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## Level 2 Biology, 2004

### 90464 Describe cell structure and function

Credits: Three

Achievement Criteria		<i>For Assessor's use only</i>	
Achievement		Achievement with Merit	Achievement with Excellence
Describe biological concepts and processes relating to cell structure and function.	<input type="checkbox"/>	Explain biological concepts and processes relating to cell structure and function.	<input type="checkbox"/>
Overall Level of Performance			<input type="checkbox"/>

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You are advised to spend 40 minutes answering the questions in this booklet.

### QUESTION ONE: THE CELL MEMBRANE AND TRANSPORT OF MATERIALS

The cell membrane forms the outer boundary of animal cells. It is very thin, but it has a complex structure, which makes it very effective in separating the cytoplasm from the surrounding environment.

- (a) **Describe** the structure of the cell membrane. You may use labelled diagrams in your answer.
  
  
  
  
  
  
  
  
  
  
- (b) **Explain** how materials move in **and** out of the cell by active or passive transport. You may refer to any diagram in the previous question.
  
  
  
  
  
  
  
  
  
  
- (c) **Discuss** the importance of the cell membrane in maintaining a constant internal environment for the cell.

### QUESTION TWO: ENDOPLASMIC RETICULUM

Gamete-producing cells in the ovaries and testes contain large amounts of smooth endoplasmic reticulum, yet the cells in the human pancreas contain extensive systems of rough endoplasmic reticulum.

- (a) How does rough endoplasmic reticulum differ from smooth endoplasmic reticulum? You may use labelled diagrams in your answer.
  
  
  
  
  
  
  
- (b) **Explain** why the pancreas cells have extensive systems of rough endoplasmic reticulum while the cells producing gametes contain large amounts of smooth endoplasmic reticulum.

### QUESTION THREE: CELL SIZE

Cells tend to reach a certain size before they divide. The new cells that are formed then grow, but never exceed a specific size limit.

- (a) **Describe** how the surface area : volume ratio **changes** as a cell grows.
- (b) **Explain** how the **surface area : volume ratio** affects the movement of material into and out of a cell as it grows. You may use labelled diagrams in your answer.

### QUESTION FOUR: BOTTLED PLANTS



A garden centre sold 'bottle gardens' as gifts for Mothers' Day. These were sealed transparent glass containers containing moist sterilised compost in which small flowering plants were growing. They were advertised as being excellent gifts, requiring no other care apart from being placed in light. Some children bought one for their mother, and she put the bottle garden in a warm light place in her house. The plants survived in the bottle, but never grew. After a while, the mother removed the lid that sealed the bottle. The plants soon began to grow, and after several weeks were almost too big for the bottle.

**Discuss** why the plants did not grow in the sealed bottle but did after the lid was removed.

## QUESTION FIVE: ENZYMES

Pepsin is an enzyme that is released into the stomach of humans. Pepsin works best in acidic conditions (pH 1) and at normal body temperature of 37°C. Pepsin breaks down proteins into polypeptides.

**Discuss** how changes in pH and temperature from the above conditions affect the activity of enzymes.