Unit 1 - Day 14L - New Axioms

Agenda

- Go over HW 1.13 and 1.14 - Next Class (and warm up quizzes next class)
- Notes - 1.14 - NEED TOOL KIT

HW

Worksheet 1-14

Problem Set 2-2R/2-3L

GO OVER NEXT CLASS

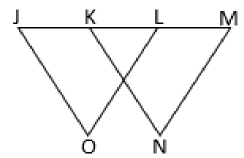
For questions 1-4, identify the property being used:

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

For questions 5-8, complete the following proofs:

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

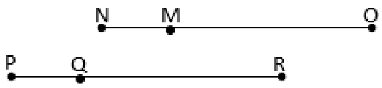
   Prove: $\measuredangle J \cong \measuredangle M$



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

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

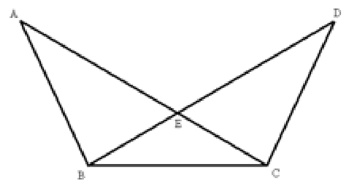
Prove: $MO = QR$



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:** $m\measuredangle ABD = m\measuredangle DCA; m\measuredangle DBC = m\measuredangle ACB$

Prove: $\measuredangle ABC \cong \measuredangle DCB$

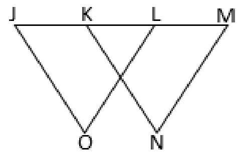


Statements	Reasons
1.	1. Given
2. $m\measuredangle ABD + m\measuredangle DBC = m\measuredangle DCA + m\measuredangle ACB$	2.
3.	3. Angle Addition Postulate
4. $m\measuredangle ABC = m\measuredangle DCB$	4.
5.	5.

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

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

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



Statements	Reasons

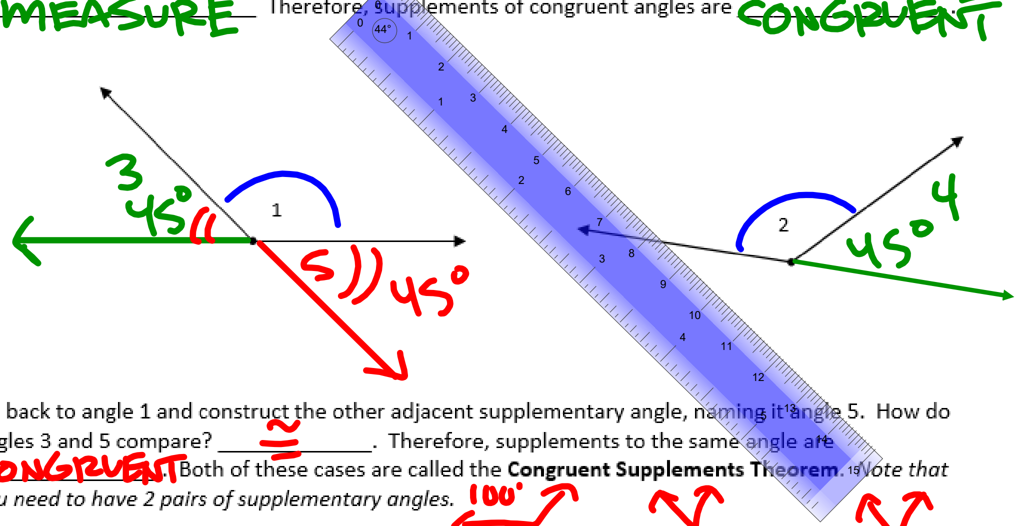
Geometry LAB Name: ______________________ Date: _______ Class: ________

1-14 Note Sheet: New Axioms

Congruent Supplements Theorem & Vertical Angles Theorem

Given $\measuredangle 1 \cong \measuredangle 2$,

1) Construct an adjacent supplementary angle for each angle, and name them 3 and 4, respectively. Are the two supplements you constructed congruent? YES How do you know? BOTH SAME MEASURE. Therefore, supplements of congruent angles are CONGRUENT.



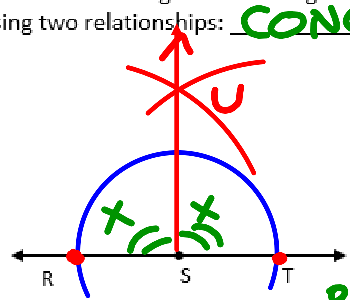
2) Go back to angle 1 and construct the other adjacent supplementary angle, naming it angle 5. How do angles 3 and 5 compare? $\cong$. Therefore, supplements to the same angle are CONGRUENT. Both of these cases are called the **Congruent Supplements Theorem**. *Note that you need to have 2 pairs of supplementary angles.* 100°

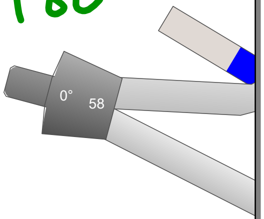
3) Now we know that $\measuredangle 3 \cong \measuredangle 5$. What is another name for this angle pair? VERTICAL ∡'S. Label the last angle 6 that was created at the same point as angles 1, 3 & 5. Compare $\measuredangle 1$ & $\measuredangle 6$. The congruent supplements theorem therefore directly leads to the **Vertical Angles Theorem** which states that VERTICAL ∡'S ARE $\cong$.

Right Angle Congruency and Congruent + Supplementary Angles

1) Construct ray $\overrightarrow{SU}$ such that it bisects the given the straight angle $\measuredangle RST$. Describe this specific linear pair of adjacent angles using two relationships: CONGRUENT, SUPPLEMENTARY

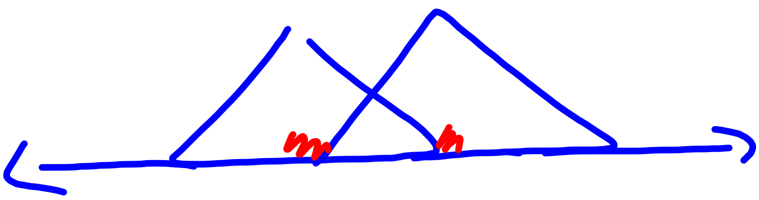
$x + x = 180°$





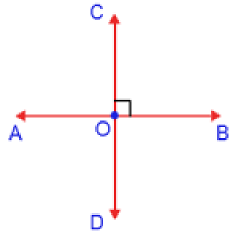
2) How much does each of the little angles measure? 90° By definition (measure=90°), each of these angles is a RIGHT angle and therefore **right angles are** CONGRUENT

3) Will supplementary and congruent angles always be right angles? Can you find a counterexample? **Therefore if** 2 **angles are both** SUPPLEMENTARY **and** CONGRUENT **then they are right angles.** *Note conjuction!*



$\perp$

Perpendicular Lines

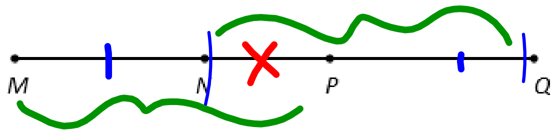


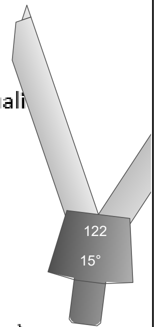
Until now, we've just used a diagram with the perpendicular symbol to say that a right angle measures 90° and then used vertical angles or a supplementary/angle addition relationship to say that the other angles also measure 90°. Why do we know this? Perpendicular lines → RIGHT ∠'S (four of them).

How do we use notation for perpendicular lines? $\overleftrightarrow{CD} \perp \overleftrightarrow{AB}$. Do not assume the lines are perpendicular unless you have information!

Common/Overlapping Theorems (A shortcut to the addition postulates w/addition property of equali

Given the segment below, use your compass to investigate and fill in the relationships:

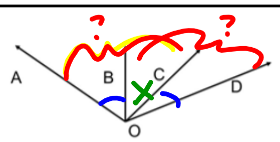




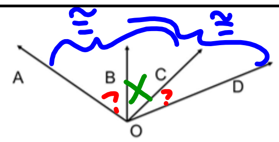
1. $\overline{MN}$ $\cong$ $\overline{PQ}$
2. $\overline{NP}$ $\cong$ $\overline{NP}$ (Property: REFLEXIVE PROPERTY)
3. $\overline{MP}$ $\cong$ $\overline{NQ}$

This is really the addition property of equality applied to segment addition postulate, with the special case that what we are adding is a figure that both the other figures have in common. This allows us to skip the algebraic approach by using the **Common/Overlapping Segment Theorem**.

If instead you were given $\overline{MP} \cong \overline{NQ}$ with $\overline{NP} \cong \overline{NP}$, what could you conclude about $\overline{MN}$ & $\overline{PQ}$? $\cong$ So we can either add the overlapping piece to congruent littles to get congruent bigs *or* subtract the overlapping piece from congruent bigs to get congruent littles. This works for both segments and angles.

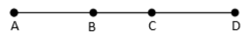


1. If $\measuredangle AOB \cong \measuredangle COD$, then $\measuredangle AOC \cong \measuredangle BOD$ using $\measuredangle BOC \cong \measuredangle BOC$ with the reasons of given, reflexive, and overlapping angles theorem.



If $\measuredangle AOC \cong \measuredangle BOD$, then $\measuredangle AOB \cong \measuredangle COD$ using $\measuredangle BOC \cong \measuredangle BOC$ with the reasons of given, reflexive, and overlapping angles theorem.

COMMON/OVERLAPPING SEGMENT THEOREM

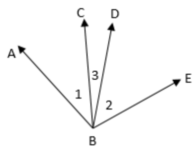


If A,B,C,D are collinear,

Little → Big
$\overline{AB} \cong \overline{CD}$ Given
$\overline{BC} \cong \overline{BC}$ Reflexive
$\overline{AC} \cong \overline{BD}$ Common/Overlapping Segment Theorem

Big → Little
$\overline{AC} \cong \overline{BD}$ Given
$\overline{BC} \cong \overline{BC}$ Reflexive
$\overline{AB} \cong \overline{CD}$ Common/Overlapping Segment Theorem

COMMON/OVERLAPPING ANGLE THEOREM



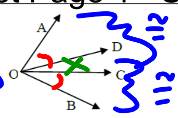
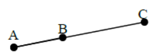
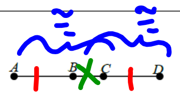
If all angles share a common vertex and are adjacent,

Little → Big
$\measuredangle 1 \cong \measuredangle 2$ Given
$\measuredangle 3 \cong \measuredangle 3$ Reflexive
$\measuredangle ABD \cong \measuredangle CBE$ Common/Overlapping Angle Theorem

Big → Little
$\measuredangle ABD \cong \measuredangle CBE$ Given
$\measuredangle 3 \cong \measuredangle 3$ Reflexive
$\measuredangle 1 \cong \measuredangle 2$ Common/Overlapping Angle Theorem

Both theorems require all three steps to be included

From Axiom Sheet Page 1 - Sum of Parts

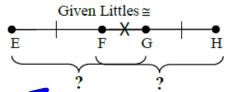
If points C and D are in the interior of $\measuredangle AOB$ AND $\measuredangle AOD \cong \measuredangle BOC$, then $\measuredangle AOC \cong \measuredangle DOB$ *See lesson summaries for 3 step process (can also go ≅ bigs → ≅ littles)*		Common Angle Theorem *Or* Overlapping Angles Theorem
If A, B, and C are collinear, then AB + BC + AC		Segment Addition Postulate
If points $A, B, C,$ AND D are collinear and $\overline{AB} \cong \overline{CD}$, then $\overline{AC} \cong \overline{BD}$ *See lesson summaries for 3 step process (can also go ≅ bigs → ≅ littles)*		Common Segment Thm *Or* Overlapping Segments Thm

From Outline

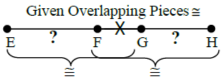
1-17 + See Axioms Pages

- Common/Overlapping Segment Theorem (Similar for Common Angle Theorem)

Given Littles ≅



Given Overlapping Pieces ≅



1) EF ≅ GH GIVEN
2) FG ≅ FG REFLEXIVE
3) EG ≅ GH OVERLAPPING SEGMENT THM

1) EG ≅ GH GIVEN
2) FG ≅ FG REFLEXIVE
3) EF ≅ GH OVERLAPPING SEGMENT THM

- Paragraph proofs consist of matches statements and their reasons in ________________ often using "since ______, then ________".
- Flowchart proofs place statements in __________ with reasons underneath. Boxes are connected by ___________ going left to right or top to bottom.