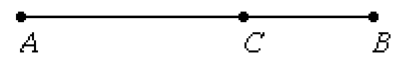
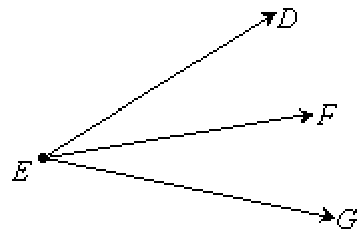
7-1: Basic Inequality Postulates

Postulate: A whole is greater than any of its parts.

- If $\overline{ACB}$ is a line segment, then
  $AB = AC + CB$, $AB > AC$, and $AB > CB$



- If $\angle DEF$ and $\angle FEG$ are adjacent angles,
  $m\angle DEG = m\angle DEF + m\angle FEG$,
  $m\angle DEG > m\angle DEF$ and $m\angle DEG > m\angle FEG$



Postulate: **The Substitution Property of Inequality:** A quantity may be substituted for its equal in any statement of inequality.

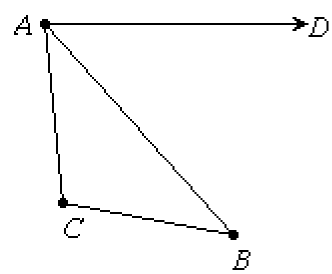
Postulate: **The Trichotomy Postulate:** Given any two quantities, *a* and *b*, one and only one of the following is true: $a < b$, $a > b$ or $a = b$.

Example:

Given: $m\angle DAC = m\angle DAB + m\angle BAC$

and $m\angle DAB > m\angle ABC$

Prove: $m\angle DAC > m\angle ABC$



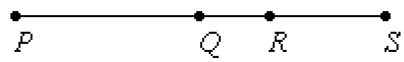
Proof:

Statements	***Reasons***
1. $m\angle DAC = m\angle DAB + m\angle BAC$	Given
2.	A whole is greater than its parts
3. $m\angle DAB > m\angle ABC$	
$\therefore$	

Example:

Given: *Q* is the midpoint of $\overline{PS}$

and $RS < QS$



Prove: $RS < PQ$

Proof:

Statements	***Reasons***
1. *Q* is the midpoint of $\overline{PS}$	
2.	
3. $PQ = QS$	
4.	
∴	Substitution Postulate

7-2: Inequality Postulates Involving Addition and Subtraction

Postulate: If equal quantities are added to unequal quantities, then the sums are unequal in the same order.

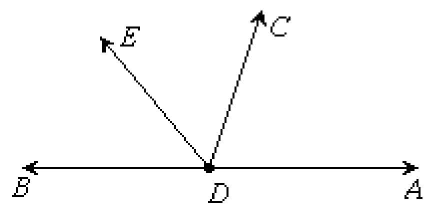
Postulate: If unequal quantities are added to unequal quantities in the same order, then the sums are unequal in the same order.

Postulate: If equal quantities are subtracted from unequal quantities, then the sums are unequal in the same order.

Example:

Given: $m\angle BDE < m\angle CDA$

Prove: $m\angle BDC < m\angle EDA$



Proof:

Statements	Reasons
1. $m\angle BDE < m\angle CDA$	
2.	
3.	Partition Postulate
4.	
$\therefore$	Substitution Postulate for Inequalities

7-3: Inequality Postulates Involving Multiplication and Division

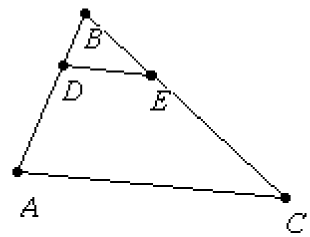
Postulate: If unequal quantities are multiplied or divided by positive equal quantities, then the products are unequal in the same order.

Postulate: If unequal quantities are multiplied or divided by negative equal quantities, then the products are unequal in the opposite order.

Example:

Given: $BA = 3BD$, $BC = 3BE$, $BE > BD$

Prove: $BC > BA$

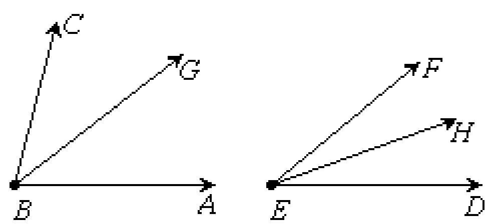


Proof:

Statements	***Reasons***
1.	Given
2.	
3.	
∴	

Given: $m\angle ABC > m\angle DEF$, $\overrightarrow{BG}$ bisects $\angle ABC$ and $\overrightarrow{EH}$ bisects $\angle DEF$

Prove: $m\angle ABG > m\angle DEH$



Proof: An angle bisector separates the angle into two congruent parts. Therefore, the measure of each part is one-half the measure of the angle that was bisected, so $m\angle ABG$ = _______________ and $m\angle DEH$ = __________________.

Since we are given that $m\angle ABC > m\angle DEF$, _______________________________ , because if unequal quantities are multiplied by positive equal quantities, the products are unequal in the same order. Therefore, by the substitution postulate for inequality, ____________________________.

Homework: