2.6 Multiplication and Division Properties

After studying this section, you will be able to:

• Apply the multiplication and division properties of segments and angles in proofs and problem solving.

Thm 14: If segments or angles are congruent then their like multiples are congruent.

Thm 15: If segments or angles are congruent, then their like divisions are congruent. [*i.e.* If two congruent angles or segments are bisected (or trisected), then the parts of these angles or segments are congruent]

CAUTION! Be very careful that you don't confuse addition and subtraction properties with multiplication and division properties!

The key to recognizing that you have multiplication or division property in play is to make sure that you have <u>two congruent</u> angle or segments to start with and then look for the double use of the words midpoint, bisect, or trisect.

EXAMPLE #1 (Division):



Given: $\angle GAF \cong \angle HCE$ $\overrightarrow{AJ} \text{ bisects} \angle GAF, \overrightarrow{CI} \text{ bisects} \angle HCE$ Prove: $\angle GAJ \cong \angle HCI$

1. Given

2. Given

3. Given

- 1. $\angle GAF \cong \angle HCE$
- 2. \overrightarrow{AJ} bisects $\angle GAF$
 - \overrightarrow{CI} bisects $\angle HCE$
- 4. $\angle GAJ \cong \angle HCI$

3.

4. Division (If $\preceq s$ are \cong , then their like divisions are \cong)

With Division:

We start with *large congruent* angles (or segments) and are asked to *prove smaller* angles (or segments) congruent.

EXAMPLE #2 (Multiplication):



Statements	Reasons
1. $\overline{AD} \cong \overline{BE}$ 2. D is mdpt of \overline{AB} 3. E is mdpt of \overline{BC} 4. $\overline{AB} \cong \overline{BC}$	 Given Given Given (Multiplication) If segs are ≅, then their like multiples are ≅

With Multiplication:

We start with *small congruent* segments (or angles) and are asked to *prove larger* segments (or angles) congruent!

BE ALERT! Notice that division OR multiplication is used whenever there is a <u>DOUBLE</u> <u>USE</u> of the words bisect, trisect or midpoint (or as in the last example, whenever a double use can be inferred from a "given"!)