Activity Sheet – Leaf Diagram Name: _____

The image on the handout is drawn to represent a large-scale replica of a leaf. The veins have been exaggerated and many small veins have been omitted from the drawing for the purpose of this activity. Please refer to the actual image of the leaf for an accurate depiction of the circulatory system of a leaf.

In the image, there are four different areas with measurements of the radii of the veins.

1. In your group, look at each area and the given measurements of each radius. There is a mathematical relationship between the radius of the larger vessel and the radii of the smaller vessels. Can you identify this relationship and model it with an equation?

Write down all of your brainstormed ideas:

2. What is Murray's Law?

3. What are some real-life applications of Murray's Law?

4. Use Murray's Law to confirm that each area of the diagram models an efficient transport system. Show that the radii of the veins satisfy Murray's Law.

Area #1 Area #2 Area #3 Area #4

5. PROJECT: Using clay, play-do, straws, pipe cleaners, or other materials, create a model of a circulatory system or fluid transport system (pipes) that meets the conditions of Murray's Law. Plan out your process, including organization, design, type of material, and measurements. In your own words, write a brief description of Murray's Law and describe the application of the equation in your project (water transport system, circulatory system of worm, etc.). Label the measurements on the model. Refer to the rubric on the back of this sheet for specific expectations.