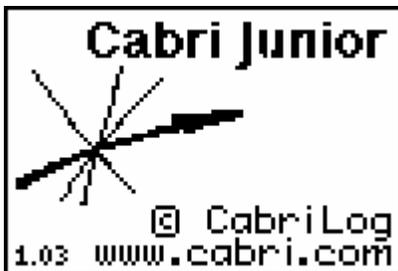


Activity 18 Constructing Similar Triangles

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



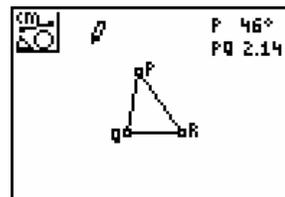
To begin the program, press any key. If a drawing comes up on the screen, press the **Y=** key (note the F1 above and to the right of the key – this program uses F1, F2, F3, F4, F5 names instead of the regular key names) and arrow down to NEW. It will ask you if you would like to save the changes. Press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

We are now ready to begin.

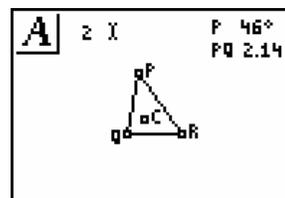
Similar triangles are those that have the same shape but not necessarily the same size. Congruent triangles are a special type of similar triangle where corresponding sides are congruent. In similar triangles, corresponding angles are congruent but corresponding sides are proportional. In this activity, you will look at three methods of constructing similar triangles and will test these properties using Dilations or stretches.

In order to examine all of the sides and angles, students should work in groups of three. Have one student in each group construct the first triangle and save it as “SIMTRI”. This is saved in the TI-84 Plus as an APPVAR. Transfer the APPVAR to the other two students in the group.

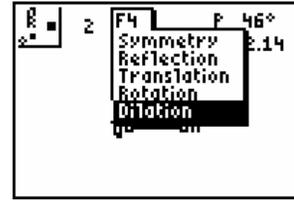
Start with any triangle PQR. The first person in the group should measure angle P and side PQ. The second person should measure angle Q and side QR. The third person should measure angle R and side PR. You may want to increase the accuracy for the length of the side.



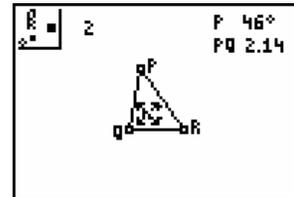
Construct a point C in the centre of the triangle. Use the Alph-Num tool to stamp the digit “2” at the top of the screen. The point C will be the center of the dilation and the digit “2” will be the scale factor.



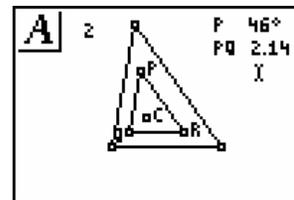
Press [F4], the Transformation menu, and select the Dilation option.



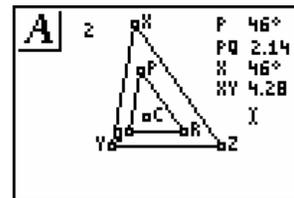
Move the cursor to point C, the center of the dilation. Notice how the shape of the cursor changes. This is to indicate that everything will be stretched away from this point. Move the cursor to the perimeter of the triangle and press [ENTER]. Finally, move to the scale factor, 2, and press [ENTER].



A new, larger triangle will appear outside of triangle PQR.

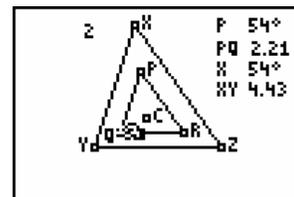


Label this triangle as XYZ so that X corresponds to P, Y to Q and Z to R. Each person in the group should select and measure their appropriate angle and side in the new triangle. What do you notice about the two angles? Compare this to the other students in your group. How do the lengths of the sides compare? Is this the result that you were expecting?

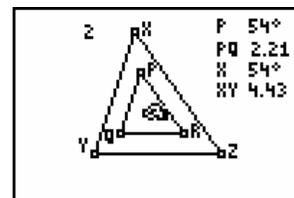


The fact that $XY = 2 PQ$ indicates that the sides are in the ratio 2:1. If all three sides display the same result, then the sides are said to be proportional.

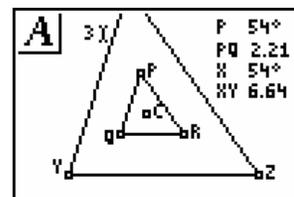
Drag your point in the original triangle PQR. Do the corresponding angles remain congruent? Does the relationship between corresponding sides remain the same? Compare your results to others in your group.



Drag the center point, C. Are the relationships preserved under this change? Compare your results to others in your group. Does it make any difference that each person may have constructed a different center point.

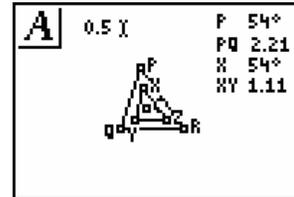


Call up the Alph-Num tool. Move to the scale factor of 2 and press [ENTER]. Delete the “2” by pressing [DEL]. Press [ALPHA] to

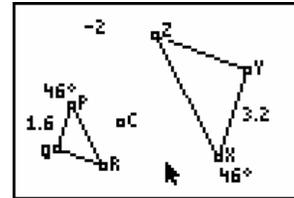


change the character to a number and enter the value “3”. What happens to your construction? Does this change the relationships you found above?

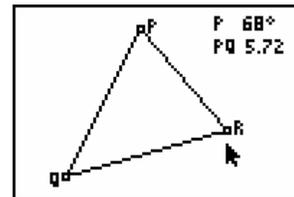
Finally, change the scale factor from 3 to 0.5. How does this affect your construction? It may be difficult to see the actual points in the triangles, but the measurements show the results clearly. Summarize your findings by stating the effect of a dilation on corresponding angles and sides.



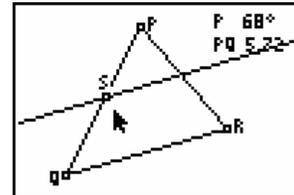
Next, we will look at the effect of a dilation when the center point “C” is outside of the pre-image triangle and a negative scale factor is used. Drag triangle PQR to the lower left corner and drag C to a point to the right of the triangle. Change the scale factor to -2. Are the properties that you noted above preserved by these changes?



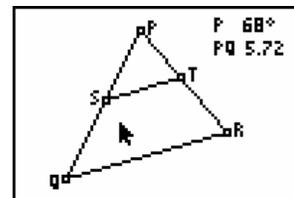
Finally, we will look at a completely different method of constructing similar triangles. Construct a triangle PQR and transfer it to the others in your group. Measure your side and angle as before. The screens below refer to side PQ and angle P.



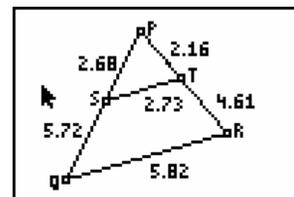
Construct a point on PQ and label it S. Construct a line through S that is parallel to QR.



Label the point of intersection of side PR and the parallel line as T. Hide the parallel line and construct line segment ST. Can you prove that all three pairs of corresponding angles are congruent? If so, then triangle PST is similar to triangle PQR.



Measure line segments of corresponding sides. In the screen to the right all three pairs of sides have been measured. What remains is to show that the sides are proportional.



Press [F5] and select the Calculate tool. Move the cursor to the measurement for the length of PQ and press the \div key. Move to the measurement for PS and press [ENTER]. The ratio of PQ:PS will be displayed on the screen. If all three ratios are equivalent, then the sides are proportional.

