CPCTC to prove a pair of alternate interior/alternate exterior/corresponding angles are congruent.
3) State the lines are parallel with reason "Parallel lines cut by a transversal create congruent alternate interior/alternate exterior/corresponding angles"

Lesson 10: I can prove triangles are isosceles, lines are parallel, and midpoint/bisector by using CPCTC to prove sides/angles are congruent.

PROVE TRIANGLES CONGRUENT

To prove midpoint/bisector:

Use CPCTC to state the appropriate sides/angles are congruent and then state the midpoint bisector

To prove isosceles:

Use CPCTC to state two sides/angles of the triangle are congruent and then state the triangle is isosceles

To prove parallel:

Use CPCTC to state that alternate interior, alternate exterior, or corresponding angles are congruent and then state the lines are parallel.

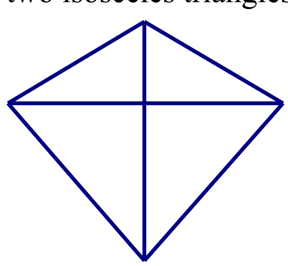
*Use the notes from lessons 8 and 9.

Lesson 11: I can answer perpendicular bisector multiple choice questions by understanding that the two top triangles are congruent, the top bottom triangles are congruent, and the big top triangle and the big bottom triangle are both isosceles.

Perpendicular bisector creates

-two pairs of congruent triangles so all of their corresponding parts are congruent due to CPCTC

-two isosceles triangles



The top 2 small triangles are congruent and the top big triangle is isosceles

The bottom 2 small triangles are congruent and the bottom big triangle is isosceles

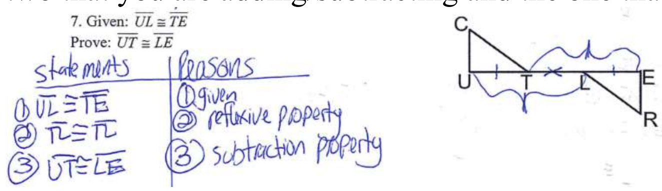
Lesson 12: I can complete an isosceles triangle theorem mini proof using “In a triangle, congruent angles are opposite congruent sides.

If given sides/angles are not in the triangles you’re trying to prove, look to see if it creates an isosceles triangle. If so, state the opposite sides/angles are congruent (that are in the triangles you’re trying to prove with reason “Isosceles Triangle Theorem.”

Lesson 13: I can complete an addition/subtraction property mini proof by following its procedure.

Addition and Subtraction Property (If you need more or less of a shared side)

*You must use three congruent statements to get one congruent statement for the triangles. The two that you are adding/subtracting and the one that you want to prove in the triangle.



Lesson 14: I can complete triangle proofs with additional tools by doing mini proofs with my givens and then using additional tools VRIAS.

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To prove segments or angles, use CPCTC

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*If segments bisect each other, they are both cut in half (2 pairs of congruent segments)

2) Use additional tools:

Vertical Angles are congruent (Look for an X)

Reflexive Property (A side/angle is in both triangles and is congruent to itself)

Isosceles Triangles (In a triangle, congruent angles are opposite congruent sides)

Addition and Subtraction Property (If you need more or less of a shared side)

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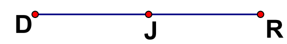
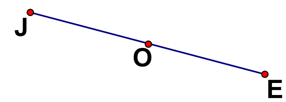
Midpoint

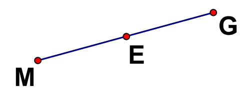
1. Given: J is the midpoint of $\overline{DR}$
Conclusion:
Reason:



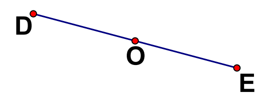
2. Given: O is the midpoint of $\overline{JE}$
Conclusion:
Reason:



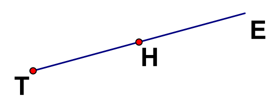
3. Given: E is the midpoint of $\overline{MG}$
Conclusion:
Reason:



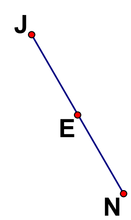
4. Given: O is the midpoint of $\overline{DE}$
Conclusion:
Reason:



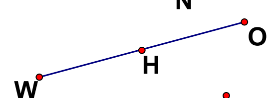
5. Given: H is the midpoint of $\overline{TE}$
Conclusion:
Reason:



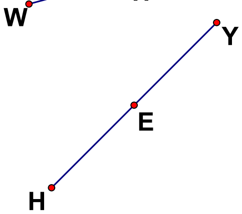
6. Given: E is the midpoint of $\overline{JN}$
Conclusion:
Reason:



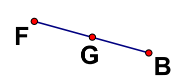
7. Given: H is the midpoint of $\overline{WO}$
Conclusion:
Reason:



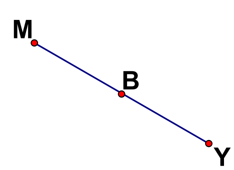
8. Given: E is the midpoint of $\overline{HY}$
Conclusion:
Reason:



9. Given: G is the midpoint of $\overline{FB}$
Conclusion:
Reason:



10. Given: B is the midpoint of $\overline{MY}$
Conclusion:



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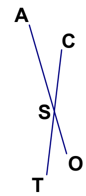
Line Bisector

1. Given: $\overline{AO}$ bisects $\overline{TC}$ at S

   Conclusion:

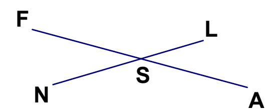
   Reason:



2. Given: $\overline{NL}$ bisects $\overline{FA}$ at S

   Conclusion:

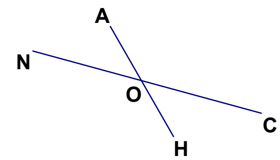
   Reason:



3. Given: $\overline{NC}$ bisects $\overline{AH}$ at O

   Conclusion:

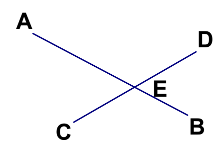
   Reason:



4. Given: $\overline{AB}$ bisects $\overline{CD}$ at E

   Conclusion:

   Reason:

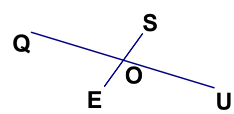


5. Given: $\overline{QU}$ and $\overline{SE}$ bisect each other at O

   Conclusion 1:

   Conclusion 2:

   Reason:

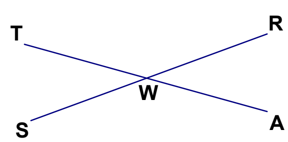


6. Given: $\overline{TA}$ and $\overline{RS}$ bisect each other at W

   Conclusion 1:

   Conclusion 2:

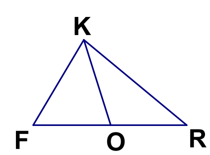
   Reason:



7. Given: $\overline{KO}$ bisects $\overline{FR}$

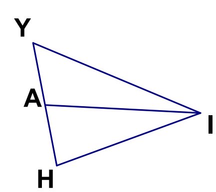
   Conclusion:

   Reason:



8. Given: $\overline{AI}$ bisects $\overline{YH}$

   Conclusion :



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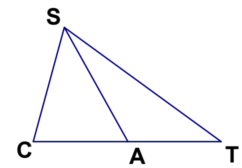
Median

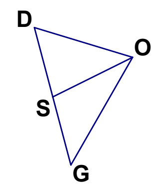
1. Given: $\overline{SA}$ is a median
Conclusion:

Reason:



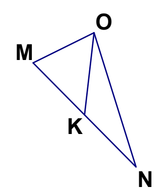
2. Given: $\overline{OS}$ is a median
Conclusion:

Reason 1:



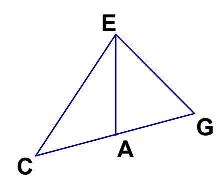
3. Given: $\overline{OK}$ is a median
Conclusion:

Reason:



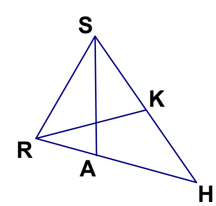
4. Given: $\overline{EA}$ is a median
Conclusion:

Reason:



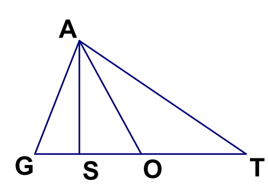
5. Given: $\overline{RK}$ is a median
Conclusion:

Reason:

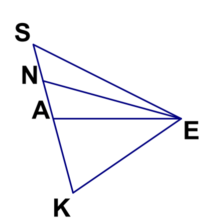


6. Given: $\overline{AO}$ is a median
Conclusion:

Reason:



7. Given: $\overline{EA}$ is a median
Conclusion:



Reason :

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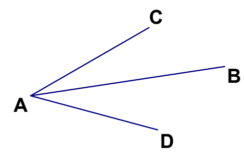
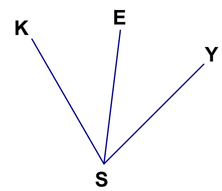
Angle Bisector

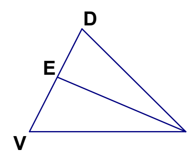
1. Given: $\overline{BA}$ bisects $\angle CAD$
Conclusion:
Reason:



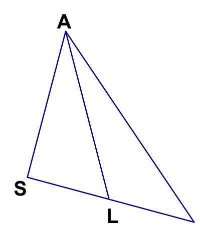
2. Given: $\overline{ES}$ bisects $\angle KSY$
Conclusion:
Reason:



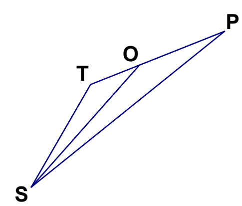
3. Given: $\overline{EI}$ bisects $\angle DIV$
Conclusion:
Reason:



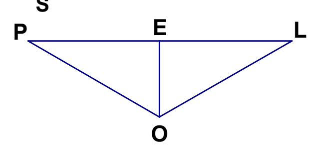
4. Given: $\overline{AL}$ bisects $\angle SAI$
Conclusion:
Reason:



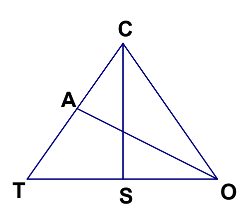
5. Given: $\overline{SO}$ bisects $\angle TSP$
Conclusion:
Reason:



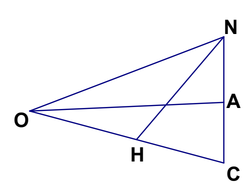
6. Given: $\overline{EO}$ bisects $\angle POL$
Conclusion:
Reason:



7. Given: $\overline{OA}$ bisects $\angle COT$
Conclusion:
Reason:



8. Given: $\overline{HN}$ bisects $\angle ONC$
Conclusion:



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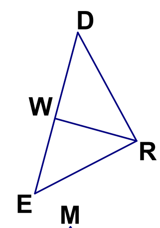
Perpendicular Lines

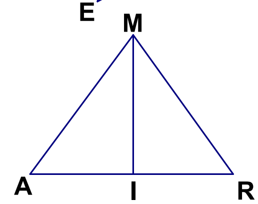
1. Given: $\overline{RW} \perp \overline{DE}$
   Conclusion:

   Reason:



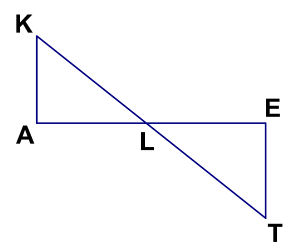
2. Given: $\overline{MI} \perp \overline{RA}$
   Conclusion :

   Reason :



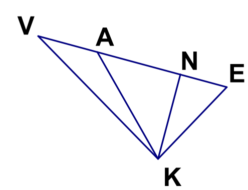
3. Given: $\overline{KA} \perp \overline{AE}, \overline{AE} \perp \overline{ET}$
   Conclusion:

   Reason:



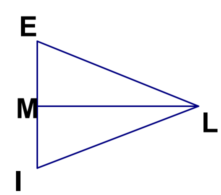
4. Given: $\overline{KN} \perp \overline{VE}$
   Conclusion :

   Reason :



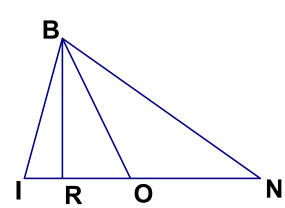
5. Given: $\overline{LM} \perp \overline{IE}$
   Conclusion :

   Reason :



6. Given: $\overline{BR} \perp \overline{IN}$
   Conclusion :

   Reason :



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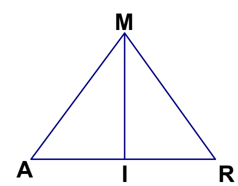
Altitude

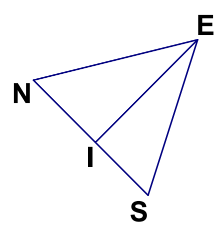
1. Given: $\overline{MI}$ is an altitude
Conclusion :

Reason :



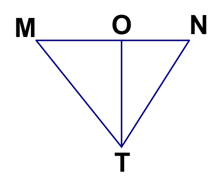
2. Given: $\overline{EI}$ is an altitude
Conclusion :

Reason :



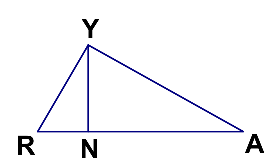
3. Given: $\overline{OT}$ is an altitude
Conclusion :

Reason :



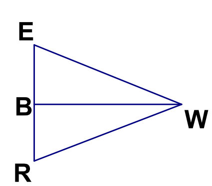
4. Given: $\overline{YN}$ is an altitude
Conclusion :

Reason :



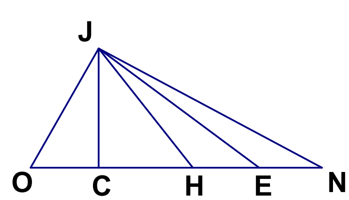
5. Given: $\overline{WB}$ is an altitude
Conclusion :

Reason :



6. Given: $\overline{JC}$ is an altitude
Conclusion :

Reason:



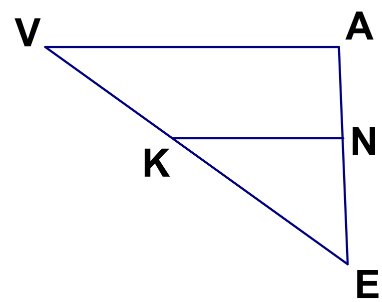
Name _______________ Date ________

Mr. Schlansky Geometry

Parallel Definitions

1. Given: $\overline{VA} \parallel \overline{KN}$

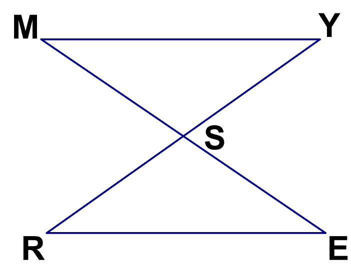
Conclusion:



Reason:

2. Given: $\overline{MY} \parallel \overline{RE}$

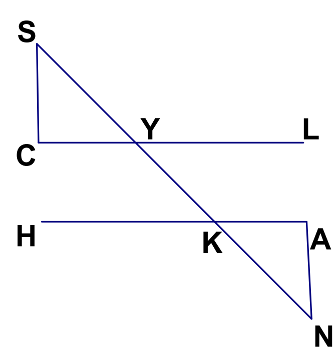
Conclusion:



Reason:

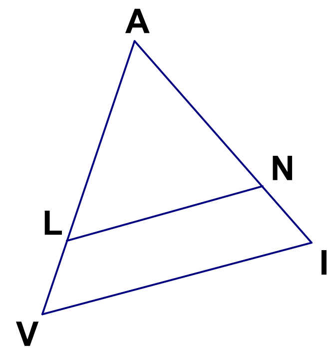
3. Given: $\overline{CL} \parallel \overline{HA}$

Conclusion:



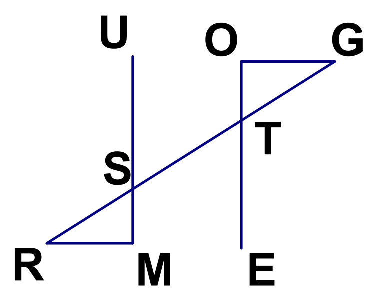
Reason:

4. Given: $\overline{LN} \parallel \overline{VI}$
Conclusion:



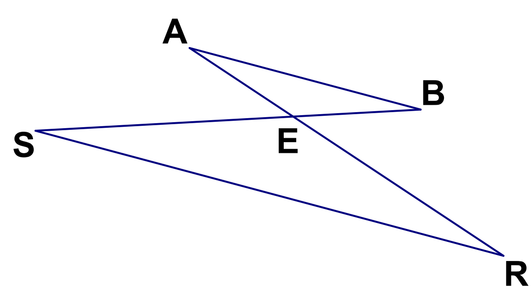
Reason:

5. Given: $\overline{UM} \parallel \overline{OE}$
Conclusion:



Reason:

6. Given: $\overline{SR} \parallel \overline{AB}$
Conclusion:



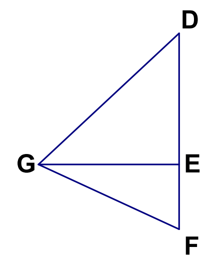
Reason:

Name _______________ Date __________
Mr. Schlansky Geometry

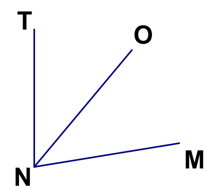
Mini Proofs

Drawn conclusions until congruence for each example

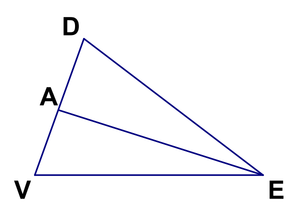
1. Given: $\overline{GE}$ is an altitude



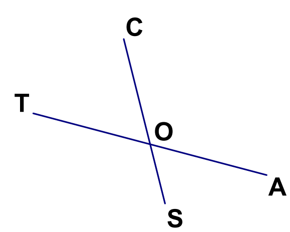
2. Given: $\overline{ON}$ bisects $\angle$ TNM



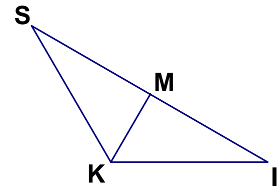
3. Given: A is the midpoint of $\overline{DV}$



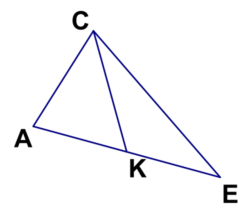
4. Given: $\overline{CS}$ bisects $\overline{TA}$



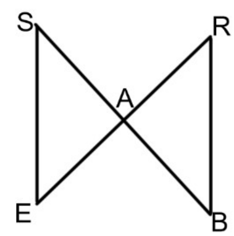
5. Given: $\overline{KM}$ bisects $\angle$ SKI



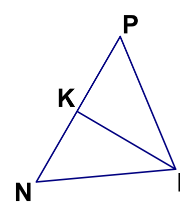
6. $\overline{CK}$ is a median



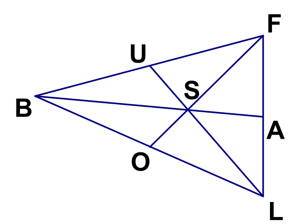
7. Given: $\overline{SE} \parallel \overline{RB}$



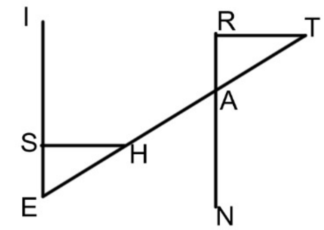
8. Given: $\overline{IK} \perp \overline{PN}$



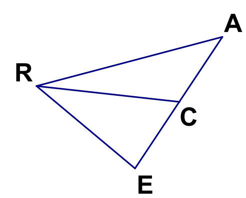
9. Given: U is the midpoint of $\overline{BF}$



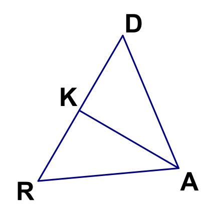
10. Given: $\overline{IE} \parallel \overline{RN}$



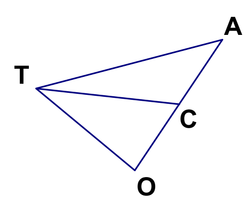
11. Given: C is the midpoint of $\overline{AE}$



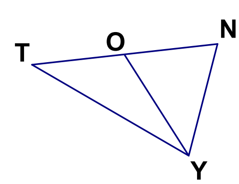
12. Given: $\overline{AK} \perp \overline{DR}$



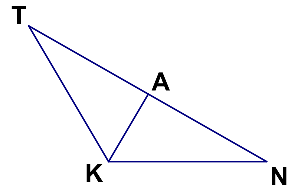
13. Given: $\overline{CT}$ bisects $\angle$ ATO



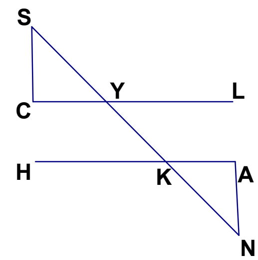
14. Given: $\overline{YO}$ is a median



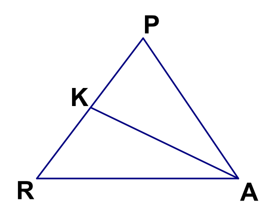
15. Given: $\overline{KA}$ is an altitude



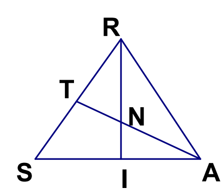
16. Given: $\overline{CL} \parallel \overline{HA}$



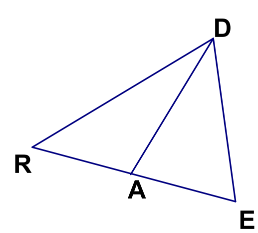
17. Given: $\overline{KA}$ bisects $\overline{PR}$



18. Given: $\overline{AT} \perp \overline{RS}$



19 $\overline{DA}$ bisects $\angle$ RDE

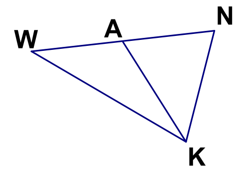


Name _______________ Date ______________

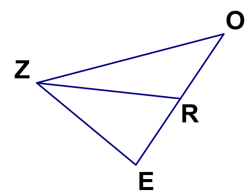
Mr. Schlansky Geometry

Mini Proofs Practice

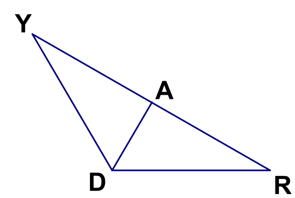
1. Given: $\overline{AK}$ is a median



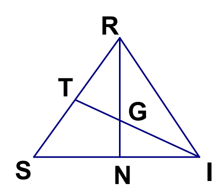
2. Given: R is the midpoint of $\overline{OE}$



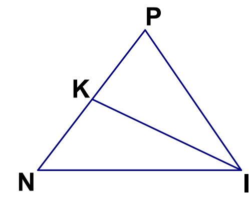
3. Given: $\overline{DA}$ is an altitude



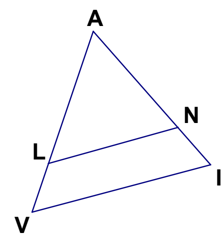
4. Given: $\overline{IT} \perp \overline{RS}$



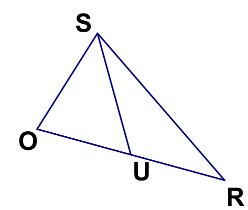
5. Given: $\overline{KI}$ bisects $\angle$ PIN



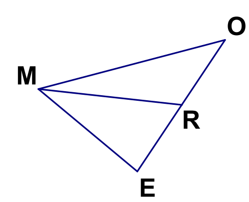
6. Given: $\overline{LN} \parallel \overline{VI}$



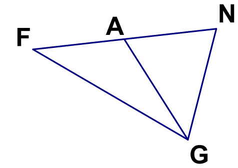
7. Given: $\overline{SU}$ bisects $\overline{OR}$



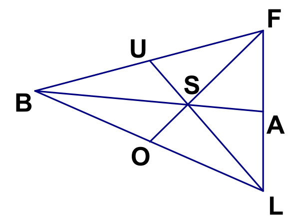
8. R is the midpoint of $\overline{OE}$



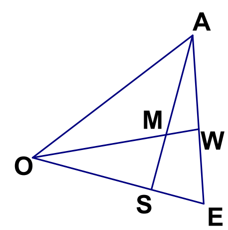
9. Given: $\overline{GA}$ bisects $\overline{FN}$



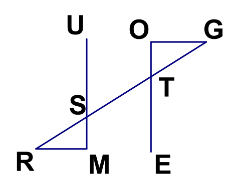
10. Given: $\overline{AB}$ bisects $\angle$ FBL



11. Given: $\overline{AS} \perp \overline{OE}$



12. Given: $\overline{UM} \parallel \overline{OE}$



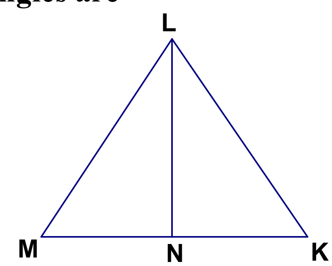
Name _______________ Date ___________

Mr. Schlansky Geometry

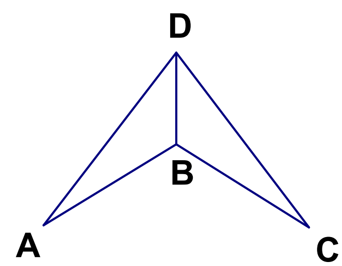
Reflexive Property and Vertical Angles

List one statement and reason that leads towards proving the triangles are congruent/similar

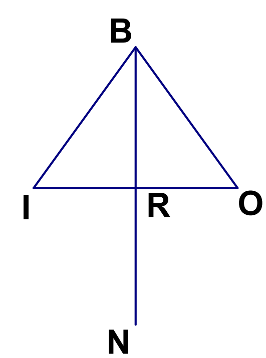
1. Given: None
   Prove: $\Delta LNM \cong \Delta LNK$



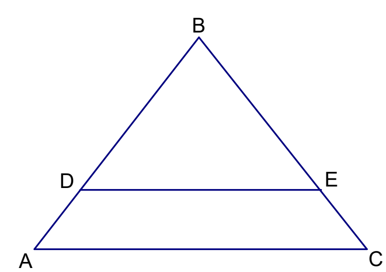
2. Given: None
   Prove: $\Delta DBA \cong \Delta DBC$



3. Given: None
   Prove: $\Delta BRI \cong \Delta BRO$

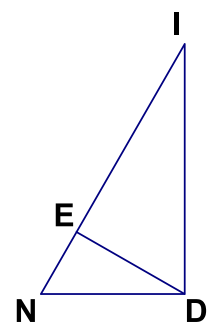


4. Given: None
   Prove: $\Delta BDE \sim \Delta BAC$

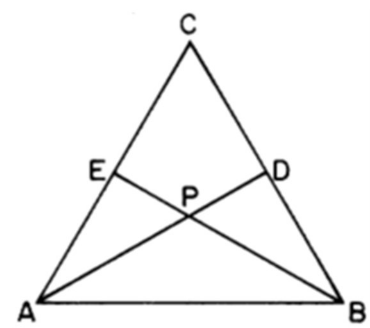


5. Given: None
Prove: $\Delta ABC \sim \Delta ADE$

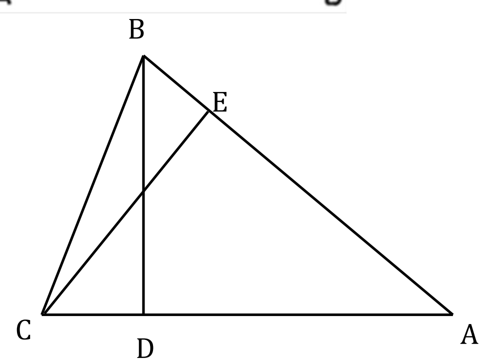
6. Given: None
Prove: $\Delta END \sim \Delta DNI$



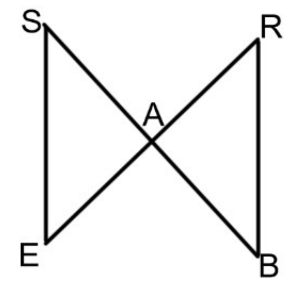
7. Given: None
Prove: $\Delta AEB \cong \Delta BDA$



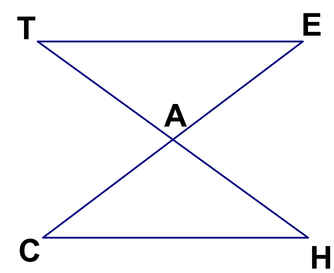
8. Given: None
Prove: $\Delta BEC \cong \Delta CDB$



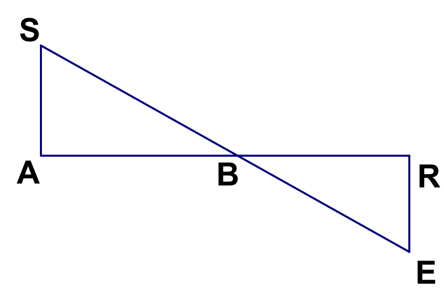
9. Given: None
Prove: $\Delta SAE \cong \Delta RAB$



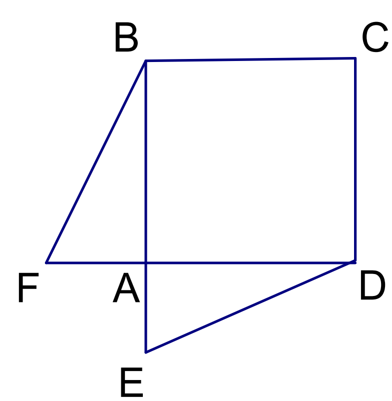
10. Given: None
Prove: $\Delta TAE \cong \Delta CAH$



11. Given: None
Prove: $\Delta SBA \cong \Delta EBR$



12. Given: None
Prove: $\Delta BAF \cong \Delta DAE$

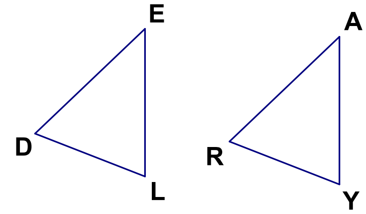


Name _______________ Date ____________
Mr. Schlansky Geometry

Congruent Triangle Methods

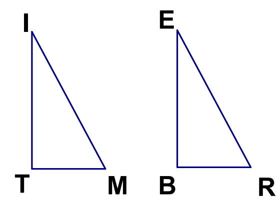
1. In the diagram below of ΔDEL and ΔRAY, $\angle D \cong \angle R$, $\angle E \cong \angle A$, and $\overline{EL} \cong \overline{AY}$
Which of the follow could be used to prove that $\Delta DEL \cong \Delta RAY$?

(1) ASA (3) AAS
(2) AA (4) SAS



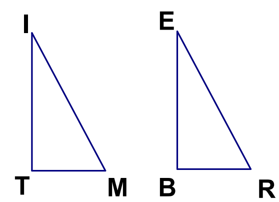
2. In the diagram below of ΔTIM and ΔBER, $\angle T$ *and* $\angle B$ are right angles, $\overline{IM} \cong \overline{ER}$, and $\overline{TM} \cong \overline{BR}$
Which of the follow could be used to prove that $\Delta TIM \cong \Delta BER$?

(1) ASS (3) HL
(2) AA (4) SAS



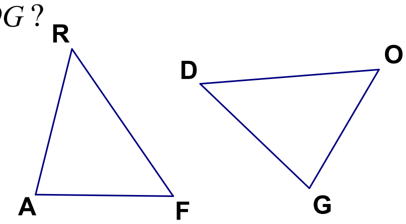
3. In the diagram below of ΔTIM and ΔBER, $\angle T$ *and* $\angle B$ are right angles, $\overline{IT} \cong \overline{EB}$, and $\overline{TM} \cong \overline{BR}$
Which of the follow could be used to prove that $\Delta TIM \cong \Delta BER$?

(1) ASS (3) HL
(2) AA (4) SAS



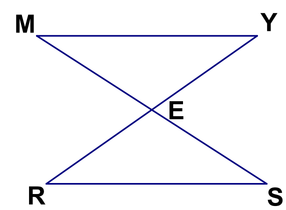
4. In the diagram below of ΔARF and ΔDOG, $\overline{GD} \cong \overline{AR}$, $\overline{RF} \cong \overline{DO}$, and $\angle D \cong \angle R$
Which of the follow could be used to prove that $\Delta ARF \cong \Delta DOG$?

(1) AAS (3) HL
(2) ASA (4) SAS



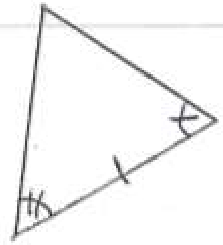
5. In the diagram below, $\overline{ME} \cong \overline{ES}$, $\angle MEY \cong \angle SER$, and $\angle M \cong \angle S$
Which of the follow could be used to prove that $\Delta MEY \cong \Delta SER$?

(1) AAS (3) HL
(2) ASA (4) SAS



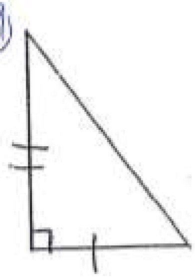
(6)

(7)

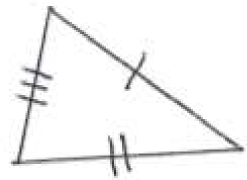


(8)

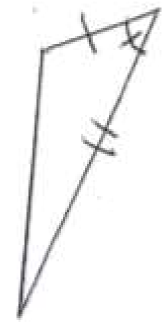
(9)



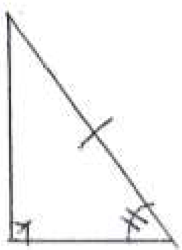
(10)



(11)



(12)



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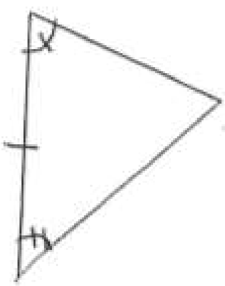

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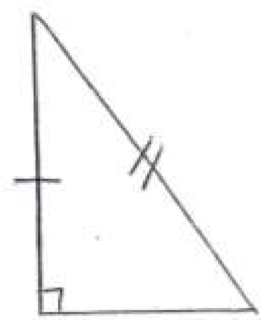

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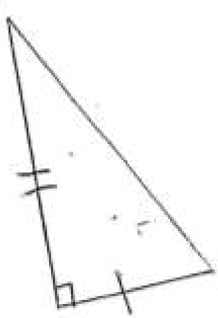

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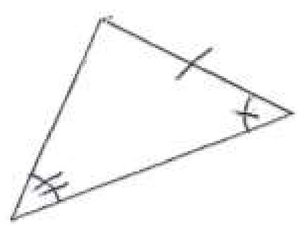

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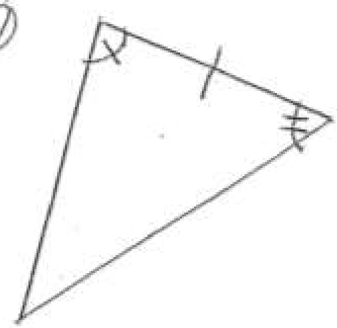


Name _______________ Date _________

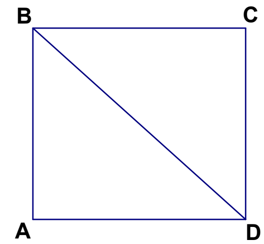
Mr. Schlansky Geometry

Triangle Proofs!

1. Given: $\overline{BD}$ bisects $\angle CDA$

$\overline{AD} \cong \overline{DC}$

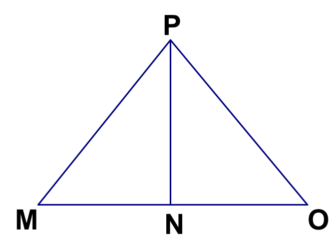
Prove: $\Delta BAD \cong \Delta BCD$



2. Given: $\overline{PN}$ is an altitude to $\overline{MO}$

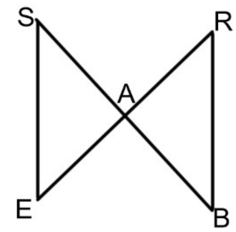
$\angle OPN \cong \angle MPN$

Prove: $\Delta MPN \cong \Delta OPN$



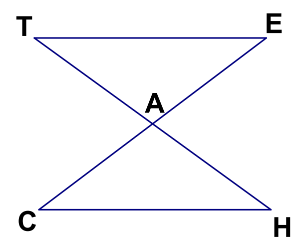
3. Given: $\overline{SE} \parallel \overline{RB}$ and $\overline{RE}$ bisects $\overline{SB}$

Prove: $\Delta ESA \cong \Delta RBA$

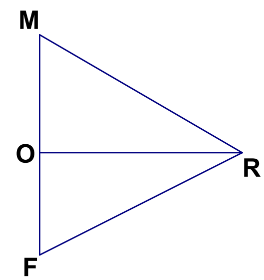


4. Given: $\overline{TH}$ *and* $\overline{CE}$ bisect each other at A

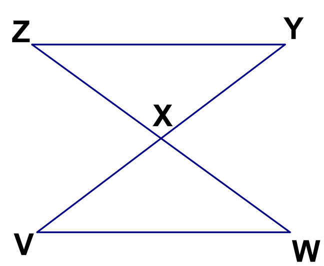
Prove: $\Delta TAE \cong \Delta CAH$



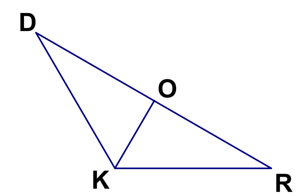
5. Given: $\overline{OR}$ bisects $\angle FRM$
$\angle F \cong \angle M$
Prove: $\Delta MOR \cong \Delta FOR$



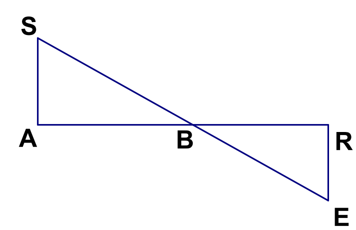
6. Given: X is midpoint of $\overline{WZ}$
$\angle W \cong \angle Z$
Prove: $\Delta WXV \cong \Delta ZXY$



7. Given: $\overline{KO} \perp \overline{DR}$, $\overline{KD} \cong \overline{KR}$
Prove: $\Delta ROK \cong \Delta DOK$



8. Given: $\overline{SA} \perp \overline{AR}$, $\overline{AR} \perp \overline{RE}$, B is the midpoint of $\overline{AR}$
Prove: $\Delta SAB \cong \Delta ERB$

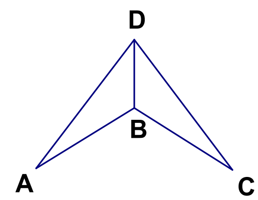


Name _______________
Mr. Schlansky

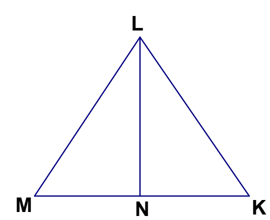
Date _________
Geometry

Triangle Proofs with CPCTC

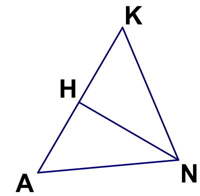
1. Given: $\overline{BD}$ bisects $\angle$ADC
   $\overline{AD} \cong \overline{DC}$
   Prove: $\overline{AB} \cong \overline{BC}$



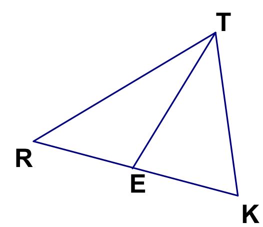
2. Given: $\overline{LN}$ bisects $\angle$KLM
   $\angle$LKM $\cong$ $\angle$LMK
   Prove: $\overline{NM} \cong \overline{NK}$



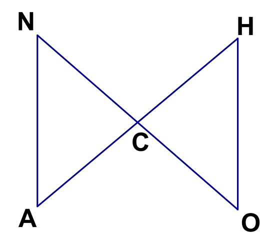
3. Given: $\overline{HN} \perp \overline{KA}$, $\overline{KN} \cong \overline{AN}$
Prove: $\angle HAN \cong \angle HKN$



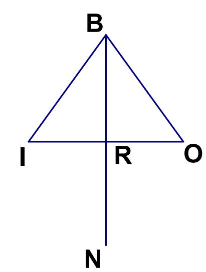
4. Given: $\overline{TE}$ is a median, $\overline{TR} \cong \overline{TK}$
Prove: $\angle$TKR $\cong$ $\angle$TRK



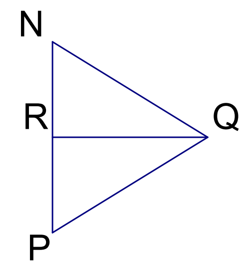
5. Given: $\overline{NO}$ and $\overline{HA}$ bisect each other
Prove: $\overline{NA} \cong \overline{HO}$



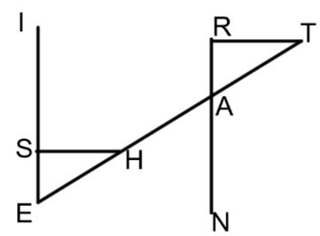
6. Given: $\overline{NB}$ bisects $\angle$IBO, $\overline{BR}$ is an altitude
Prove: $\angle$BIO $\cong$ $\angle$BOI



7. Given: $\overline{QR}$ is the perpendicular bisector of $\overline{NP}$
Prove: $\angle NQR \cong \angle PQR$



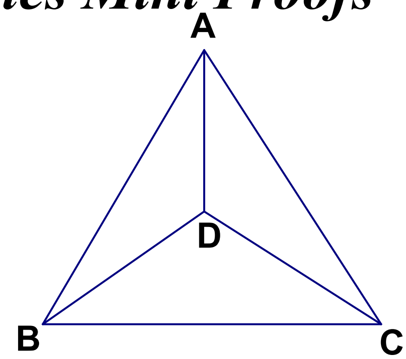
8. Given: $\overline{IE} \parallel \overline{RN}$, $\overline{TR} \perp \overline{RN}$, $\overline{HS} \perp \overline{IE}$, $\overline{EH} \cong \overline{AT}$
Prove: $\overline{SH} \cong \overline{RT}$



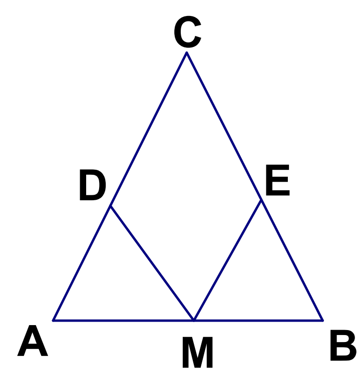
Name _______________ Date ____________
Mr. Schlansky Geometry

Proving Triangles Isosceles Mini Proofs

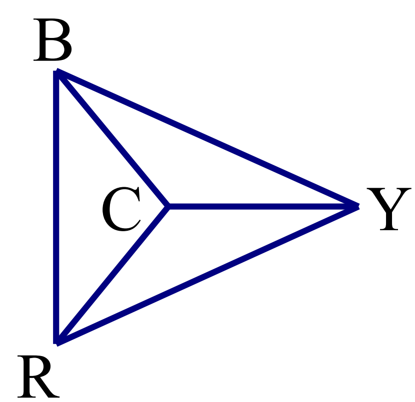
1. Given: $\Delta ADB \cong \Delta ADC$
   Prove: ΔBAC is isosceles



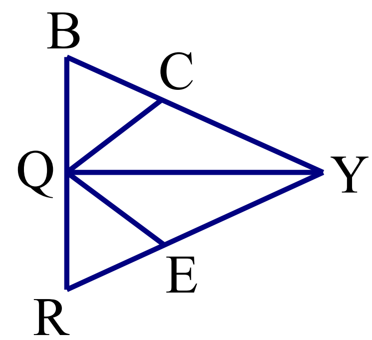
2. Given: $\Delta ADM \cong \Delta BEM$
   Prove: ΔACB is isosceles



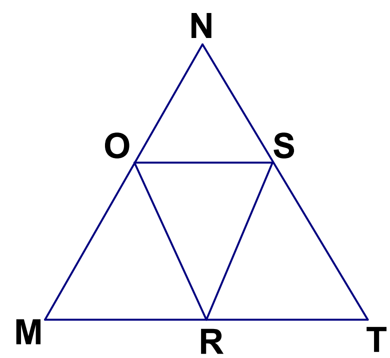
3. Given: $\Delta YCB \cong \Delta YCR$
   Prove: ΔBYR is isosceles



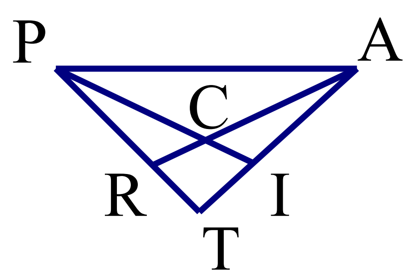
4. Given: $\Delta BQC \cong \Delta RQE$
   Prove: ΔBYR is isosceles



5. Given: $\Delta MOR \cong \Delta TSR$
   Prove: ΔMNT is isosceles



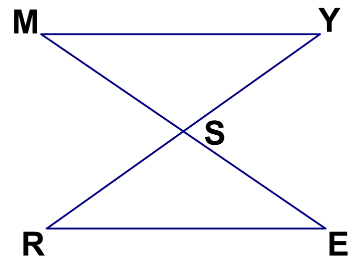
6. Given: $\Delta PRA \cong \Delta AIP$
   Prove: ΔPTA is isosceles



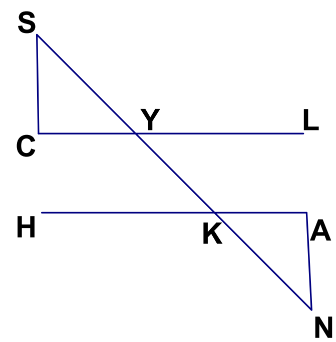
Name _______________ Date ___________
Mr. Schlansky Geometry

Proving Parallel Mini Proofs

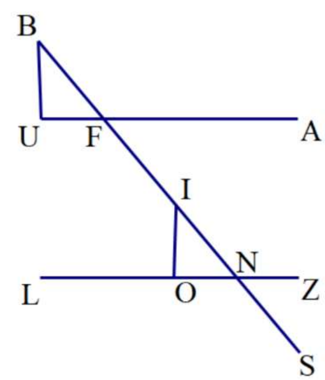
1. Given: $\Delta MYS \cong \Delta ERS$
Prove: $\overline{MY} \parallel \overline{RE}$



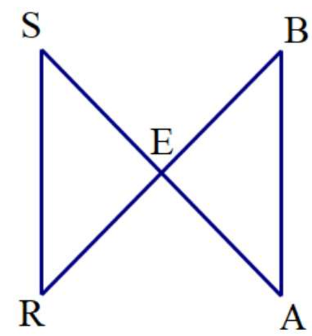
2. Given: $\Delta SCY \cong \Delta NAK$
Prove: $\overline{CL} \parallel \overline{HA}$



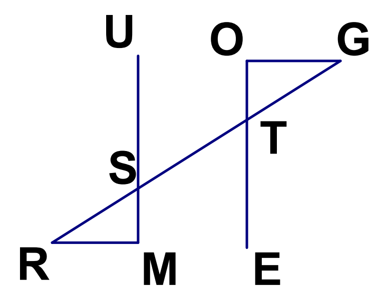
3. Given: $\Delta BUF \cong \Delta ION$
Prove: $\overline{UA} \parallel \overline{LZ}$



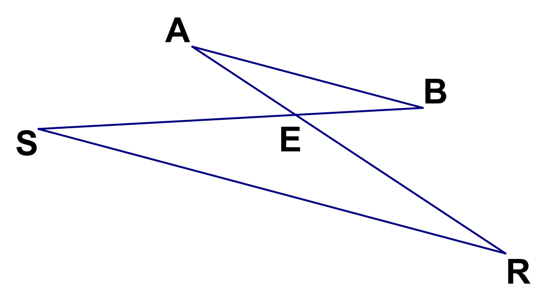
4. Given: $\Delta SRE \cong \Delta ABE$
Prove: $\overline{SR} \parallel \overline{BA}$



5. Given: $\Delta RMS \cong \Delta GOT$
Prove: $\overline{MU} \parallel \overline{EO}$



6. Given: $\Delta ABE \cong \Delta RSE$
Prove: $\overline{SR} \parallel \overline{AB}$

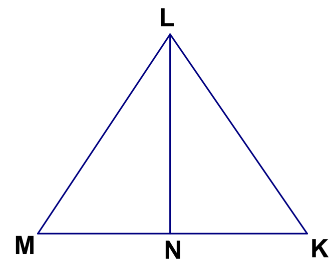


Name ____________ Date __________

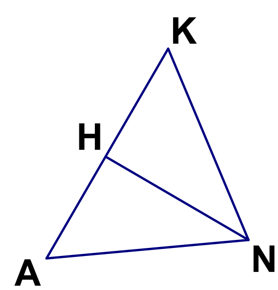
Mr. Schlansky Geometry

Triangle Proofs Using CPCTC

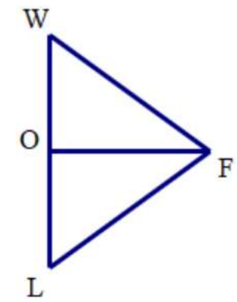
1. Given: $\overline{LN}$ bisects $\angle$ KLM
   $\angle$ LKM $\cong$ $\angle$ LMK
   Prove: N is the midpoint of $\overline{MK}$



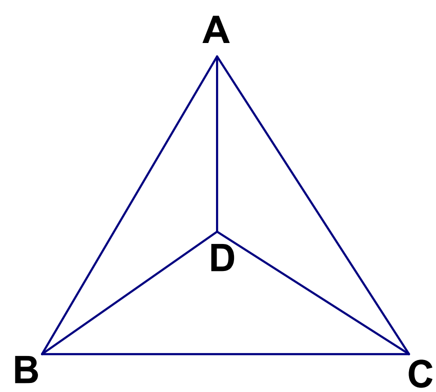
2. Given: $\overline{HN} \perp \overline{KA}$, $\overline{KN} \cong \overline{AN}$
   Prove: $\overline{HN}$ bisects $\angle KNA$



3. Given: $\overline{OF}$ is the perpendicular bisector of $\overline{WL}$
Prove: ΔWFL is isosceles

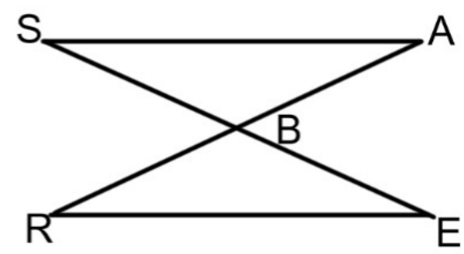


4. Given: $\angle ADB \cong \angle ADC$
$\overline{AD}$ bisects $\angle BAC$
Prove: ΔABC is isosceles

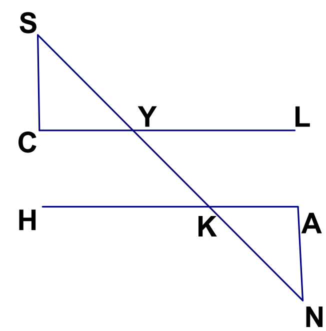


5. Given: $\overline{SE}$ and $\overline{AR}$ bisect each other.

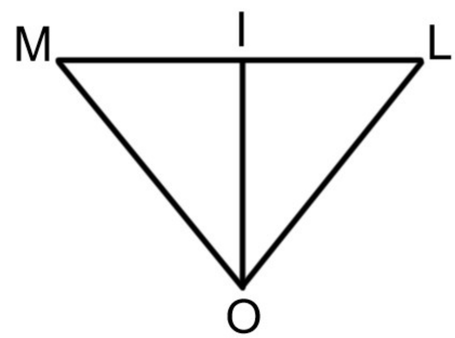
Prove that $\overline{SA} \parallel \overline{RE}$



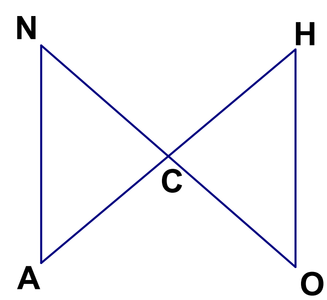
6. Given: $\overline{SC} \perp \overline{CL}$, $\overline{HA} \perp \overline{AN}$, $\overline{SY} \cong \overline{KN}$, and $\overline{SC} \cong \overline{AN}$.
Prove $\overline{CL} \parallel \overline{HA}$



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



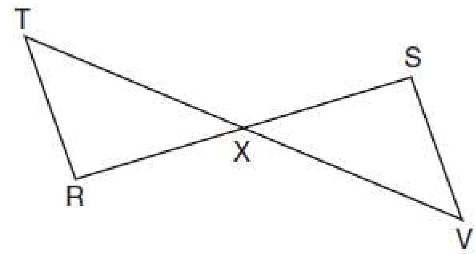
8. Given: $\overline{NA} \parallel \overline{HO}$, $\overline{NA} \cong \overline{HO}$
Prove: $\overline{NO}$ bisects $\overline{HA}$



9. Given: $\overline{RS}$ and $\overline{TV}$ bisect each other at point X

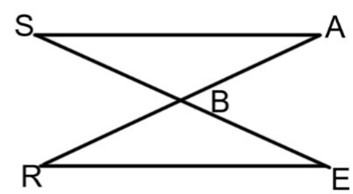
$\overline{TR}$ and $\overline{SV}$ are drawn

Prove: $\overline{TR} \parallel \overline{SV}$

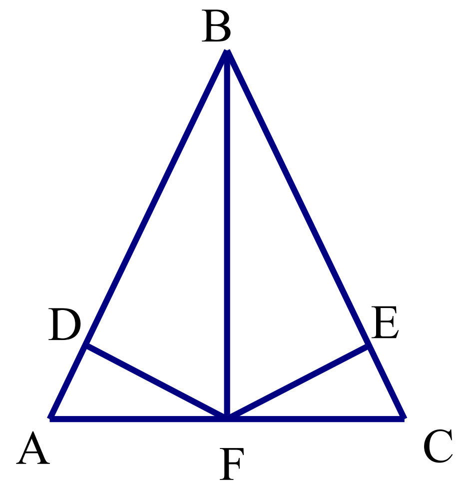


10. Given: $\overline{SA} \cong \overline{RE}$ and B is the midpoint of $\overline{SE}$.

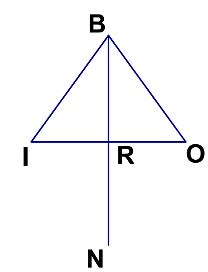
Prove: $\overline{SA} \parallel \overline{RE}$.



11. 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



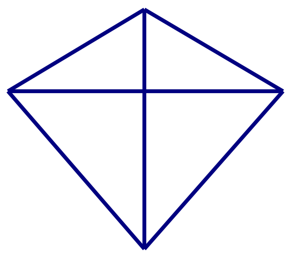
12. Given: $\overline{BR}$ is the perpendicular bisector of $\overline{IO}$
Prove: $\overline{NB}$ bisects $\angle OBI$



Name ____________ Date ________
Mr. Schlansky Geometry

Perpendicular Bisector Multiple Choice

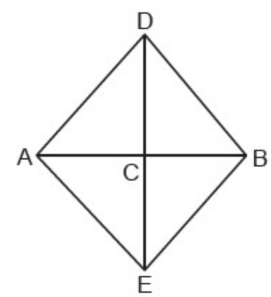
Perpendicular bisector creates
-two pairs of congruent triangles so all of their corresponding parts are congruent due to CPCTC
-two isosceles triangles



The top 2 small triangles are congruent and the top big triangle is isosceles
The bottom 2 small triangles are congruent and the bottom big triangle is isosceles

1. In the diagram below of quadrilateral *ADBE*, $\overline{DE}$ is the perpendicular bisector of $\overline{AB}$. Which statement is always true?

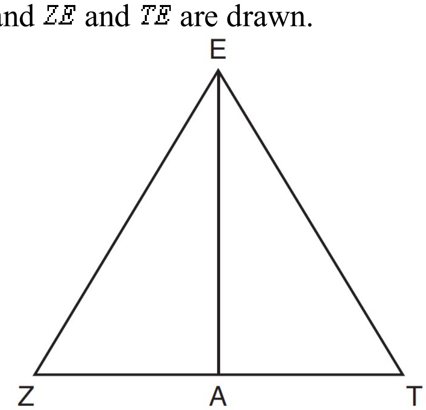
1) $\angle ADC \cong \angle BDC$
2) $\angle EAC \cong \angle DAC$
3) $\overline{AD} \cong \overline{BE}$
4) $\overline{AE} \cong \overline{AD}$



2. Line segment *EA* is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.

Which conclusion can *not* be proven?

1) $\overline{EA}$ bisects angle *ZET*.
2) Triangle *EZT* is equilateral.
3) $\overline{EA}$ is a median of triangle *EZT*.
4) Angle *Z* is congruent to angle *T*.



3. Segment *CD* is the perpendicular bisector of $\overline{AB}$ at *E*. Which pair of segments does *not* have to be congruent?
1) $\overline{AD}, \overline{BD}$
2) $\overline{AC}, \overline{BC}$
3) $\overline{AE}, \overline{BE}$
4) $\overline{DE}, \overline{CE}$

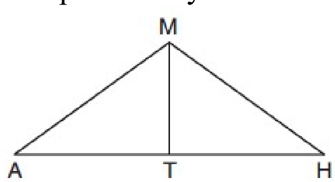
4. In $\triangle ABC$, $\overline{BD}$ is the perpendicular bisector of $\overline{ADC}$. Based upon this information, which statements below can be proven?

I. $\overline{BD}$ is a median.

II. $\overline{BD}$ bisects $\angle ABC$.

III. $\triangle ABC$ is isosceles.
1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

5. In triangle *MAH* below, $\overline{MT}$ is the perpendicular bisector of $\overline{AH}$.
Which statement is *not* always true?
1) $\triangle MAH$ is isosceles. 2) $\triangle MAT$ is isosceles. 3) $\overline{MT}$ bisects $\angle AMH$. 4) $\angle A$ and $\angle TMH$ are complementary.



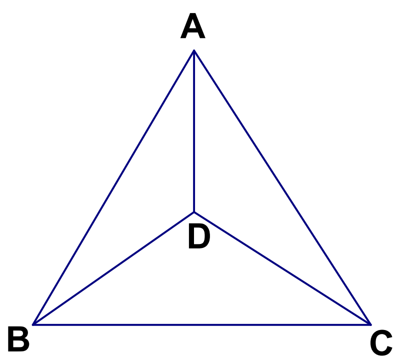
6. Segment *AB* is the perpendicular bisector of $\overline{CD}$ at point *M*. Which statement is always true?
1) $\overline{CB} \cong \overline{DB}$
2) $\overline{CD} \cong \overline{AB}$
3) $\Delta ACD \cong \Delta BCD$
4) $\Delta ACM \cong \Delta BCM$

Name _______________
Mr. Schlansky

Date ___________
Geometry

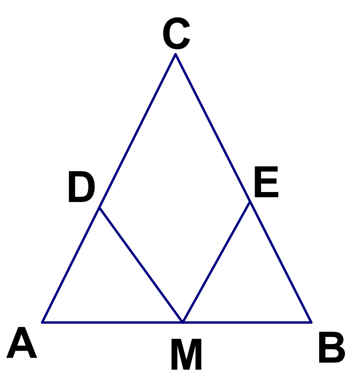
Isosceles Triangle Theorem Mini Proofs

1. Given: $\angle ABC \cong \angle ACB$
   Prove: $\Delta ADB \cong \Delta ADC$

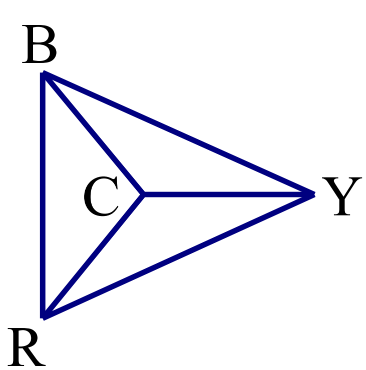


2. Given: $\overline{CA} \cong \overline{CB}$

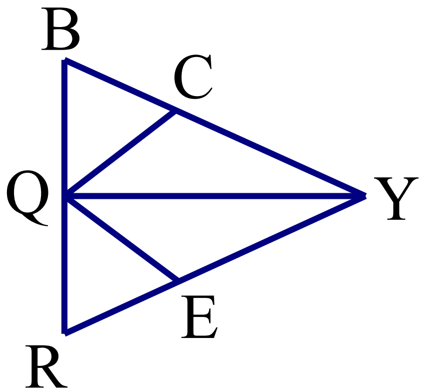
   Prove: $\Delta ADM \cong \Delta BEM$



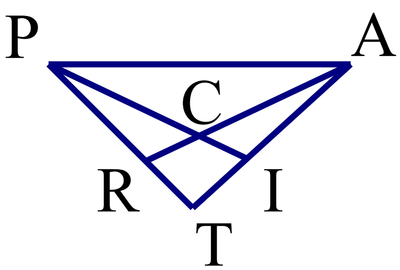
3. Given: $\angle BRY \cong \angle YRB$
   Prove: $\Delta YCB \cong \Delta YCR$



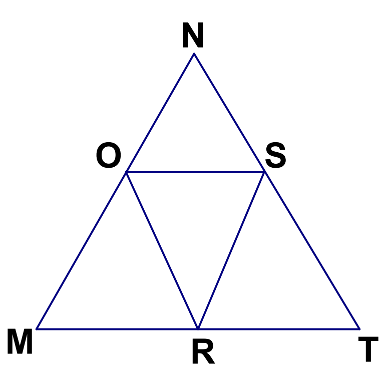
4. Given: $\overline{BY} \cong \overline{RY}$
   Prove: $\Delta BQC \cong \Delta RQE$



5. Given: $\overline{PT} \cong \overline{AT}$
   Prove: $\Delta PRA \cong \Delta AIP$



6. Given: $\overline{MN} \cong \overline{NT}$, $\angle ROS \cong \angle RSO$
   Prove: $\Delta MOR \cong \Delta TSR$



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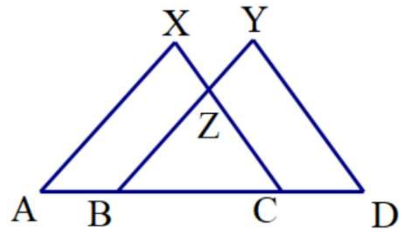
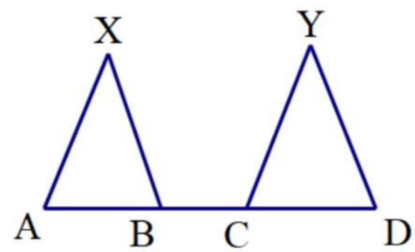
Addition and Subtraction Property Mini Proofs

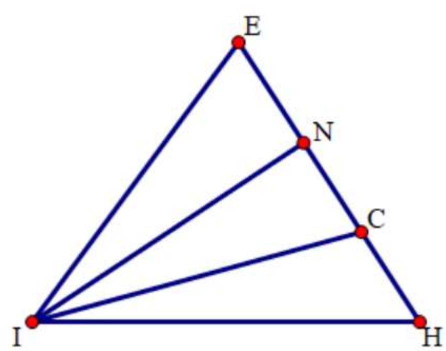
1. Given: $\overline{AB} \cong \overline{CD}$
Prove: $\Delta AXC \cong \Delta BYD$



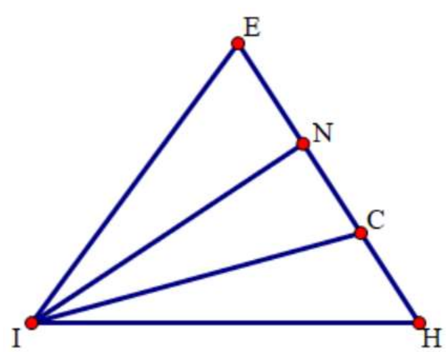
2. Given: $\overline{AC} \cong \overline{BD}$
Prove: $\Delta AXB \cong \Delta DYC$



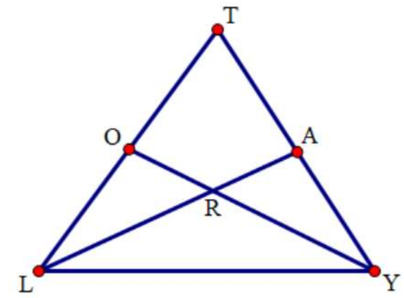
3. Given: $\angle EIN \cong \angle HIC$
Prove: $\Delta EIC \cong \Delta HIN$



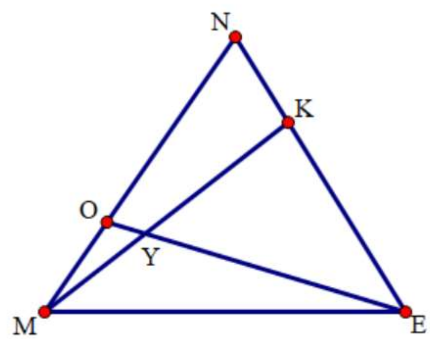
4. Given: $\angle EIC \cong \angle HIN$
Prove: $\Delta EIN \cong \Delta HIC$



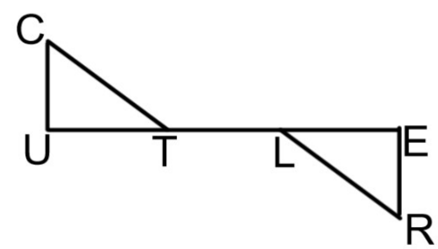
5. Given: $\angle TLA \cong \angle TYO$, $\angle ALY \cong \angle OYL$
Prove: $\Delta OLY \cong \Delta AYL$



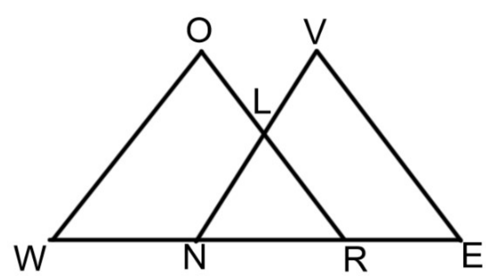
6. Given: $\overline{MN} \cong \overline{NE}$, $\overline{ON} \cong \overline{KE}$
Prove: $\Delta MOE \cong \Delta NKM$



7. Given: $\overline{UL} \cong \overline{TE}$
Prove: $\Delta CUT \cong \Delta REL$



8. Given: $\overline{WN} \cong \overline{RE}$
Prove: $\Delta WOR \cong \Delta NVE$



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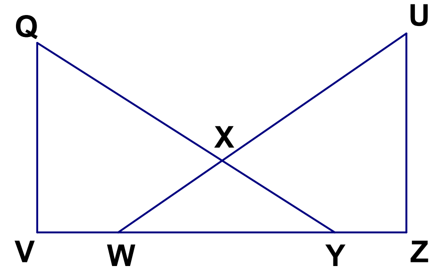
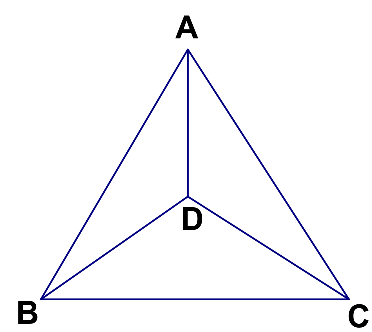
Triangle Proofs with Additional Tools

1. Given: $\overline{QV} \cong \overline{UZ}$, $\overline{VW} \cong \overline{YZ}$, $\overline{YQ} \cong \overline{WU}$
Prove: $\angle Q \cong \angle U$



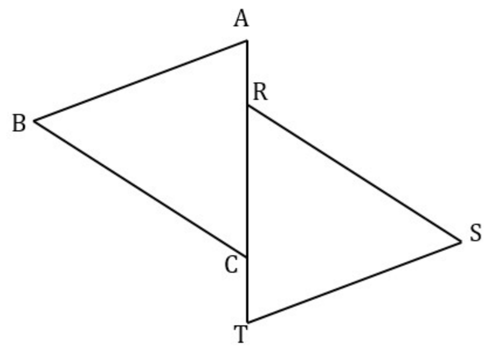
2. Given: $\angle ABC \cong \angle ACB$, $\overline{AD}$ bisects $\angle BAC$

Prove: $\overline{BD} \cong \overline{DC}$



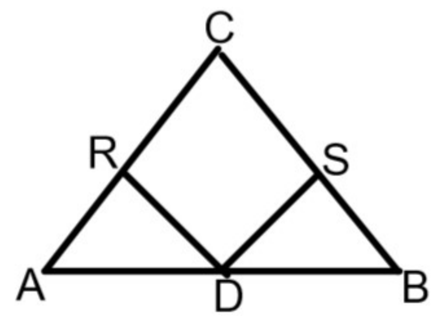
3. Given: $\angle B \cong \angle S$, $\overline{AB} \parallel \overline{ST}$, $\overline{AR} \cong \overline{TC}$

Prove: $\overline{BC} \cong \overline{SR}$

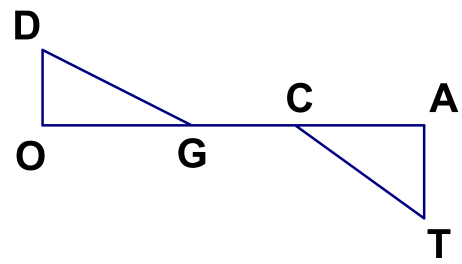


4. Given: In ΔABC, $\overline{CA} \cong \overline{CB}$, $\overline{AR} \cong \overline{BS}$, $\overline{DR} \perp \overline{AC}$, and $\overline{DS} \perp \overline{BC}$

Prove: $\overline{DR} \cong \overline{DS}$

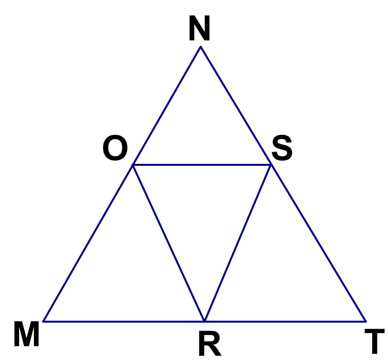


5. Given: $\overline{DO} \perp \overline{OA}$, $\overline{TA} \perp \overline{OA}$, $\overline{DO} \cong \overline{TA}, \overline{OC} \cong \overline{AG}$
Prove: $\overline{DG} \cong \overline{TC}$



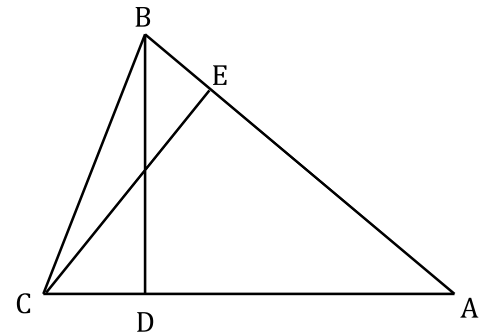
6. Given: $\overline{MN} \cong \overline{NT}$, $\angle ROS \cong \angle RSO$, $\angle ORM \cong \angle SRT$

Prove: $\Delta MOR \cong \Delta TSR$



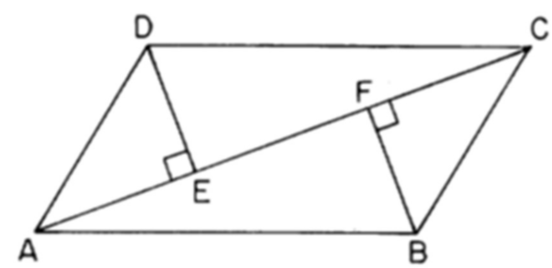
7. Given: $\overline{AB} \cong \overline{AC}, \overline{CE} \perp \overline{AB}, \overline{BD} \perp \overline{AC}$

Prove: $\overline{CE} \cong \overline{BD}$



8. Given: $\overline{DC} \parallel \overline{AB}$, $\overline{AE} \cong \overline{CF}$, $\overline{DE} \perp \overline{AC}$, $\overline{BF} \perp \overline{AC}$

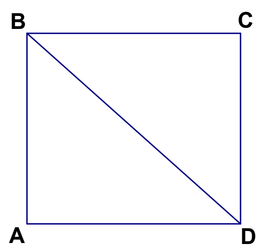
Prove: $\Delta ABF \cong \Delta CDE$



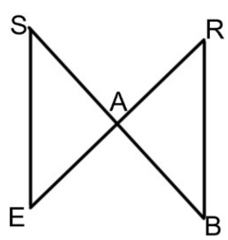
Name ____________ Date ________
Mr. Schlansky Geometry

Triangle Proofs Practice

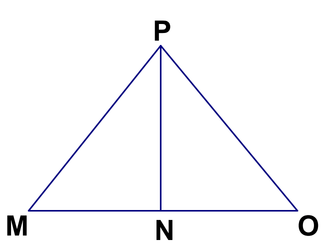
1. Given: $\overline{BD}$ bisects $\angle CDA$
$\overline{AD} \cong \overline{DC}$
Prove: $\overline{BA} \cong \overline{BC}$



2. Given: $\overline{SB}$ and $\overline{RE}$ bisect each other
Prove: $\overline{SE} \cong \overline{RB}$



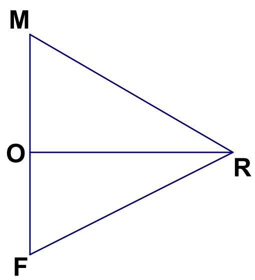
3. Given: $\overline{PN} \perp \overline{MO}$
$\overline{PM} \cong \overline{PO}$
Prove: $\angle PMN \cong \angle PON$



4. Given: $\overline{OR}$ bisects $\angle FRM$

$\angle F \cong \angle M$

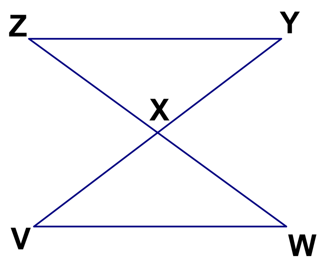
Prove: $\Delta MOR \cong \Delta FOR$



5. Given: X is midpoint of $\overline{WZ}$

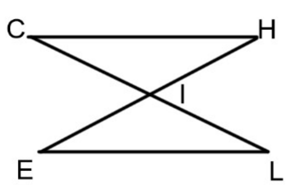
$\angle W \cong \angle Z$

Prove: $\angle V \cong \angle Y$



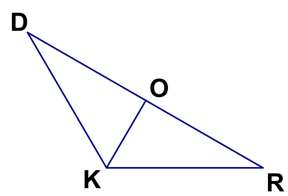
6. Given: $\overline{CH} \parallel \overline{LE}$ and $\overline{CH} \cong \overline{LE}$

Prove $\overline{CI} \cong \overline{IL}$



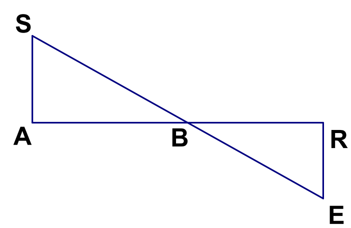
7. Given: $\overline{KO}$ is the perpendicular bisector of $\overline{DR}$

Prove: $\angle DKO \cong \angle RKO$



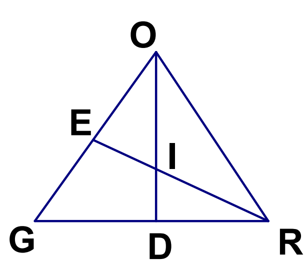
8. Given: $\overline{SA} \perp \overline{AR}$, $\overline{AR} \perp \overline{RE}$, B is the midpoint of $\overline{AR}$

Prove: $\Delta SAB \cong \Delta ERB$



9. Given: $\overline{ER}$ bisects $\angle$ ORG, $\overline{ER}$ is an altitude

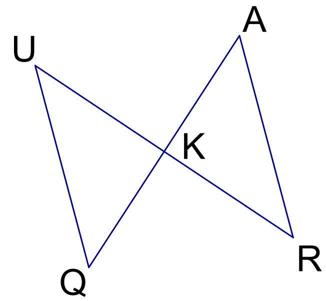
Prove: $\Delta ORE \cong \Delta GRE$



10. Given: $\overline{QA}$ bisects $\overline{UR}$

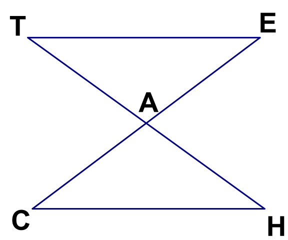
$\angle Q \cong \angle A$

Prove: $\overline{QU} \cong \overline{AR}$



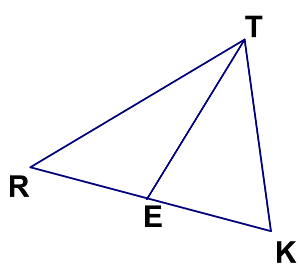
11. Given: $\overline{TH}$ and $\overline{CE}$ bisect each other at A

Prove: $\Delta TAE \cong \Delta CAH$



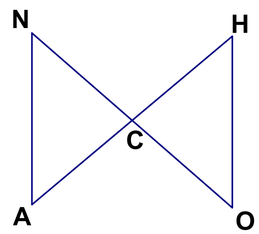
12. Given: $\overline{TE}$ is a median, $\overline{TR} \cong \overline{TK}$

Prove: $\angle$ RTE $\cong$ $\angle$ KTE



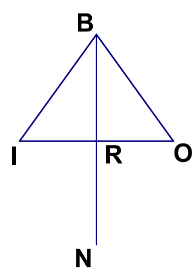
13. Given: $\overline{NO}$ and $\overline{HA}$ bisect each other

Prove: $\angle N \cong \angle O$



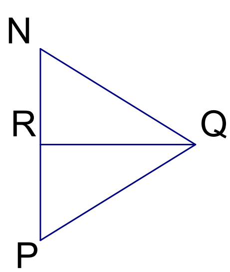
14. Given: $\overline{NB}$ bisects $\overline{IO}$, $\overline{BR}$ is an altitude

Prove: $\overline{IB} \cong \overline{OB}$



15. Given: $\overline{QR}$ is the perpendicular bisector of $\overline{NP}$

Prove: $\angle NQR \cong \angle PQR$



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Name _______________ Date ____________
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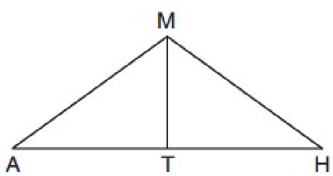
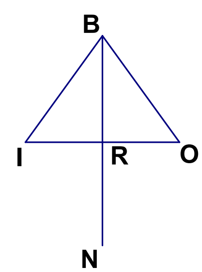
Triangle Proofs Review Sheet

1. Segment AB is the perpendicular bisector of $\overline{CD}$ at point M. Which statement is always true?
1) $\overline{CB} \cong \overline{DB}$
2) $\overline{CD} \cong \overline{AB}$
3) $\Delta ACD \cong \Delta BCD$
4) $\Delta ACM \cong \Delta BCM$

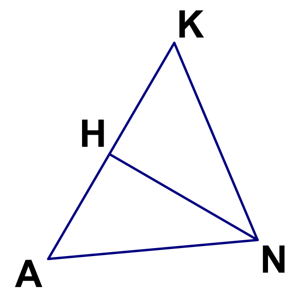
2. In triangle MAH below, $\overline{MT}$ is the perpendicular bisector of $\overline{AH}$.
Which statement is *not* always true?
1) $\triangle MAH$ is isosceles. 2) $\triangle MAT$ is isosceles. 3) $\overline{MT}$ bisects $\angle AMH$. 4) $\angle A$ and $\angle TMH$ are complementary.



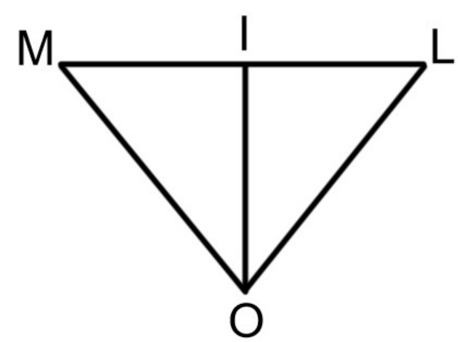
3. Given: $\overline{NB}$ bisects $\angle$ IBO, $\overline{BR} \perp \overline{IO}$
Prove: $\angle$ BIO $\cong$ $\angle$ BOI



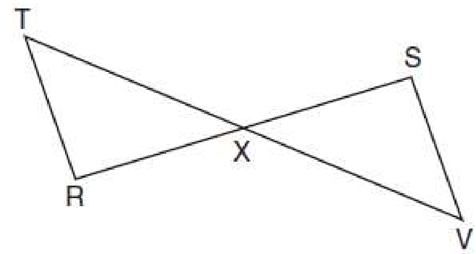
4. Given: $\overline{HN} \perp \overline{KA}$, $\overline{KN} \cong \overline{AN}$
Prove: $\angle HAN \cong \angle HKN$



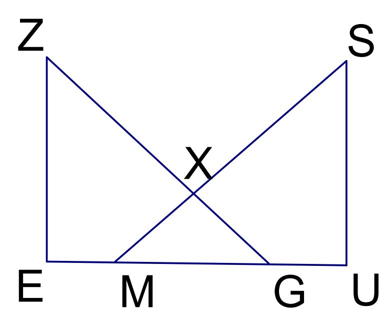
5. Given: $\overline{OI}$ is the perpendicular bisector of $\overline{ML}$
Prove: ΔMLO is isosceles



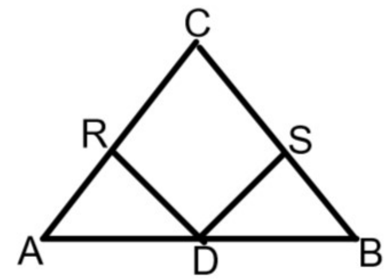
6. Given: $\overline{RS}$ and $\overline{TV}$ bisect each other at point X
$\overline{TR}$ and $\overline{SV}$ are drawn
Prove: $\overline{TR} \parallel \overline{SV}$



7. Given: $\overline{ZE} \perp \overline{EU}$, $\overline{SU} \perp \overline{EU}$, $\overline{ZE} \cong \overline{SU}$, $\overline{EM} \cong \overline{GU}$
Prove: $\angle Z \cong \angle S$



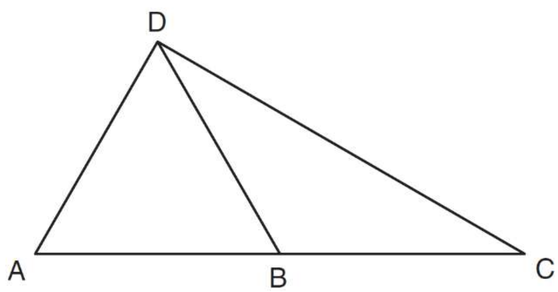
8. Given: In ΔABC, $\overline{CA} \cong \overline{CB}$, $\overline{AR} \cong \overline{BS}$, $\overline{DR} \perp \overline{AC}$, and $\overline{DS} \perp \overline{BC}$
Prove: $\overline{DR} \cong \overline{DS}$



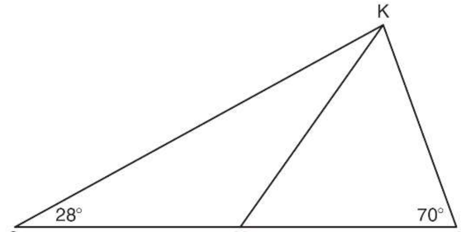
Spiral Review
Complex Triangle Problems:

1) The three angles of a triangle add to equal 180º. Look for triangles.
2) Linear pairs add to 180º. Look for linear pairs.
3) Isosceles triangle has congruent angles opposite congruent sides (given congruent sides).
4) Equilateral triangle has angles 60, 60, 60 (given equilateral triangle).
5) An angle bisector cuts an angle into two congruent halves (given bisected angles).
6) Use parallel lines cut by a transversal (extend and follow the transversal, fill in 8 angles.)

9. In the diagram below of $\triangle ACD$, B is a point on $\overline{AC}$ such that $\triangle ADB$ is an equilateral triangle, and $\triangle DBC$ is an isosceles triangle with $\overline{DB} \cong \overline{BC}$. Find $m\angle C$.



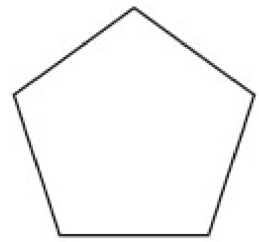
10. In the diagram below of $\triangle GJK$, H is a point on $\overline{GJ}$, $\overline{HJ} \cong \overline{JK}$, $m\angle G = 28$, and $m\angle GJK = 70$. Determine whether $\triangle GHK$ is an isosceles triangle and justify your answer.



Rotating Regular Polygons onto Themselves

1) The minimum rotation is $\frac{360}{n}$.
2) Any multiple of that will also map the regular polygon onto itself!

11. The regular polygon below is rotated about its center.
Which angle of rotation will carry the figure onto itself?



1) 60°
2) 108°
3) 216°
4) 540°

12. Which of the following rotations would not map an equilateral triangle onto itself?

(1) 120º (3) 180º
(2) 240º (4) 480º

Triangle Inequality Theorem

The two smallest sides of a triangle must add to be greater than the third side

13. Which of the following cannot make up the three sides of a triangle?

1) {3,5,4} 3) {9,7,5}
2) {2,2,3} 4) {6,1,4}

14. Which of the following can make up the three sides of a triangle?

1) {2,4,2} 3) {8,1,6}
2) {1,7,4} 4) {5,5,7}