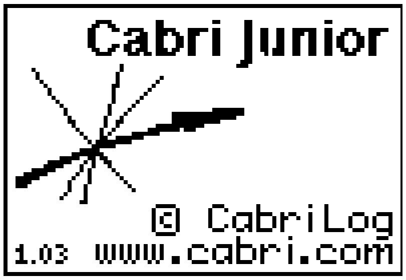
SSS Triangle Congruence

First, turn on your TI-84 and press the APPS key. Arrow down until you see Cabri Jr and press ENTER. You should now see this introduction screen.

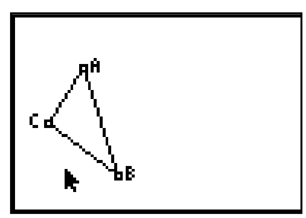


To begin the program, press any key. If a drawing comes up on the screen, press the Y= key (note the F1 above and to the right of the key – this program uses F1, F2, F3, F4, F5 names instead of the regular key names) and arrow down to NEW. It will ask you if you would like to save the changes. Press the 2nd key and then enter to not save the changes.

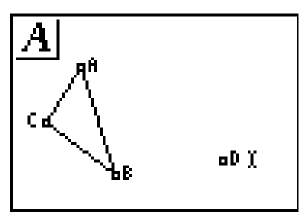
We are now ready to begin.

Two triangles are considered to be congruent if all three sides have the same length and all three angles have the same degree measure. However, to show that two triangles are congruent, we need only to show that certain sets corresponding sides and angles are congruent. This activity will lead you through the first of these triangle congruence postulates – that if all three sets of corresponding sides are congruent then the two triangles are congruent (and the three pairs of corresponding angles have the same degree measure).

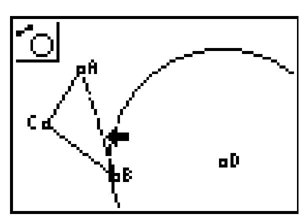
To begin, construct a triangle ABC. As before, you may wish to refrain from labeling points in order to keep the screen cleaner.



Construct point D anywhere else on the screen. For the rest of this construction, point D will correspond to point A in the original triangle.

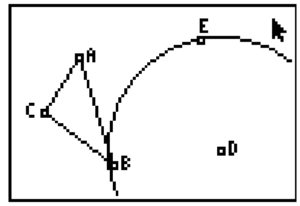


In order to copy the line segment AB, we will use the compass tool, from the F3 menu. Select point D as the center and line segment AB as the radius. By connecting point D to any point on this circle, we will have a line segment DE which has the same

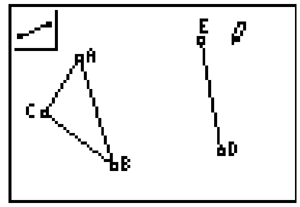


length as AB.

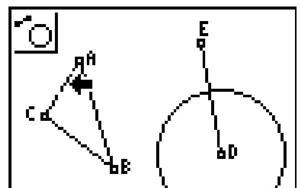
Use the Point On tool ([F2]>Point>Point On) to construct point E anywhere on the circle.



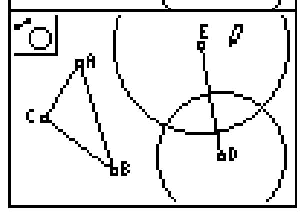
Hide the circle and construct a line segment joining D to E. Line segment DE has the same length as AB.



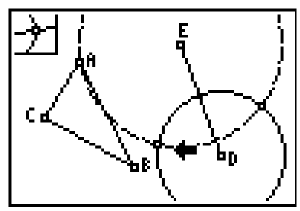
We will now copy the length of AC at point D. Use the compass tool again and select point D for the center and line segment AC as the radius. Note: A line segment connecting D to any point on this circle will have the same length as AC.



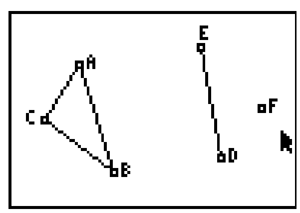
In the same way, we need to copy the length of BC at E. With the compass tool, select point E as the center and BC as the radius. Note: A line segment connecting point E to any point on the newest circle will have the same length as BC.



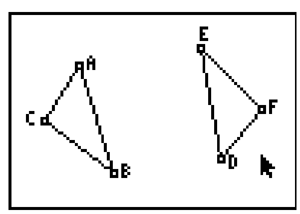
The last point that we need is the intersection of the two circles. Note that there will be two such points, one on either side of DE.



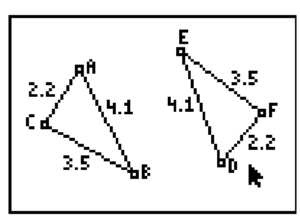
Hide the two circles and one of the points of intersection. Label the point of intersection as F.



Connect point F to point E and point D to complete the second triangle.

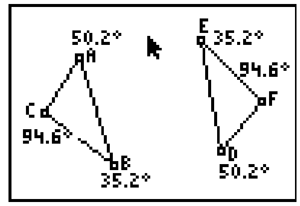


To confirm that the three sets of corresponding sides have the same length, use the Measure tool to find the lengths of all three sides in each triangle. When you are measuring, it may happen

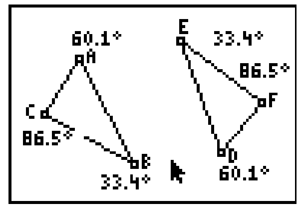


that the entire perimeter becomes active rather than just the side that you want. If this happens, press the [2nd] button and the side will become active. Once you have confirmed that the three pairs of corresponding sides have the same length, hide these measurements.

To determine if the triangles are congruent, we must show that the three pairs of corresponding angles have the same degree measure. Use the Measure tool to find the degree measure of each angle in both triangles.



To test the result, move any of points A, B or C from their original positions. The lengths of the corresponding sides and degree measure of corresponding angles will change but remain equal.



Explain why point F is the same distance from D and E as point C is from A and B respectively.
Would it have made any difference if we had decided to keep the other point of intersection as point F and hide the first one chosen?

Extensions:

Try answering these questions after the activity with your class:

1. Using the method in this construction, is it possible to construct two triangles that are not congruent?
2. Select one pair of corresponding triangles. Can you explain why these angles are congruent?