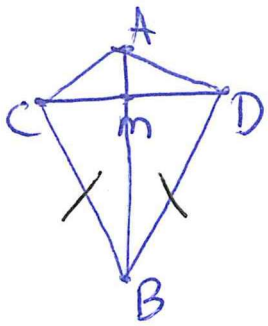
Name _____ Date _____

Mr. Schlansky Geometry

Triangle Proofs Review Sheet

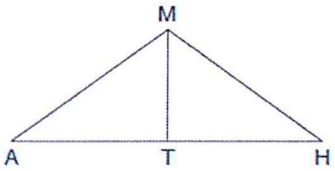
1. Segment AB is the perpendicular bisector of $\overline{CD}$ at point M. Which statement is always true?

1) $\overline{CB} \cong \overline{DB}$
2) $\overline{CD} \cong \overline{AB}$
3) $\Delta ACD \cong \Delta BCD$
4) $\Delta ACM \cong \Delta BCM$

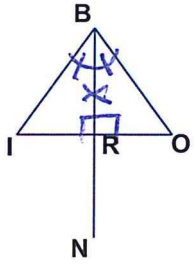


2. In triangle MAH below, $\overline{MT}$ is the perpendicular bisector of $\overline{AH}$.
Which statement is *not* always true?

1) ΔMAH is isosceles. 2) ΔMAT is isosceles. 3) $\overline{MT}$ bisects $\angle AMH$. 4) $\angle A$ and $\angle TMH$ are complementary.

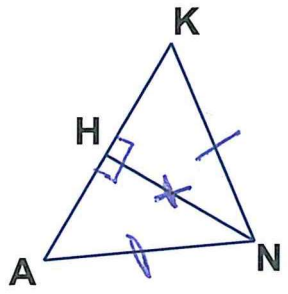


3. Given: $\overline{NB}$ bisects $\angle$IBO, $\overline{BR} \perp \overline{IO}$
Prove: $\angle$BIO $\cong$ $\angle$BOI



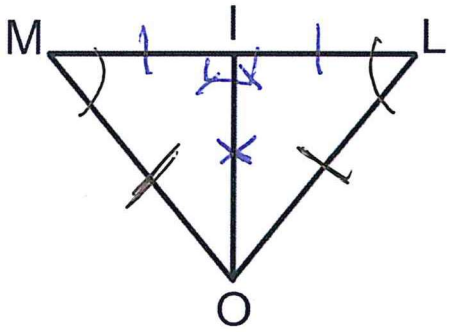
Statements	Reasons
1) $\overline{NB}$ bisects $\angle IBO$	1) given
2) $\angle RBI \cong \angle RBO$	2) An angle bisector creates two congruent angles
3) $\overline{BR} \perp \overline{IO}$	3) given
4) $\angle BRI \cong \angle BRO$	4) Perpendicular lines create congruent right angles
5) $\overline{BR} \cong \overline{BR}$	5) Reflexive Property
6) $\Delta BRI \cong \Delta BRO$	6) ASA $\cong$ ASA
7) $\angle BIO \cong \angle BOI$	7) CPCTC

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



Statements	Reasons
① $\overline{HN} \perp \overline{KA}$	① given
② $\angle KHN \cong \angle AHN$	② Perpendicular lines create congruent right angles
③ $\overline{KN} \cong \overline{AN}$	③ given
④ $\overline{HN} \cong \overline{HN}$	④ Reflexive Property
⑤ $\triangle KHN \cong \triangle AHN$	⑤ HL≅HL
⑥ $\angle HAN \cong \angle HKN$	⑥ CPCTC

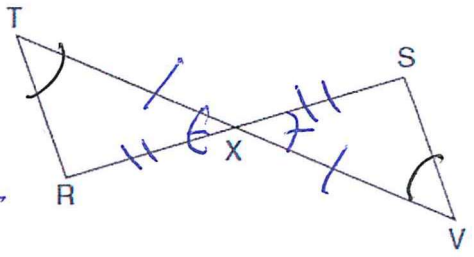
5. Given: $\overline{OI}$ is the perpendicular bisector of $\overline{ML}$
Prove: ΔMLO is isosceles



Statements	Reasons
① $\overline{OI}$ is the perpendicular bisector of $\overline{ML}$	① given
② $\angle MIO \cong \angle LIO$	② Perpendicular lines form congruent right angles
③ $\overline{MI} \cong \overline{IL}$	③ A line bisector creates two congruent segments
④ $\overline{IO} \cong \overline{IO}$	④ Reflexive Property
⑤ $\triangle MIO \cong \triangle LIO$	⑤ SAS≅SAS
⑥ $\overline{MO} \cong \overline{LO}$ or $\angle M \cong \angle L$	⑥ CPCTC
⑦ ΔMLO is isosceles	⑦ An isosceles triangle has two congruent sides

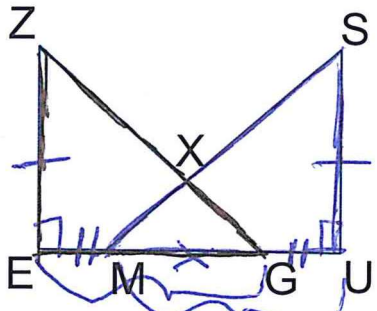
6. Given: $\overline{RS}$ and $\overline{TV}$ bisect each other at point X
$\overline{TR}$ and $\overline{SV}$ are drawn

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



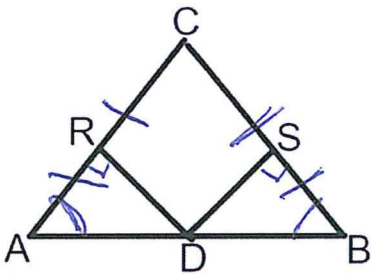
Statements	Reasons
① $\overline{RS}$ and $\overline{TV}$ bisect each other	① given
② $\overline{TX} \cong \overline{XV}, \overline{RX} \cong \overline{XS}$	② A line bisector creates two congruent segments
③ $\angle TXR \cong \angle SXV$	③ Vertical angles are congruent
④ $\triangle TXR \cong \triangle VXS$	④ SAS≅SAS
⑤ $\angle T \cong \angle V$	⑤ CPCTC
⑥ $\overline{TR} \parallel \overline{SV}$	⑥ Parallel lines cut by a transversal creates congruent alternate interior angles

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



Statements	Reasons
① $\overline{ZE} \perp \overline{EU}$, $\overline{SU} \perp \overline{EU}$	① given
② $\angle ZEG \cong \angle SUM$	② Perpendicular lines form congruent right angles
③ $\overline{ZE} \cong \overline{SU}$	③ given
④ $\overline{EM} \cong \overline{GU}$	④ given
⑤ $\overline{MG} \cong \overline{MG}$	⑤ reflexive property
⑥ $\overline{EG} \cong \overline{MU}$ or $\overline{EM} + \overline{MG} = \overline{GU} + \overline{MG}$	⑥ addition property
⑦ $\triangle ZEG \cong \triangle SUM$	⑦ SAS≅SAS
⑧ $\angle Z \cong \angle S$	⑧ CPCTC

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



Statements	Reasons
(1) $\overline{CA} \cong \overline{CB}$	(1) given
(2) $\angle RAD \cong \angle SBD$	(2) isosceles triangle theolem
(3) $\overline{AR} \cong \overline{BS}$	(3) given
(4) $\overline{DR} \perp \overline{AC}$, $\overline{DS} \perp \overline{BC}$	(4) given
(5) $\angle DRA \cong \angle DSB$	(5) Perpendicular lines form congruent right angles
(6) $\Delta DRA \cong \Delta DSB$	(6) ASA $\cong$ ASA
(7) $\overline{DR} \cong \overline{DS}$	(7) CPCTC

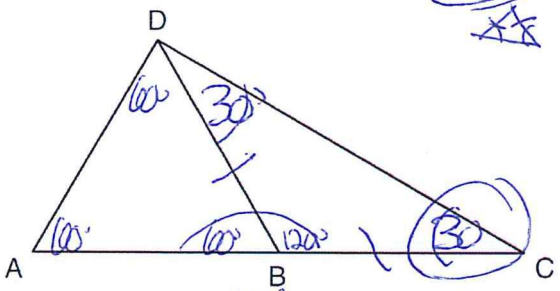
Spiral Review

Complex Triangle Problems:

1) The three angles of a triangle add to equal 180°. Look for triangles.
2) Linear pairs add to 180°. 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 ΔACD, B is a point on $\overline{AC}$ such that ΔADB is an equilateral triangle, and ΔDBC is an isosceles triangle with $\overline{DB} \cong \overline{BC}$. Find $m\angle C$.

60, 60, 60



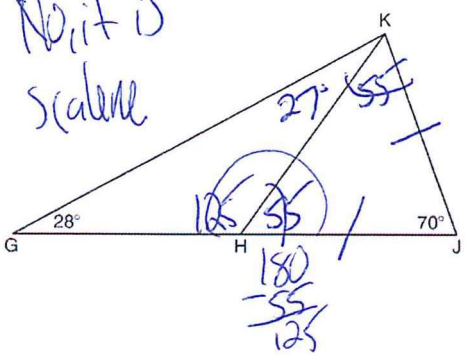
180 − 120 = 60

60 ÷ 2 = 30

180 − 60 = 120

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

No, it is scalene



180 − 70 = 110

110 ÷ 2 = 55

125 + 28 = 153

180 − 153 = 27

180 − 55 = 125

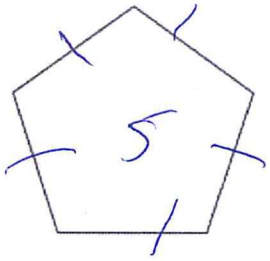
Rotating Regular Polygons onto Themselves

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° 72(3)
4) 540°

$\frac{360}{5}=72$



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

(1) 120° ✓ (3) 180°
(2) 240° 120(2) ✓ (4) 480° 120(4) ✓

$\frac{360}{3}=120$

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+4>5 ✓ 3) {9,7,5} 5+7>9 ✓
2) {2,2,3} 2+2>3 ✓ 4) {6,1,4} 1+4>6 ✗

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

1) {2,4,2} 2+2>4 ✗ 3) {8,1,6} 1+6>8 ✗
2) {1,7,4} 1+4>7 ✗ 4) {5,5,7} 5+5>7 ✓