Lesson 2-6L : Flowchart & Paragraph Proofs

- Common Segment/Angle Theorems

Agenda

- Check and Review Homework 2-5L Proofs
- Turn in CR #1
- Mini Quiz #3
- Guided Notes - need pouches, notes, and your unit outline/ lesson summaries/axioms pages

HW

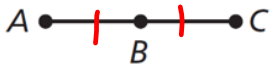
- 2-6 LAB problems in your packet (separate paper)

Formats of Proofs

- Formal 2-Column Proofs: Statements are written in the left column with corresponding reasons written on the right.
- Flowchart Proofs: Boxes and arrows which show the structure of a proof are read left to right and top to bottom.
- Paragraph Proofs: Steps with their matching reasons are written as sentences.

Regardless of the format, *all logical thinking and reasoning* behind connections must be shown.

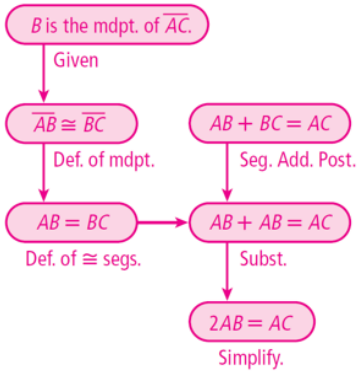
Example Given: B is the midpoint of $\overline{AC}$
Prove: 2(AB) = AC



2-Column

Statements	Reasons
1. B is the mdpt of $\overline{AC}$	1. Given
2. $\overline{AB} \cong \overline{BC}$	2. Defn midpoint → 2 ≅ segments
3. AB=BC	3. ≅ ⟷ = *measure*
4. AB + BC = AC	4. Segment addition postulate
5. AB + AB = AC	5. Substitution (step 3 into 4)
6. 2(AB) = AC	6. Simplification

Flowchart



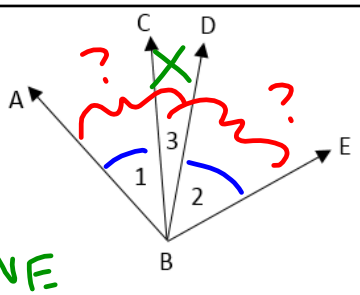
Paragraph

B is the midpoint of $\overline{AC}$ so $\overline{AB} \cong \overline{BC}$ since a midpoint creates two congruent segments. Then AB=BC since congruent segments have equal measure. By the segment addition postulate, AB+BC=AC. Then AB+AB=AC by substitution. Finally 2(AB)=AC by simplification.

Guided Practice

Given: $\angle 1 \cong \angle 2$

Prove: $\angle ABD \cong \angle CBE$



Flowchart

$\angle 1 \cong \angle 2$ GIVEN

$m\angle 3 = m\angle 3$ REFLEXIVE

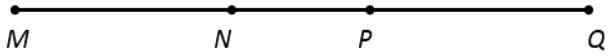
$m\angle 1 = m\angle 2$ = MEASURE $\cong$

$m\angle 1 + m\angle 3 = m\angle 2 + m\angle 3$ ADDITION PROP OF EQ.

$m\angle ABD = m\angle CBE$ $\angle$ ADD POST

$\angle ABD \cong \angle CBE$ = MEAS $\cong$

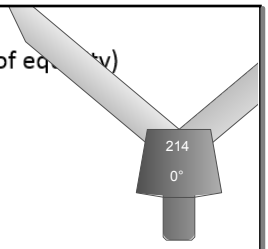
Is there an easier way? Remember when we saw that the piece being added to two congruent littles was in common? We simplified the segment addition postulate with the **Common/Overlapping Segment Theorem.**



Recall from 2-2

Common Segment Theorem (A shortcut to the addition postulates w/addition property of eq[illegible]y)

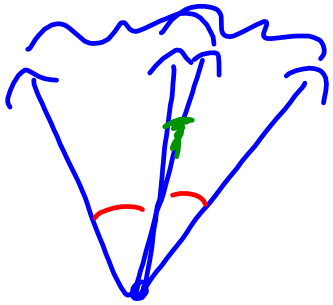
Given the segment below, use your compass to investigate and fill in the relationships:



1. $\overline{MN}$ ___$\cong$___ $\overline{PQ}$ GIVEN
2. $\overline{NP}$ ___$\cong$___ $\overline{NP}$ (Property: REFLEXIVE PROP OF $\cong$)
3. $\overline{MP}$ ___$\cong$___ $\overline{NQ}$ OVERLAPPING/COMMON SEGMENT THM

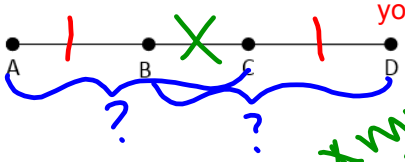
This is really the addition property of equality applied to segment addition postulate, with the special case that what we are adding is a figure that both the other figures have in common. This allows us to skip the algebraic approach by using the **Common/Overlapping Segment Theorem.**

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 angles and segments.



COMMON/OVERLAPPING SEGMENT THEOREM

Use this to complete your lesson summaries



X MUST BE STATED

If A,B,C,D are collinear,

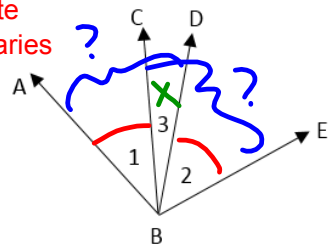
Little → Big

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

$\angle 1 \cong \angle 2$	Given
$\angle 3 \cong \angle 3$	Reflexive
$\angle ABD \cong \angle CBE$	Common/Overlapping Angle Theorem

Big → Little

$\angle ABD \cong \angle CBE$	Given
$\angle 3 \cong \angle 3$	Reflexive
$\angle 1 \cong \angle 2$	Common/Overlapping Angle Theorem

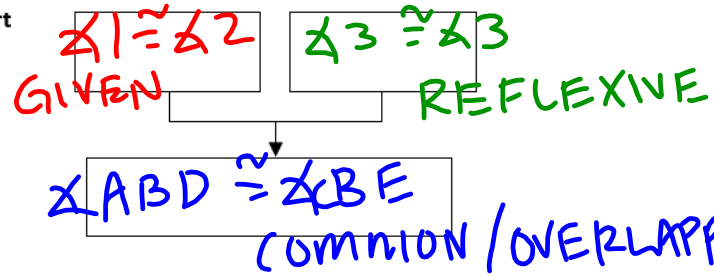
Both theorems require all three steps to be included

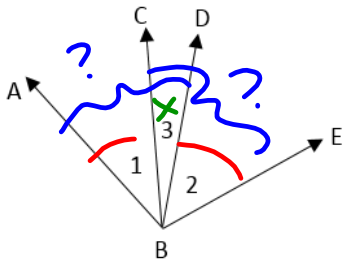
Revisit the Guided Practice Using the Common/Overlapping Angle Theorem

Given: $\angle 1 \cong \angle 2$

Prove: $\angle ABD \cong \angle CBE$

Flowchart

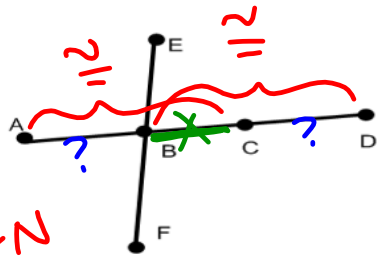




Example 2 – Common/Overlapping Segment Theorem

Given: $\overline{AC} \cong \overline{BD}$

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

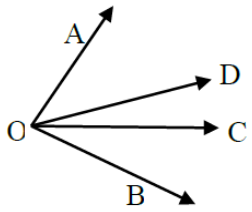
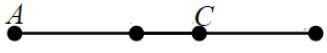


Paragraph Proof:

SINCE $\overline{AC} \cong \overline{BD}$ IS GIVEN AND $\overline{BC} \cong \overline{BC}$ BY REFLEXIVE, THEN $\overline{AB} \cong \overline{CD}$ BY THE COMMON/OVERLAPPING SEGMENT THEOREM.

AXIOMS (Theorems, Corollaries, Postulates, Definitions)

Sum of Parts

Conditional Statement	Diagram / Example	Stated as a Reason in a Proof
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
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