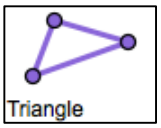
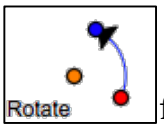
Rotate 3 Name(s):

1. Construct a 

. Make the sides and angles different from each other.

2. Construct a 

function. Restrict the independent variable to the triangle.

Q1 Vary x and observe the behavior of x'. How fast does it move compared to x? In what direction does it move compared to x? What shape does it seem to trace out?

Q2 Change the angle, turn on tracing, and drag x around its domain. Draw the triangle and the traces. Include the two variables, the center, and θ in your drawing.

3. To turn the trace of the range into a polygon, rotate vertices A, B, and C using the same function rule. Then turn traces off and use A', B', and C' to construct a new triangle: the rotated image of $\triangle ABC$.

4. Color $\triangle A'B'C'$ a different color from $\triangle ABC$.

5. Animate independent variable x around its domain. Then change the function (by moving the center and changing the angle) and change the domain (by changing the shape of $\triangle ABC$). Hint: turn traces off while you change the function.)

Q3 Before you measure the sides of each triangle, make a prediction:

Q4 Measure the sides:

$AB =$	$BC =$	$CA =$
$A'B' =$	$B'C' =$	$C'A' =$

Q5 How does your answer to Q4 relate to the relative speed of x and x'?

Next you will rotate $\triangle A'B'C'$ (to construct $\triangle A''B''C''$), and adjust your new rotate function to put $\triangle A''B''C''$ directly on top of $\triangle ABC$.

6. Use a different Rotate function to rotate x' (not x!). (A different function requires you to use a new angle and a new center point.)

Q6 With tracing on, animate x. What do you observe about the trace of x''?

7. Turn the trace of x'' into a real triangle by rotating A', B', and C' using the new center point and angle, and then constructing $\triangle A''B''C''$.
8. Animate again to make sure that $\triangle A''B''C''$ really is the range of x''.

Q7 Adjust your second Rotate function to send $\triangle A''B''C''$ home, so that it's exactly on top of $\triangle ABC$. Experiment by changing the angle and moving the center point. Be patient in your efforts.

What do you notice about the angle you used?

What do you notice about the center point you used?

Can you find a different Rotate function that puts $\triangle A''B''C''$ on top of $\triangle ABC$? Explain why or why not.

Q8 Pages 2 and 3 are available for you to explore on your own, or to investigate questions posed by your teacher.

Q9 On pages 4, 5, and 6 are challenges for you to solve. Draw your constructions in the space below, showing how you solved each challenge.

Q10 On page 7 create a puzzle of your own. Then ask a classmate to solve it.