EISENHOWER PROFESSIONAL DEVELOPMENT PROGRAM

Mathematics Within: Shape, Space & Measurement

Lesson Plan

Participant Name: Kurt Alpers **School District:** VCC

Broad Topic: Geometry **Specific Topic:** Dilation

Aim:

Students will use dilation to create an exact replica of a shape, either smaller or larger than the original shape.

Objectives:

- To introduce terms dilation, center of enlargement, proportion, scaling.
- To teach how to create exact replica of a shape, either smaller or larger than the original shape.
- To prove the entire shape is larger or smaller in the same proportion by measuring with a ruler

Materials & Supplies:

- Paper
- Pencils
- 12" Rulers

Lesson:

- Show picture with large head and regular sized body. What is wrong? Lead them to idea of proportion, which is a relationship that states that two ratios are equal.
- Introduce dilation – to make bigger (or smaller) in the same proportion – real life examples – binoculars, magnifying glass, and microscope.
- Draw right triangle. Ask for volunteers to come to front of room and draw a similar triangle exactly twice as large. How do you know it is exactly twice as large?
- Demonstrate: Extend the legs of the right triangle. Measure from right angle vertex to each adjacent vertex. Double this measure and make a dot at this point. Connect the two dots. Measure the hypotenuse of the original figure, as well as the hypotenuse of the image. What do you notice about these two lengths?
- Kids go back to table and draw right triangle and work on this on own. If they finish early, kids may choose different vertex of the same triangle, and create another triangle by repeating the process.
- Call class back together. What did you notice about the length of the corresponding sides of the triangle?
- Terms:
  - Center of enlargement – the point from which you begin when making a dilation
  - Scaling – a transformation that creates a similar figure
  - Scale factor – the number by which the original figure's lengths are multiplied
  - Original figure – the first figure drawn
  - Image – the figure created from the original
- Possible extensions:
  - Make a different shape (scalene or isosceles triangle, square)
  - Make a square letter (such as F)
  - Make image 3 times as large or ½ as large
  - Make center of enlargement away from the figure. Draw line from dot through each vertex and beyond. Measure distance from dot to each vertex, then double this and make a dot. Connect the dots and measure corresponding lengths.
- Closure: Gather in a circle and share your results. What do you notice about the relationships of the measurements? Does vertex chosen affect the size of the image? What does affect the size of the image? (scale factor) Would this work for any figure or shape? What is proportion/ratio? What did you discover?