Name Period Date

**Limits to Cell Size Lab – Day 2 /20**

**STARTER:** Summarize what you learned about limits to cell size in our previous lab. (3 pts)

**PART 2 PROCEDURE**

Now that you have been able to explore the relationship between cell dimensions and diffusion time, let’s see if you can put your new-found understanding to good use. Cells do come in many shapes and sizes in organisms. Natural selection has crafted them to do their jobs better with their unique form. You will find that the relationship between structure and function is a recurrent theme throughout biology.

Let’s give you the anointed role of “Intelligent Designer” for a competitive Cell Diffusion Race.

Each group will get an equal size block of bromothymol blue agar and will have the opportunity to design a cell to **maximize mass** but **minimize diffusion time**. The cell with the greatest mass *and* the shortest diffusion time will be judged the winner.

**THE CELL DIFFUSION RACE RULES:**

1. No donut-like holes through the agar cell—this is biologically impossible.

2. Once agar cell is in beaker of vinegar, no poking, prodding, touching beaker.

3. Teacher determines when 100% diffusion takes place. Diffusion will be considered complete when the blue color completely disappears from the center of the cell.

4. Students mass agar at end of race and cell must not break when handled! If cell breaks upon massing, then entry is disqualified.

5. **WINNER** = **highest ratio** of **mass divided by time**.

**SUMMARY QUESTIONS**

1.Complete the chart below to investigate the relationship between surface area & volume as a cube increases in size. (11 pts)

|  |  |  |  |
| --- | --- | --- | --- |
| Cube size (cm) | Surface Area | Volume | SA : V ratio |
| 1 x 1 x 1 |  |  |  |
| 2 x 2 x 2 |  |  |  |
| 3 x 3 x 3 |  |  |  |

As the cube increases in size, what happens to the surface area to volume **ratio**? Explain.

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2.Which cell in Part 1 had the fastest diffusion time? (2 pts)\_\_\_\_

Explain why.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3. The 2x2x2 cell and the 1x1x8 cell have the same volume. Were their diffusion times the same? Explain why or why not. (2 pts)

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4. In general, what is the relationship between the SA:V ratio and diffusion time? (1 pt)

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5. Explain why cells can’t get very, very big. (1 pt)

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**Homework: Finish the summary questions if needed**