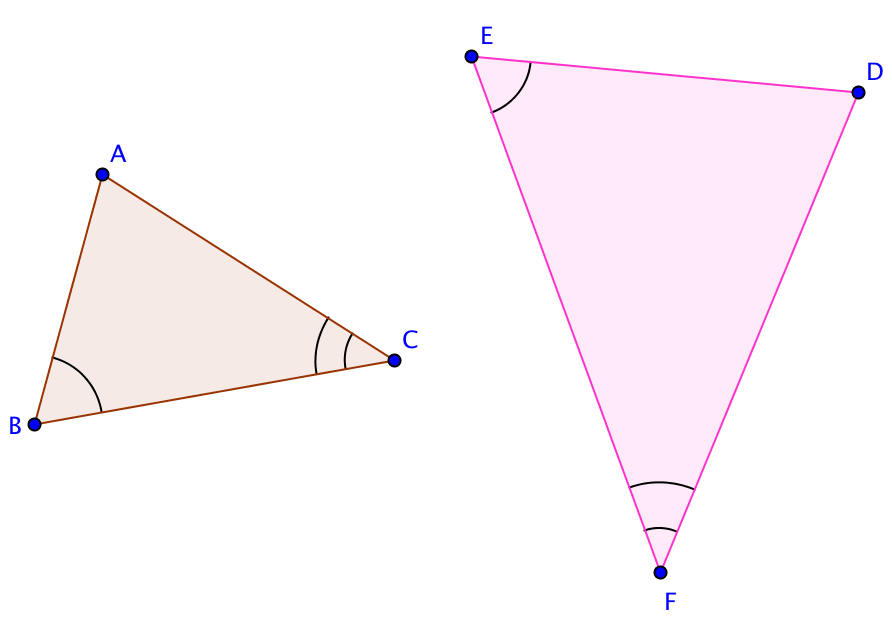
**Activity 4.3.2 AA & SAS Similarity Theorems**

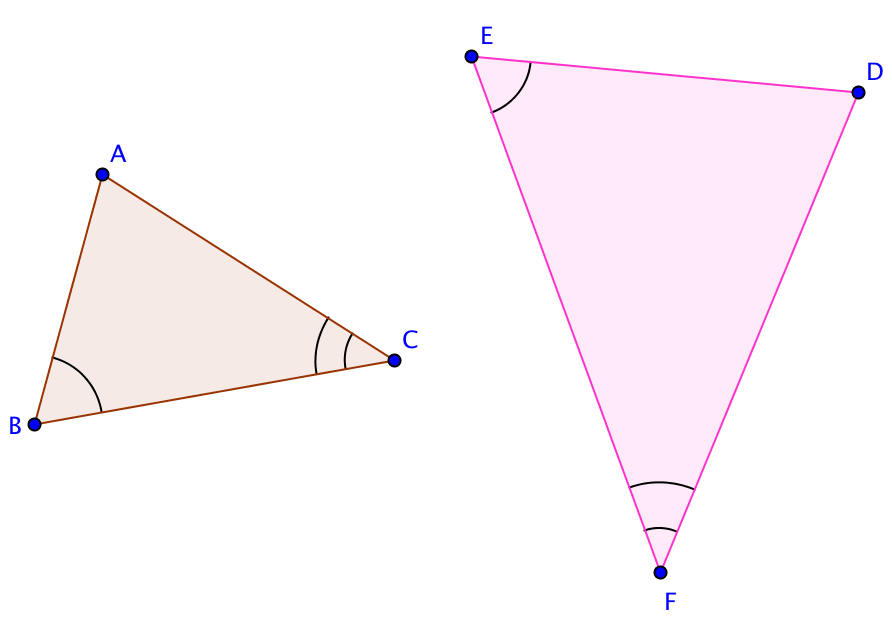
**AA Similarity Theorem**

Prove the **AA Similarity Theorem**: If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

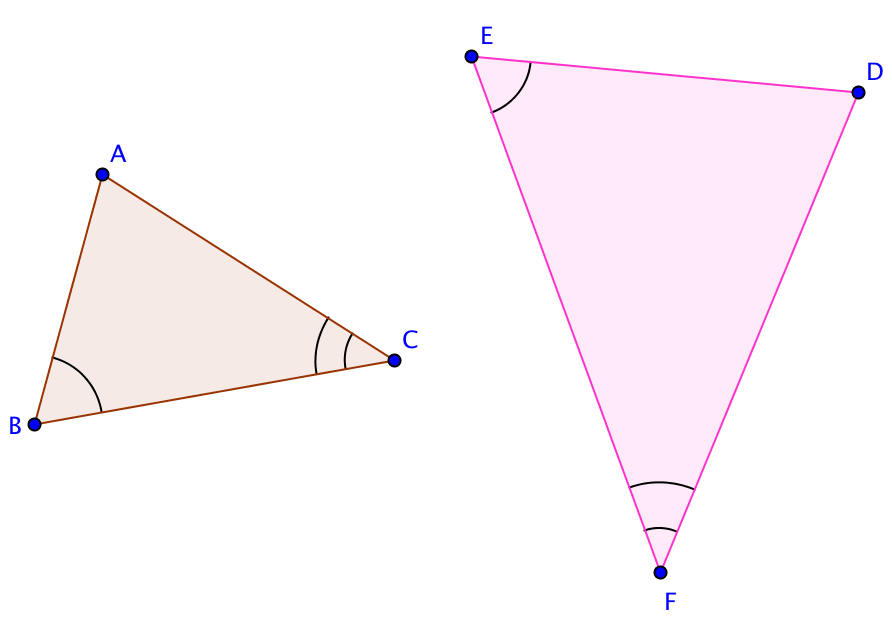
Given: ∆*ABC* and ∆*DEF* with m*ACB* = m*DFE* and m*ABC* = m*DEF*

Prove ∆*ABC*∆*DEF.*

1. If *C* and *F* do not coincide then translate ∆*ABC* by the vector from \_\_\_\_ to \_\_\_\_ and name the image ∆*A’B’C’*. Sketch the translated image.



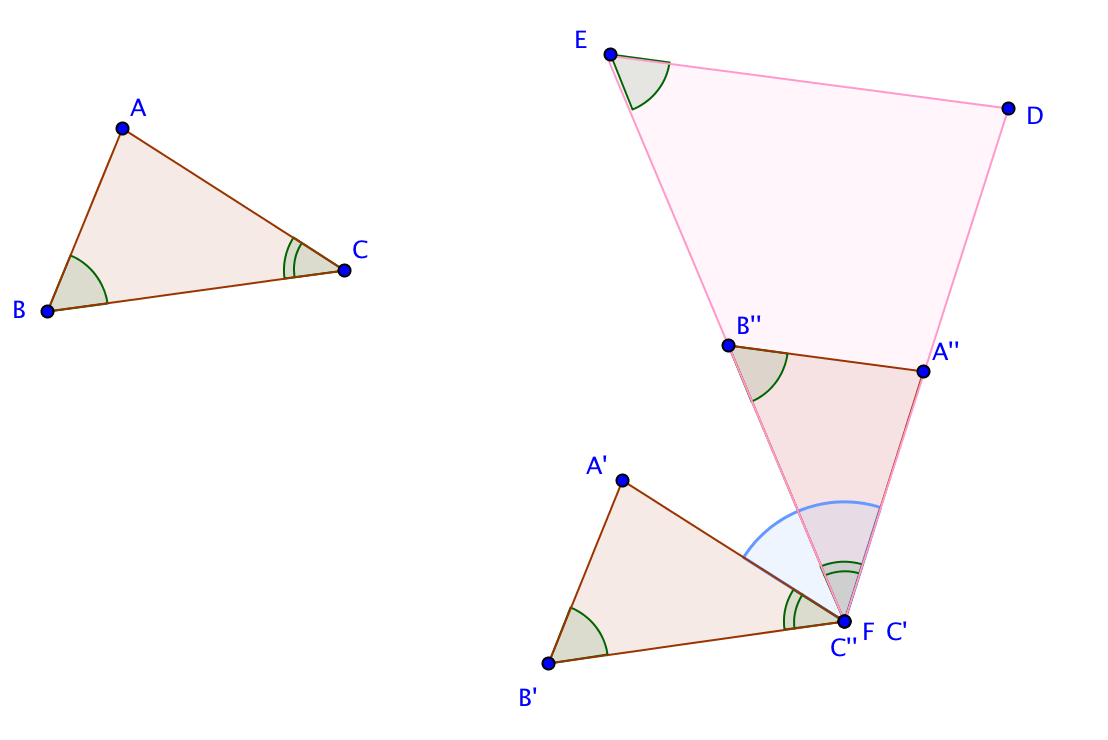
2. If *B’* does not lie on , then rotate ∆*A’B’C’* about point *F* or *C’*  
 through \_\_\_\_\_\_. Name the image ∆*A’’B’’C’’*. Sketch the rotated image.



3. will lie on \_\_\_\_ and will lie on \_\_\_\_ since m*ACB* = m*DFE*.

4. Since m*A’’B’’C’’* = m\_\_\_\_\_\_\_ then because when \_\_\_\_\_\_\_\_\_\_\_\_\_ angles formed by two lines are a transversal are congruent, the two lines are parallel.

5. Dilate ∆*A’’B’’C’’* using center point \_\_\_\_\_\_ by factor . Point *B’’’* will then coincide with point \_\_\_\_.



6. By our dilation postulate:

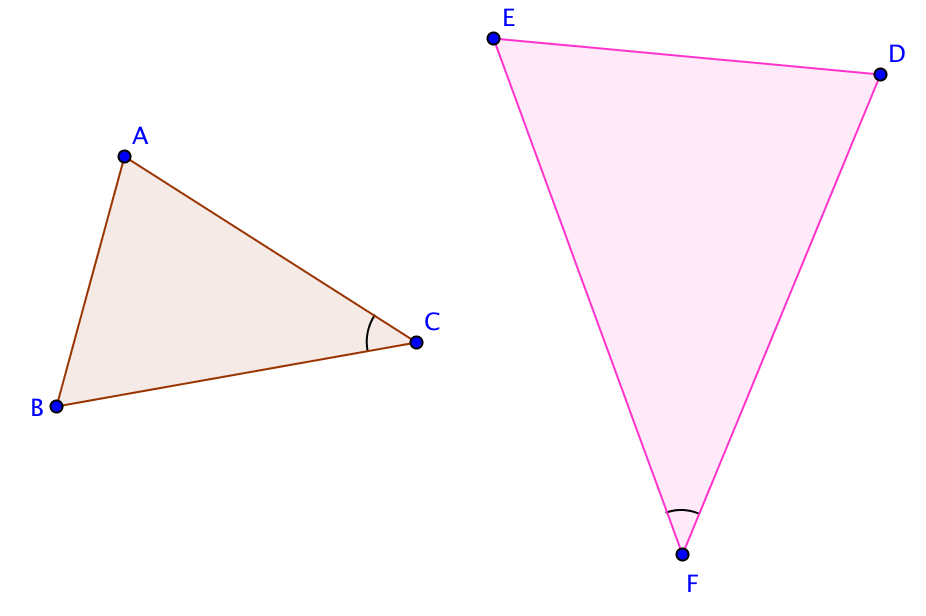
1. || (Dilations map a line not through the center onto a parallel line.) Therefore, through point *B’’’* (that is, point *E*) both and are parallel to ’. Since there is only one line through a given point parallel to a given line, this means that lines \_\_\_\_\_ and \_\_\_\_\_ coincide.
2. will map onto (Dilations map a line through the center onto itself). Since two lines () and intersect in at most one point. points \_\_\_\_\_ and \_\_\_\_ coincide.

7. Since ∆*A’’’B’’’C’’’* coincides with ∆*DEF*, ∆*DEF* is the image of ∆*ABC* under a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transformation. This means that ∆*ABC* and ∆*DEF* are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

This completes the proof.

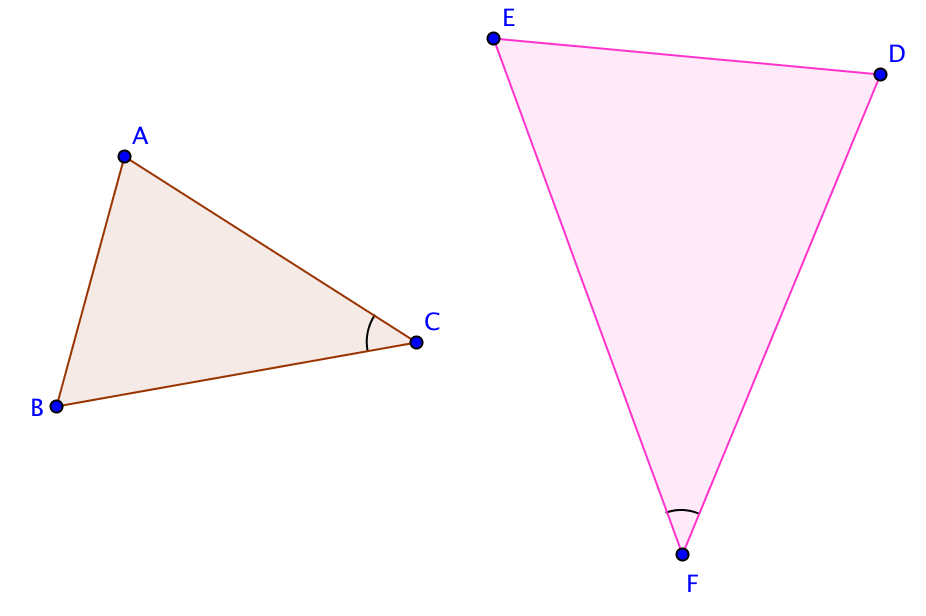
**SAS Similarity Theorem**

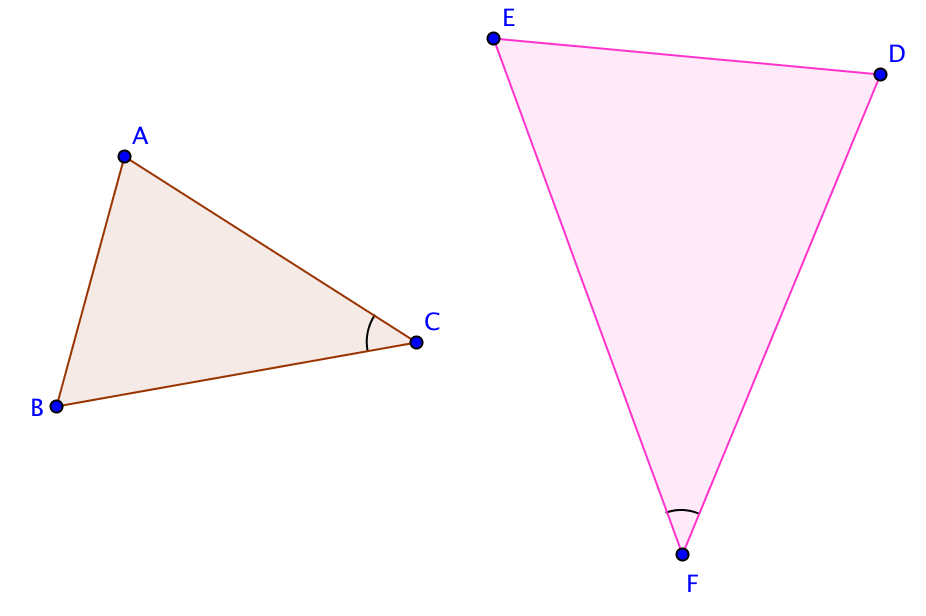
Prove the **SAS Similarity Theorem:** If two sides of one triangle are proportional to two sides of another triangle and the angles included by these sides are congruent, then the triangles are similar.



Given ∆*ABC* and ∆*DEF*   
with m*ACB* = m*DFE* and .

Prove ∆*ABC*∆*DEF*.

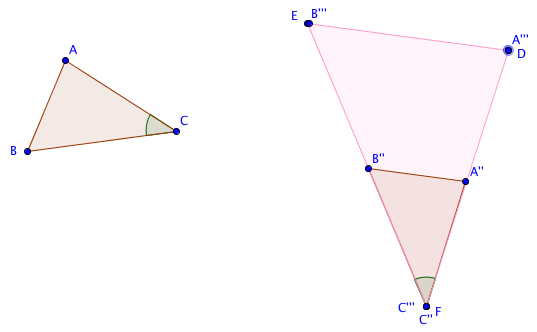
1. If Points *C* and *F* do not coincide then translate ∆*ABC* by   
the vector from \_\_\_\_ to \_\_\_\_.   
Draw the translated image and call it ∆*A’B’C’*.



2. If *\_\_\_\_*does not lie on then rotate ∆*A’B’C’* about point \_\_\_\_\_ through \_\_\_\_\_\_. Draw the image of this rotation and call it ∆*A’’B’’C’’*.

3. Segment \_\_\_\_\_\_ will lie on and segment \_\_\_\_\_ will lie on since m = m*DFE*.

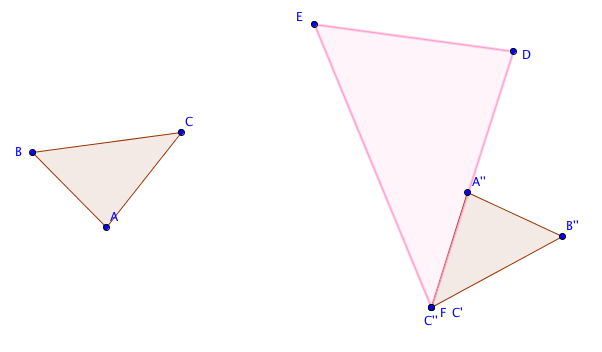
4. Dilate ∆\_\_\_\_\_\_\_\_\_ using center point *F*(*C’’*) by factor . Point *A*’’’ will then coincide with Point *D* and since then Point *B*’’’ will coincide with Point \_\_\_\_\_\_.



5. Side ’ must coincide with side because only \_\_\_\_\_ \_\_\_\_\_\_\_\_ may pass through two points.

6. Since ∆*DEF* is the image of ∆*ABC* under a \_\_\_\_\_\_\_\_\_\_\_\_\_ transformation then ∆*ABC*∆*DEF*. This completes the proof.

7. Suppose after step 2 in either of the above proofs, we had a situation like this:



What additional transformation would be needed to complete the proof?