**HARD BOILED EGG LAB: What limits the sizes of cells?**

**Materials**

2 peeled hard-boiled eggs

Food coloring

150-mL beaker

Scalpel or plastic knife

Spoon

Paper towels

Metric ruler

**Procedure**

1. Place 100 mL of water in a beaker. Add 10 drops of food coloring, and stir with a spoon. \***CAUTION: Food coloring may stain hands and clothing.**
2. Use the knife to cut through the middle of 1 hard-boiled egg. Share ½ of the egg with another group.
3. Remove the yolk. Cut an 8-mm cube from the thickest part of the egg white.
4. Place the egg cube and a peeled hard-boiled egg gently into the beaker of food coloring and water. Allow the eggs to sit in the beaker for 10 minutes.
5. Answer questions #1-8.
6. After 10 minutes, use a spoon to carefully remove the egg cube and the whole egg from the beaker, and place them on a paper towel. Cut the egg cube in half. Clean the knife blade and cut the whole egg in half.
7. Measure how far the color penetrated the egg cube and the whole egg.
8. Compare the whole egg and the egg cube to cells to explain why a cell cannot continue to grow indefinitely.

***While the eggs are soaking*** in the food coloring answer these questions.

1. Predict: Which sample, the whole egg or the cube, do you think the food coloring will penetrate into further from the surface? Why? Explain your reasoning.
2. Predict: Which sample, the whole egg or the cube, do you think will have food coloring closer to the center in the first 1 minute of soaking? Explain.

1. Predict: Which sample, the whole egg or the cube, do you think will remove more food coloring solution from the beaker? Why?
2. The egg will act as a cell. Which of the characteristics of life do you think this experiment is exploring? (Besides all living things are made of at least one cell). Explain your answer.
3. How is a cube different from a square?

1. How is circle different from a sphere?

1. If a cube is 2 cm tall, 2 cm wide, and 2 cm deep, what is its volume? Show your work.

1. If a cube has the same dimensions as the cube in #7, what is its surface area? (think about how many sides a cube has)

**After 10 minutes…**

1. Draw the cube and egg after cutting in half. Shade the areas that have food coloring on them.
2. Measure in mm how close to the center of each the food coloring reached.

Egg: Cube:

1. When a living cell takes in materials from its environment, would a larger or smaller cell be better for transporting materials quickly from the cell surface to the center? Why?

12. Which would take less time, to travel from the middle of Plano to the edge of town, or to travel from the middle of Chicago to the edge of Chicago? Why?