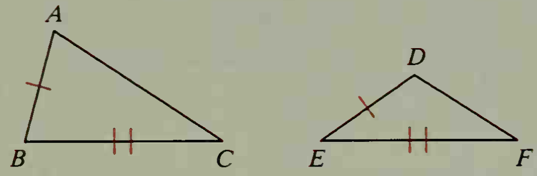
## Theorem 6-6 *SSS Inequality Theorem*

**If two sides of one triangle are congruent to two sides of another triangle, but the third side of the first triangle is longer than the third side of the second, then the included angle of the first triangle is larger than the included angle of the second.**

Given: $\overline{BA} \cong \overline{ED}$; $\overline{BC} \cong \overline{EF}$;
$AC > DF$

Prove: $m\angle B > m\angle E$




**Proof:**

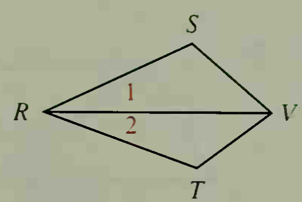
Assume temporarily that $m\angle B \ngtr m\angle E$.
Then either $m\angle B = m\angle E$ or $m\angle B < m\angle E$.

*Case 1:* If $m\angle B = m\angle E$, then $\triangle ABC \cong \triangle DEF$ by the SAS Postulate, and $AC = DF$.

*Case 2:* If $m\angle B < m\angle E$, then $AC < DF$ by the SAS Inequality Theorem.

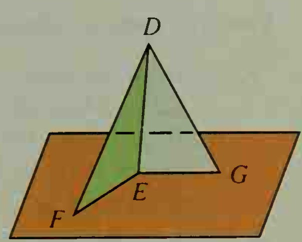
In both cases there is a contradiction of the given fact that $AC > DF$. What was temporarily assumed to be true, that $m\angle B \ngtr m\angle E$, must be false. It follows that $m\angle B > m\angle E$.

**Example 1** Given: $\overline{RS} \cong \overline{RT}$; $m\angle 1 > m\angle 2$
What can you deduce?




**Solution** In the two triangles you have $\overline{RV} \cong \overline{RV}$ as well as $\overline{RS} \cong \overline{RT}$. Since $m\angle 1 > m\angle 2$, you can apply the SAS Inequality Theorem to get $SV > TV$.

**Example 2** Given: $\overline{EF} \cong \overline{EG}$; $DF > DG$
What can you deduce?




**Solution** $\overline{DE}$ and $\overline{EF}$ of $\triangle DEF$ are congruent to $\overline{DE}$ and $\overline{EG}$ of $\triangle DEG$. Since $DF > DG$, you can apply the SSS Inequality Theorem to get $m\angle DEF > m\angle DEG$.