Problem 1 – Similar Triangles Using Dilation

- Open Cabri Jr. and open a new file.

Student A: Construct a triangle and label the vertices *P*, *Q*, and *R*. Send the file to Students B and C. Measure $\angle P$ and $\overline{PQ}$.

Student B: Measure $\angle Q$ and $\overline{QR}$.

Student C: Measure $\angle R$ and $\overline{PR}$.

Note: Place the measurements in the top right corner.

- Construct point *C* in the center of the triangle.

- Place the number 2 on the screen.

- Select the **Dilation** tool and then select point *C*, the triangle, and the number **2**.

- Label the triangle that appears, *XYZ*, so that *X* corresponds to *P*, *Y* to *Q* and *Z* to *R*.

Student A: Measure $\angle X$ and $\overline{XY}$.

Student B: Measure $\angle Y$ and $\overline{YZ}$.

Student C: Measure $\angle Z$ and $\overline{XZ}$.

1. What do you notice about the two angles? Compare this to the other students in your group.

2. How do the lengths of the sides compare? Is this the result that you were expecting?

3. Predict what will happen to the corresponding angles and sides when a point on $\triangle PQR$ is moved. Drag your point in $\triangle PQR$. Do the corresponding angles remain congruent? Does the relationship between corresponding sides remain the same? Compare your results to others in your group.

4. Drag 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.

Problem 2 – Different Scale Factors

Using the **Alph-Num** tool, change the scale factor from 2 to 3.

5. What happens to your construction? Does this change the relationships you found in Problem 1?

6. Change the scale factor from 3 to 0.5. How does this affect your construction?

7. Summarize your findings by stating the effect of a dilation on corresponding angles and sides.

8. Drag $\triangle PQR$ to the lower left corner and drag point C to the right of the triangle. Change the scale factor to –2. Are the properties that you noted above preserved by these changes?

Problem 3 – Similar Triangles with a Parallel Line

Student A: Open a new file and construct a $\triangle PQR$. Send the file to Students B and C. Measure $\angle P$ and $\overline{PQ}$.

Student B: Measure $\angle Q$ and $\overline{QR}$.

Student C: Measure $\angle R$ and $\overline{PR}$.

- Construct a point on $\overline{PQ}$ and label it *S*.

- Construct a line through *S* that is parallel to $\overline{QR}$.

- Label the point of intersection of side *PR* and the parallel line as *T*.

- Hide the parallel line and construct line segment *ST*.

9. Describe how you can prove whether or not all three pairs of corresponding angles are congruent. If they are congruent, then $\triangle PST$ is similar to $\triangle PQR$.

10. Calculate the ratio of *PQ:PS*. Then calculate the ratios of the other sides. If all the ratios are equivalent, then the sides are proportional. Are the sides in $\triangle PST$ and $\triangle PQR$ proportional?