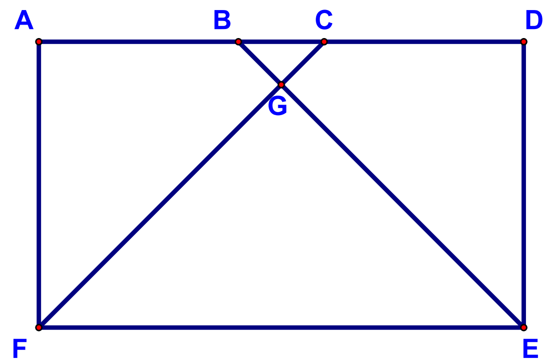
Transitive & Substitution Properties - Lesson 2-7

Here's the warmup!

Given: $\overline{FC}$ bisects $\angle AFE$
$\overline{EB}$ bisects $\angle DEF$

Prove: $\angle AFE \cong \angle DEF$



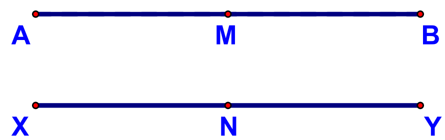
Statements	Reasons

Today, we're going to cover two new theorems and one really cool property....but…before we do that, I want to see how your practice with proving theorems is going…try proving the Division Property (you're looking for about 16 steps!)…

Theorem 15 **- If segments are ≅, their like divisions are ≅ (Division Property of ≅ Segments).**

Given: $\overline{AB} \cong \overline{XY}$
M & N are midpoints

Prove: $\overline{AM} \cong \overline{XN}$



Statements	Reasons

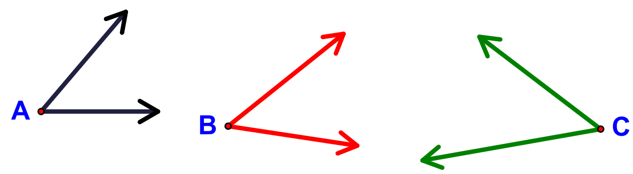
Hopefully, you see the similarities between that proof and the proof of the multiplication property…I also hope that you're getting better at these theorem proofs – remember that you'll have to do one on the upcoming Chapter 2 test!!

OK…let's prove the Transitive Property. This one should look really familiar and should be straight forward for you now...Ask yourself, "what does it mean to be congruent." "What does it mean for angles to have the same measure?" Also – this proof is only 5 steps!

Theorem 16 **- If segments (or ∠s) are ≅ to the same segment (or ∠s), they are ≅ to each other (Transitive Property of ≅ Segments or ∠s - Version 1).**

Given: ∠A ≅ ∠B
∠A ≅ ∠C

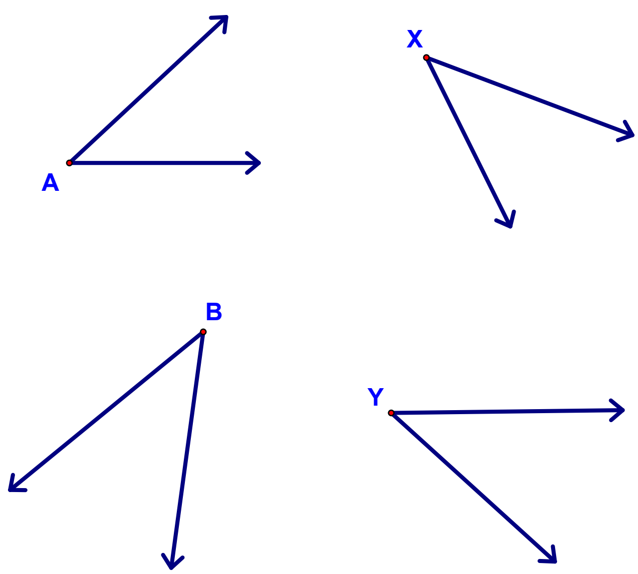
Prove: ∠B ≅ ∠C



Statements	Reasons

Another version of this theorem is very similar...you should be able to understand what would be given and what the conclusion would be (by using this theorem):

Theorem 17 **- If segments (or angles) are congruent to congruent segments (or angles), they are congruent to each other (Transitive Property of ≅ ∠s - Version 2).**



Given: ∠A ≅ ∠X
∠B ≅ ∠Y
∠X ≅ ∠Y

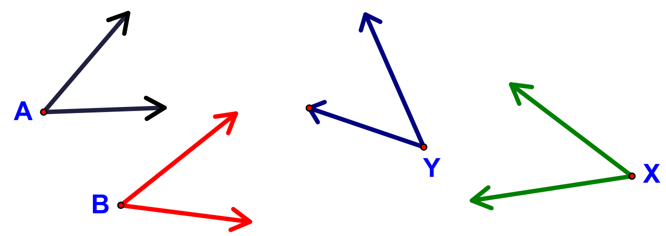
Conclusion: ∠A ≅ ∠B

See if you can prove it! (there are 8 steps)

Theorem 17 **- If segments (or ∠s) are ≅ to ≅ segments (or ∠s), they are ≅ to each other (Transitive Property of ≅ Segments or ∠s - Version 2).**

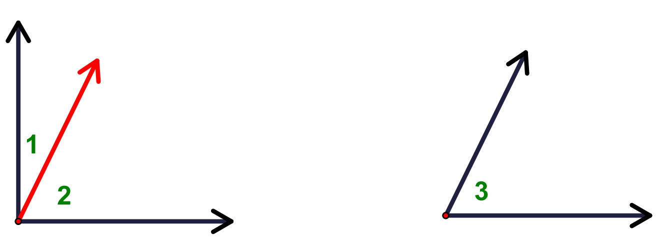
Given: ∠A ≅ ∠X
∠B ≅ ∠Y
∠X ≅ ∠Y

Prove: ∠A ≅ ∠B



Statements	**Reasons**

We'll end by covering the ***Substitution Property***. This one is cool since it can really shorten some of these proofs! One example is shown below. It'd be a bummer to have to write all the steps to making this conclusion, wouldn't it? With the Substitution Property, we can do it in one fell swoop!



If ∠1 is complementary ∠2 and ∠2 ≅ ∠3, then ∠1 is complementary to ∠3 by the substitution postulate!