Name: notes.
Date: ______________

Segment & Angle Addition

Postulate: A simple statement that can be assumed true without any justification.

1. Do you know any postulates already? List one or two here:

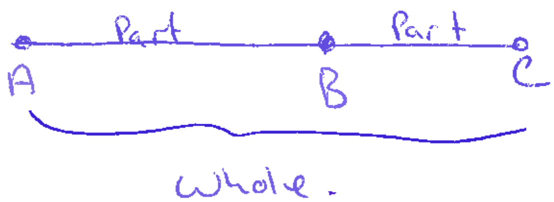
Transitive, 2 points determine a line.
Reflexive, 3 points determine a plane. etc.

Segment/Angle Addition Postulates: "Part + Part = Whole"

2. Draw a picture to represent each postulate and identify the "Parts" and the "Whole".

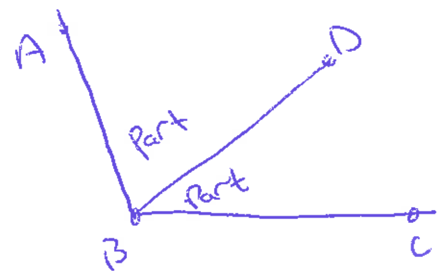
Segment Addition Postulate:

If points A, B, and C are *colinear* with B between A and C then AB + BC = AB.



Angle Addition Postulate:

If point D is in the interior of ∠ABC, then m∠ABD + m∠DBC = m∠ABC.



$\angle ABC$ = whole.

Postulates of Equality: These postulates will support our Angle & Segment Addition postulates.

Addition If: $A = B$

then $A + x = B + x$

"Add x to both sides"

Subtraction If $A + x = B + x$

then $A = B$

"Subtract x from both sides.

Substitution If $A = B$

and $A + x = C$

then $B + x = C$.

Reflexive $A = A$

3. How is the **Substitution** postulate used differently from the **Transitive** postulate? Explain.

Substitution is use for substituting into equations.

Transitive is for equating 3 Quantities: ie) If $A = B$, $B = C$, then $A = C$.

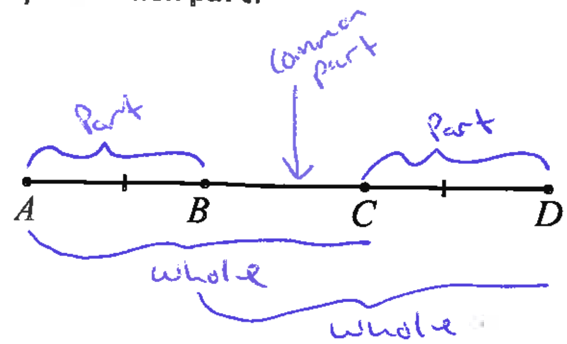
The Addition Method: *"Going from Small to Big"*

4. Example: In this example, two equal parts are connected by a **common part**.

Given: $\overline{ABCD}$

$\overline{AB} \cong \overline{CD}$ ⟵ Equal Parts (Small)

Prove: $\overline{AC} \cong \overline{DB}$ ⟵ Equal Wholes (Big)

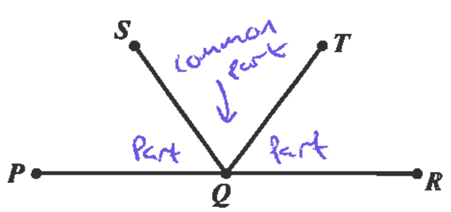


	Statements	Reasons
	1. $\overline{ABCD}$	1. Given.
(Part = Part)	$AB = CD$	
(Part + Part = Part + Part)	2. $\underbrace{AB+BC}_{\downarrow} = \underbrace{CD+BC}_{\downarrow}$	2. Addition.
(Whole = Whole)	3. $AC = BD$	3. Segment Addition.

5. Example:

Given: $\angle PQS \cong \angle RQT$ ← parts (Small)

Prove: $\angle PQT \cong \angle RQS$ ← wholes (Big)

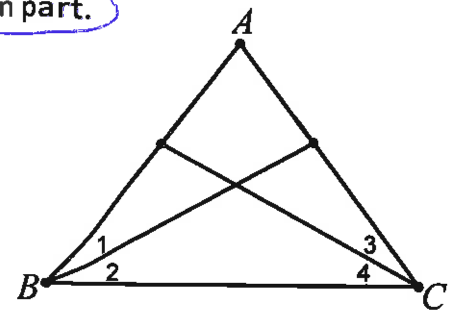


Statement	Reason
① $m\angle PQS = m\angle RQT$	① Given.
② $\underbrace{m\angle PQS + m\angle SQT}_{\downarrow} = \underbrace{m\angle RQT + m\angle SQT}_{\downarrow}$	② Addition.
③ $m\angle PQT = m\angle SQR$	③ Angle Addition.

6. Example: In this example equal parts are not connected by a common part.

Given: $\angle 1 \cong \angle 3$ ← Equal Parts (Small)
$\angle 2 \cong \angle 4$

Prove: $\angle ABC \cong \angle ACB$ ← Equal Wholes (Big)

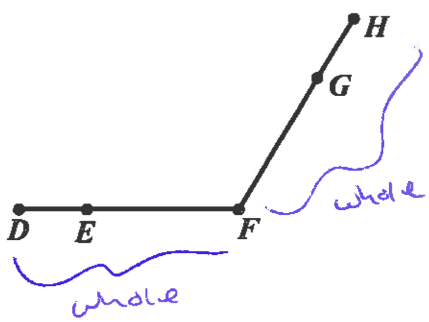


	Statements	Reasons
(Part = Part)	1. $m\angle 1 = m\angle 3$	1. Given
(Part = Part)	$m\angle 2 = m\angle 4$	
(Part + Part = Part + Part)	2. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	2. Addition
(Exchange Parts)	3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	3. Substitution.
(Whole = Whole)	4. $m\angle ABC = m\angle ACB$	4. Angle Addition

7. Example:

Given: $\overline{DE} \cong \overline{HG}$ } Small parts
$\overline{GF} \cong \overline{EF}$

Prove: $\overline{DF} \cong \overline{HF}$ } Big wholes



Statement	Reason
① $DE = HG$	① Given
$GF = EF$	
② $DE + GF = HG + GF$	② Addition
③ $DE + EF = HG + GF$	③ Substitution
④ $DF = HF$	④ Segment addition.

The Subtraction Method: *"Going from Big to Small"*

*There is **NO** segment/angle subtraction postulate!*

8. Example:

Given: $\overline{ABCD}$

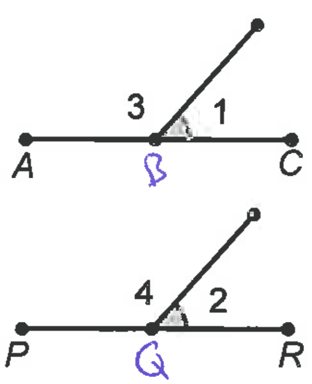
$\overline{AC} \cong \overline{DB}$ ← Equal Wholes (Big)

Prove: $\overline{AB} \cong \overline{CD}$ ← Equal Parts (Small)

	Statements	Reasons
	1. $\overline{ABCD}$	1. Given
(Whole = Whole)	AC = DB	
(Part + Part = Part + Part)	2. AB+BC = DC+BC	2. Segment Addition
(Part = Part)	3. AB = DC	3. Subtraction

9. Use the **Subtraction Method** to write a proof for the following theorem:

"Congruent angles have congruent supplements."



Statements	Reasons
① Straight Angle ∠ABC Straight Angle ∠PQR. ∠1 ≅ ∠2.	① Given.
② m∠ABC = m∠PQR	② All St. ∠'s are ≅.
③ m∠1 + m∠3 = m∠2 + m∠4	③ Angle Addition.
④ m∠2 + m∠3 = m∠2 + m∠4	④ Substitution
⑤ m∠3 ≅ m∠4	⑤ Subtraction.

A Final Thought...

10. How are the ***Addition Postulate*** and the ***Segment Addition Postulate*** different? Explain.

adding the measure of an object to both sides of an =

↳ adding 2 smaller segments to form a larger segment.