

Name:

Block:

LIFE SCIENCES 11

REASON FOR CELL DIVISION

Learning Outcomes:

- I can explain why cells must divide to stay healthy.

Background

- In order for a cell to remain healthy, it must have a steady supply of nutrients entering the cell and waste products leaving the cell. Movement of material in either direction must occur across the cell membrane. The ability of a cell to move these materials at a rate that can sustain life is related to the cell's surface area to volume ratio.

Activity

1. Accurately cut a 3x3x3 cm, a 2x2x2 cm and a 1x1x1 cm cube of agar-phenolphthalein jelly. Calculate the surface area (cm^2), volume (cm^3) and surface area to volume ratio (reduce to x:1). Record your results in Table 1 below.
2. Half fill a 250 mL beaker with 0.1 M sodium hydroxide.
3. Add the blocks to the beaker and gently stir with a spoon every 30 seconds for 10 minutes.
4. After 10 minutes, remove all of the blocks with the spoon. Place them on a piece of paper towel and gently blot dry.
5. Immediately cut each cube in half and measure the depth of the pink layer in centimetres. Record your results in the Table 2 below.

Observations

Table 1. Surface area (cm^2) and volume (cm^3) data. (3 marks)

Block Dimensions (cm)	1x1x1	2x2x2	3x3x3
Surface Area (cm^2)			
Volume (cm^3)			
Surface Area to Volume Ratio			

Table 2. Sodium hydroxide penetration data. (6 marks)

Block Dimensions (cm)	1x1x1	2x2x2	3x3x3
Depth of Pink Part (cm)			
Diffusion Rate (cm/min)			
Thickness of Clear Part (cm)			
Volume of Clear Part (cm^3)			
Percent of Cube Unpenetrated			
Percent of Cube Penetrated			

Discussion Questions

1. What does the different sizes of agar blocks represent in this lab? (1 mark)

2. What caused the agar blocks to become pink? (Hint: phenolphthalein is a pH indicator.) (1 mark)

3. If each of the blocks was a cell, what would the depth of the pink area represent? (1 mark)

4. From your results, which block has the largest surface area and volume? (1 mark)

5. From your results, which block has the largest surface area to volume ratio? (1 mark)

6. Using the results as a model for cell health, which cube would represent the healthiest cell? Which cube would represent the unhealthiest cell? Explain your reasoning. (4 marks)
