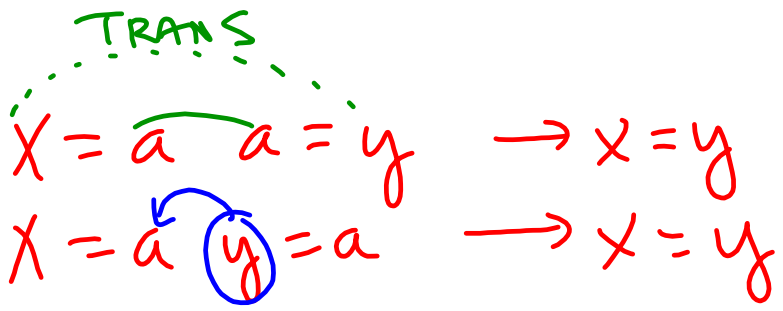
Lesson 2-3/ 2-4L : Algebraic & Geometric Proofs -

Agenda

- Check and Review Homework on Algebraic Proofs
- Mini Quiz #1
- Guided Notes - need pouches, notes, and your unit outline/lesson summaries/axioms pages

HW

- Worksheet 2-3/ 2-4L
- Cumulative Review due Friday



Problem Set 2-2R/2-3L

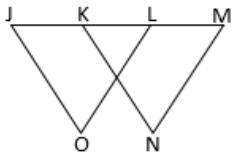
For questions 1-4, identify the property being used:

1. If AB = CD and CD = EF, then AB=EF. _____
2. If AB = CD and EF = CD, then AB=EF. _____
3. $\angle TRY \cong \angle TRY$ _____
4. If $m\angle 1 = m\angle 2$ and $m\angle 3 = m\angle 3$ then $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 3$. _____

For questions 5-8, complete the following proofs:

5. Given: $\angle J \cong \angle OLJ; \angle OLJ \cong \angle M$

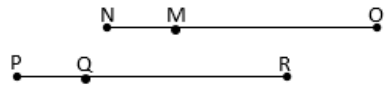
   Prove: $\angle J \cong \angle M$



Statements	Reasons
1. $\angle J \cong \angle OLJ$	1.
2. $\angle OLJ \cong \angle M$	2.
3. $\angle J \cong \angle M$	3.

6. **Given:** $\overline{NMQ}, \overline{PQR}, NO = PR, NM = PQ$

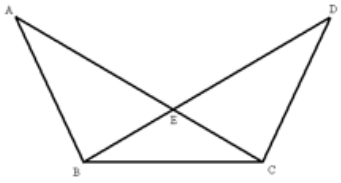
   Prove: $MO = QR$



Statements	Reasons
1. $\overline{NMQ}, \overline{PQR}, NO = PR$	1.
2. $NM + MO = NO; PQ + QR = PR$	2.
3. $NM + MO = PQ + QR$	3.
4. $NM = PQ$	4.
5. $MO = QR$	5.

7. **Given:** $m\angle ABD = m\angle DCA; m\angle DBC = m\angle ACB$

   Prove: $\angle ABC \cong \angle DCB$

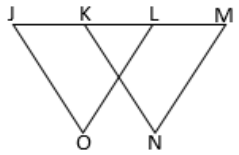


Statements	Reasons
1.	1. Given
2. $m\angle ABD + m\angle DBC = m\angle DCA + m\angle ACB$	2.
3.	3. Angle Addition Postulate
4. $m\angle ABC = m\angle DCB$	4.
5.	5.

8. **Given:** $\overline{JK} \cong \overline{ML}$

Prove: $\overline{JL} \cong \overline{MK}$

(Hint: how is this really just a segment problem?)



Statements	Reasons

Geometry + LAB Name:_____ Date:_____ Section: _____

2-3R/2-4L Notes Algebraic + Geometric Proofs (Bisectors & Halves of Congruent Figures)

Refer to your lesson summaries and axiom pages for examples of & additional reasons used in proofs.

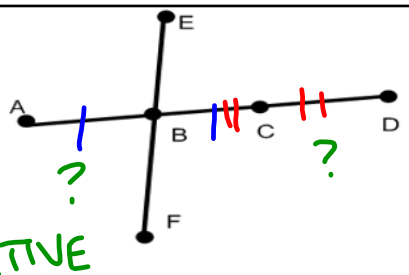
- Angle bisector $\leftrightarrow 2 \cong$ adjacent angles (definition of an angle bisector)
- Segment bisector $\leftrightarrow 2 \cong$ adjacent collinear segments (definition of a segment bisector)
- Midpoint $\leftrightarrow 2 \cong$ adjacent collinear segments (definition of a midpoint)
- Also: segment bisector $\leftrightarrow$ midpoint of the segment
- Halves of Congruent Angles are Congruent / Halves of Congruent Segments are Congruent
- *Angle Addition Postulate/Segment Addition Postulate*
- *Reflexive, Transitive, Properties, Algebraic Properties & Substitution*

EX 1: Given Bisectors → 2 ≅ SEGS

Given: $\overline{EF}$ bisects $\overline{AC}$ at B; $\overline{ABCD}$
C is the midpoint of $\overline{BD}$
→ 2 ≅ SEGS

Prove: $\overline{AB} \cong \overline{CD}$

PLAN: TRANSITIVE



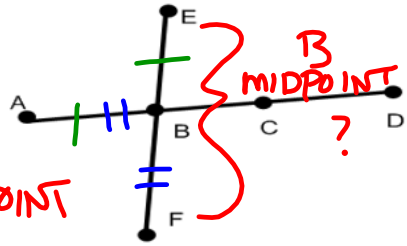
Statements	Reasons
1. $\overline{EF}$ BISECTS $\overline{AC}$ @ B, $\overline{ABCD}$	1. GIVEN
2. $\overline{AB} \cong \overline{BC}$	2. DEFN OF SEGMENT BISECTOR
3. C MIDPOINT OF $\overline{BD}$	3. GIVEN
4. $\overline{BC} \cong \overline{CD}$	4. DEFN OF MIDPOINT
5. $\overline{AB} \cong \overline{CD}$	5. TRANSITIVE PROP OF ≅ (STEP 2 → 4)

EX 2: Prove a Bisector

Given: $\overline{BE} \cong \overline{AB}; \overline{AB} \cong \overline{BF}, EBF$

Prove: B is the midpoint of $\overline{EF}$

PLAN: TRANS
$\overline{EB} \cong \overline{BF}$ → MIDPOINT

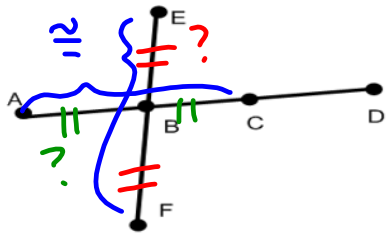


Statements	Reasons
1. $\overline{BE} \cong \overline{AB}, \overline{AB} \cong \overline{BF}, EBF$	1. GIVEN
2. $\overline{BE} \cong \overline{BF}$	2. TRANSITIVE PROP OF ≅
3. B IS THE MIDPOINT OF $\overline{EF}$	3. DEFN OF MIDPOINT

EX 3: Halves of Congruent Figures

Given: $\overline{AC} \cong \overline{EF}, \overline{ABC}, \overline{EBF}$; B bisects $\overline{AC}$ and $\overline{EF}$

Prove: $\overline{AB} \cong \overline{EB}$



Statements	Reasons
1. B BISECTS $\overline{AC}$, $\overline{ABC}$	1. GIVEN
2. $\overline{AB} \cong \overline{BC}$ halves	2. DEFN OF SEGMENT BISECTOR
3. B BISECTS $\overline{EF}$, $\overline{EBF}$	3. GIVEN
4. $\overline{EB} \cong \overline{BF}$ halves	4. DEFN OF SEGMENT BISECTOR
5. $\overline{AC} \cong \overline{EF}$ $\cong$ BIGS	5. GIVEN
6. $\overline{AB} \cong \overline{EB}$	6. HALVES OF CONGRUENT SEGMENTS ARE CONGRUENT

EX 4: Halves of Congruent Figures

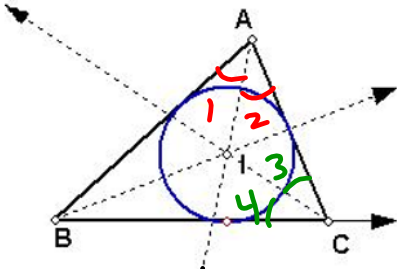
Given: $\overrightarrow{AI}$ bisects $\angle BAC$; $\overrightarrow{CI}$ bisects $\angle BCA$ $\angle BAC \cong \angle BCA$

Prove: $\angle IAC \cong \angle ICA$

BIG $\angle$'S

$\angle 2 \cong \angle 3$

HALVES OF $\cong$ $\angle$'S ARE $\cong$



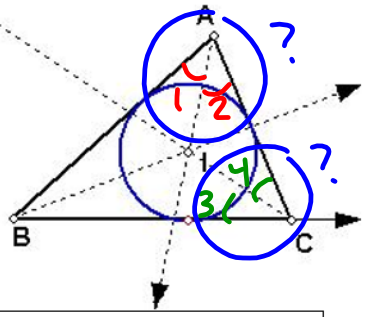
Statements	Reasons
1. $\overrightarrow{AI}$ BISECTS $\angle BAC$,	1. GIVEN
2. $\overrightarrow{CI}$ BISECTS $\angle BCA$, $\angle 1 \cong \angle 2$; $\angle 3 \cong \angle 4$	2. DEFN OF $\angle$ BISECTOR
3. $\angle BAC \cong \angle BCA$	3. GIVEN
4. $\angle 2 \cong \angle 3$	4. HALVES OF $\cong$ $\angle$'S ARE CONGRUENT

HALVES OF ≅ ∠'S ARE ≅ ✓

EX 5: Halves of Congruent Figures

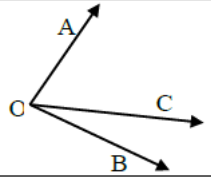
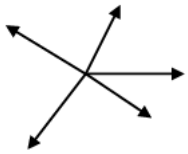
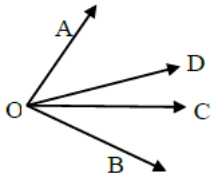
Given: $\angle BAI \cong \angle IAC \cong \angle BCI \cong \angle ICA$

Prove: $\angle BAC \cong \angle BCA$

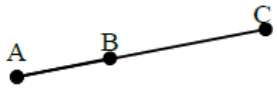
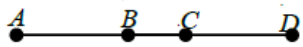


Statements	Reasons
1. ∠BAI ≅ ∠IAC ≅ ∠BCI ≅ ∠ICA	1. GIVEN
2. BI BISECTS ∠BAC	2. DEFN OF ∠ BISECTOR
3. CI BISECTS ∠BCA	3. HALVES OF ≅ ∠'S ARE ≅
∠BAC ≅ ∠BCA	

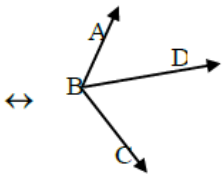
Sum of Parts

Conditional Statement	Diagram / Example	Stated as a Reason in a Proof
If point C is in the interior of $\angle AOB$, then _____		
Given a sequence of ***n*** consecutive adjacent angles whose interiors are all disjoint such that the angle formed by the first ***n – 1*** angles and the last angle are a linear pair, then the angle measures _____	(∠'s on a line)	Consecutive adjacent angles on a line sum to 180°
If the sum of the measures of all angles formed by three or more rays with the same vertex and whose interiors do not overlap, then the angle measures _____	 (∠'s at a point)	Angles at a point sum to 360°
If points C and D are in the interior of $\angle AOB$ AND $\angle AOD \cong \angle BOC$, then _____ *See lesson summaries for 3 step process (can also go ≅ bigs → ≅ littles)*		Common Angle Theorem *Or* Overlapping Angles Theorem

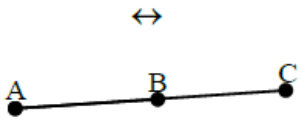
Sum of parts (con't)

If A, B, and C are collinear, then _____		
If points $A, B, C,$ AND D are collinear and $\overline{AB} \cong \overline{CD}$, then_____ *See lesson summaries for 3 step process (can also go ≅ bigs → ≅ littles)*		Common Segment Thm *Or* Overlapping Segments Thm

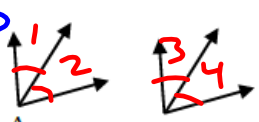
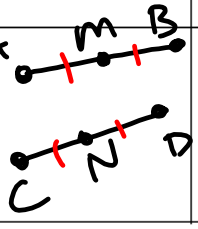
Bisectors

Conditional Statement	Diagram / Example	Stated as a Reason in a Proof
If $\overrightarrow{BD}$ bisects $\angle ABC$, then _____		Definition of Angle Bisector *Or* Angle Bisector ↔ two congruent adjacent angles
If $\angle ABD \cong \angle CBD$ and they are adjacent, then _____ *Note conjunction!*		

Bisectors (con't)

If B is the midpoint of $\overline{AC}$, then _____		Definition of a Midpoint *or* Midpoint ↔ two congruent collinear segments
If $\overline{AB} \cong \overline{BC}$ and A, B, and C are collinear, then _____ *Note conjunction!*		
$\overline{CD}$ bisects $\overline{EF}$ at G and $\overline{EFG}$ ↔ G is the midpoint.		
$\overline{CD}$ bisects $\overline{EF}$ at G and $\overline{EFG}$ ↔ $\overline{EG} \cong \overline{GF}$.		Segment bisector ↔ 2 ≅ collinear segments. *Or* Definition of a Segment Bisector

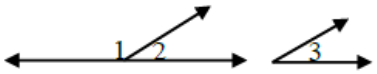
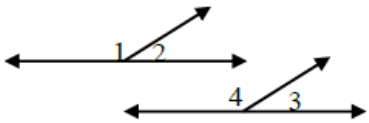
Bisectors (con't)

If 2 ≅ angles are bisected, then their HALVES ARE CONGRUENT	∠A ↔ ∠B BISECTED ∠A ≅ ∠B  ∠1 ≅ ∠2 ≅ ∠3 ≅ ∠4	Halves of Congruent Angles are Congruent.
If 2 ≅ segments are bisected, then their HALVES ARE CONGRUENT	$\overline{AB}$ & $\overline{CD}$ BISECTED & $\overline{AB} \cong \overline{CD}$ 	HALVES OF CONGRUENT SEGMENTS ARE ≅

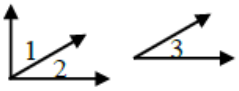
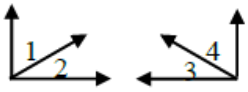
Angle Pairs

Conditional Statement	Diagram / Example	Stated as a Reason in a Proof
The sum of two angles = 90° if and only if the angles are _____		
The sum of two angles = 180° if and only if the angles are _____		
If two angles are adjacent and their noncommon sides form opposite rays, then the angles are a _____		Defn. of a Linear Pair
If two ∠'s form a linear pair, then they are _____		Linear pairs of ∠'s are supplementary. Linear Pair → Supp ∠'s

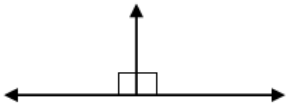
Angle pairs (Con't)

If 2 non-adjacent ∢'s are formed by intersecting lines then they are _____.		Defn of Vertical Angles
If angles are vertical ∢'s , then the angles are _____		Vertical ∢ pairs are equal in measure Vertical ∢ pairs are ≅
If 2 angles are supplementary to the same angle, then they are _____		Congruent Supplements Theorem *Or* Supplements of the same angle are congruent
If 2 angles are supplementary to congruent angles, then they are _____		Congruent Supplements Theorem *Or* Supplements of congruent angles are congruent

Angle pairs (Con't)

If 2 angles are complementary to the same angle, then they are _____		Congruent Supplements Theorem *Or* Supplements of the same angle are congruent
If 2 angles are complementary to congruent angles, then they are _____		Congruent Supplements Theorem *Or* Supplements of congruent angles are congruent

Right Angles

If 2 ∢'s are right ∢'s, then _____ _____		Right ∢'s are ≅.
If 2 ≅ ∢'s are supplementary, then _____ *Note conjunction!*		Congruent & supplementary angles are right ∢'s