Addition & Subtraction Properties - Lesson 2-5

Here's the warmup!

If the complement of an angle is 40° less than the supplement of the angle, find the measure of the angle.

Today, we're going to cover a number of new theorems regarding addition and subtraction of segments and angles. Let's start by proving Theorem 8 (The Addition Property of Congruent Segments).

Theorem 8 - If a segment is added to two ≅ segments, then the sums are ≅.
(*The Addition Property of ≅ Segments - Version 1*)

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

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

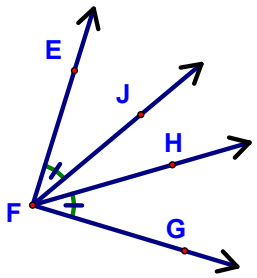
Statements	Reasons

Now that you've done that, try Theorem 9 (The Addition Property of Congruent Angles). Do you see the similarities here? You should be starting to see these more and more...

***Theorem 9* - If an angle is added to two ≅ angles, then the sums are ≅.**
(*The Addition Property of* ≅ *Angles - Version 1*)

Given: ∠EFJ ≅ ∠GFH

Prove: ∠EFH ≅ ∠GFJ

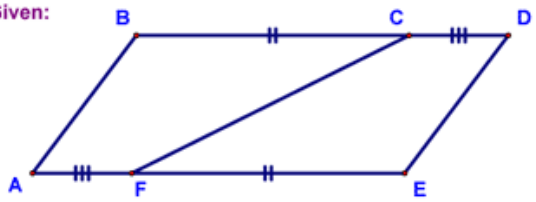


Statements	Reasons

Here are second versions of The Addition Property of Congruent Segments and The Addition Property of Congruent Angles. You might want to take a shot at proving these. It would be good practice for the chapter test (hint hint)!!

Theorem 10 **- If congruent segments are added to congruent segments, then the sums are ≅. (*The Addition Property of ≅ Segments - Version 2*)**

Given:

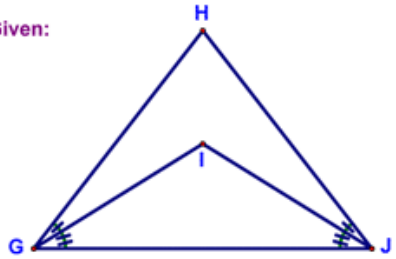


Conclusion:

$\overline{BD} \cong \overline{AE}$

Theorem 11 **- If congruent angles are added to congruent angles then the sums are ≅. (*The Addition Property of ≅ Angles - Version 2*)**

Given:



Conclusion:

$\angle HGJ \cong \angle HJG$

And the follow two as well (two version of The Subtraction Property of Congruent Segments & Angles)!

Theorem 12 **- If a segment (or angle) is subtracted from congruent segments (or angles), then the differences are ≅. (*The Subtraction Property of ≅ Segments & Angles - Version 1*)**

Theorem 13 **- If congruent segments (or angles) are subtracted from congruent segments (or angles) then the differences are ≅. (*The Subtraction Property of ≅ Segments & Angles - Version 2*)**

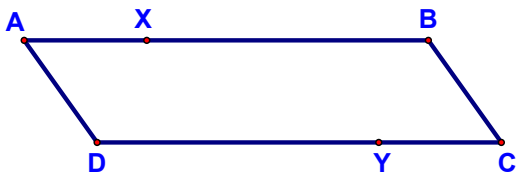
You should be able to follow all the steps in these proofs and should be beginning to see some similarities between how they "flow." Are you starting to recognize patterns? Are you following each given as far as it goes? Are you looking at the conclusion and working backwards? Hopefully, you're starting to get the hang of things here, but if you're not, make sure to come to extra help!

Here are blank proofs for those we covered today…use them for practice!!

Theorem 10 **- If ≅ segments are added to ≅ segments, the resulting segments are ≅ (The Addition Property of ≅ Segments - Version 2).**

Given: $\overline{AX} \cong \overline{YC}$
$\overline{XB} \cong \overline{DY}$

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

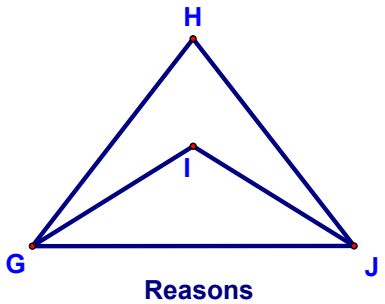


Statements	Reasons

Theorem 11 **- If ≅ angles are added to ≅ angles, the resulting angles are ≅ (The Addition Property of ≅ ∠s - Version 2).**

Given: ∠HGI ≅ ∠HJI
∠IGJ ≅ ∠IJG

Prove: ∠HGJ ≅ ∠HJG

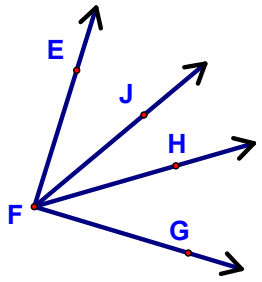


Statements	Reasons

Theorem 12 **- If an angle is subtracted from two ≅ angles, then the resulting ∠s are ≅ (The Subtraction Property of ≅ ∠s - Version 1).**

Given: ∠EFH ≅ ∠GFJ

Prove: ∠EFJ ≅ ∠GFH

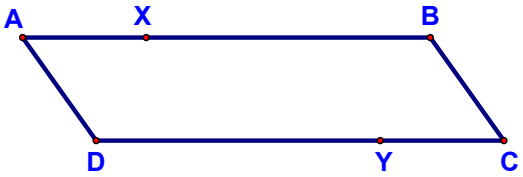


Statements	Reasons

Theorem 13 **- If ≅ segments are subtracted from ≅ segments, the resulting segments are ≅ (Subtraction Property of ≅ Segments - Version 2)**

Given: $\overline{AB} \cong \overline{DC}$
$\overline{AX} \cong \overline{YC}$

Prove: $\overline{XB} \cong \overline{DY}$



Statements	Reasons