Suppose $\triangle ABC$ is a triangle and $DE$ is a segment congruent to $AB$. Then, on each side of $\overrightarrow{DE}$ there is a point $F$ such that $\triangle ABC \cong \triangle DEF$.

**Proof** The Angle Construction Theorem (4.5) shows that on any pre-determined side of $\overrightarrow{DE}$ you can construct a ray $\overrightarrow{DG}$ such that $\angle BAC \cong \angle GDE$.

Next, by the Segment Construction Theorem (3.35) there is a point $F$ in the interior of the ray $\overrightarrow{DG}$ such that $AC = DF$.

Finally, the triangles $ABC$ and $DEF$ now satisfy the hypotheses of the SAS postulate: $AB = DE$ by hypothesis, $AC = DF$ by our construction of $F$, and $m\angle BAC = m\angle FDE$ by our construction of the ray $\overrightarrow{DG} = \overrightarrow{DF}$. The postulate then ensures the congruence of the two triangles $ABC$ and $DEF$. 