

# 1.3 Cells: Membrane Structure & Transport

## Question Paper

|            |   |
|------------|---|
| Course     | DP IB Biology                             |
| Section    | 1. Cell Biology                           |
| Topic      | 1.3 Cells: Membrane Structure & Transport |
| Difficulty | Easy                                      |

**Time allowed:** 60  
**Score:** /48  
**Percentage:** /100

### Question 1a

a)  
Define the following terms:

i) hydrophilic

ii) hydrophobic

[2 marks]

[2 marks]

### Question 1b

b)  
Draw a labelled diagram of a phospholipid molecule.

[2 marks]

[2 marks]

### Question 1c

c)  
State the property of phospholipids that causes them to form bilayers when placed in water.

[1 mark]

[1 mark]

### Question 1d

d)  
State the functions of cholesterol in animal membranes.

[2 marks]

[2 marks]

### Question 2a

a)

Define active transport.

[3 marks]

[3 marks]

### Question 2b

b)

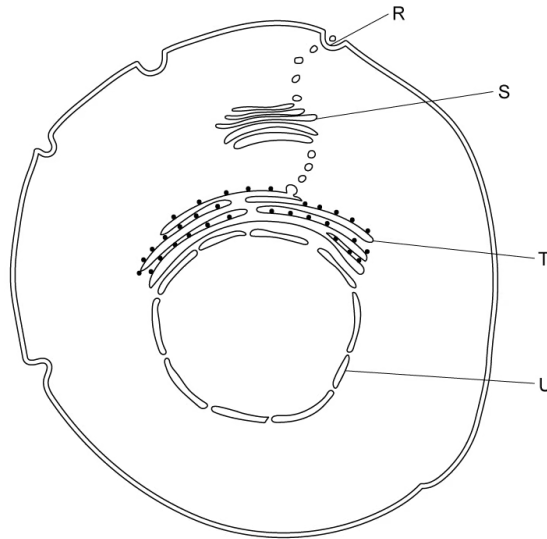
List **three** factors that affect the rate of diffusion of substances across a membrane.

[3 marks]

[3 marks]

### Question 2c

c)  
State the name of the process by which materials are transported from structures **S** to **R** in the diagram below.



[1 mark]

[1 mark]

### Question 2d

d)  
Name **one** material that could be transported from structure **S** to **R**.

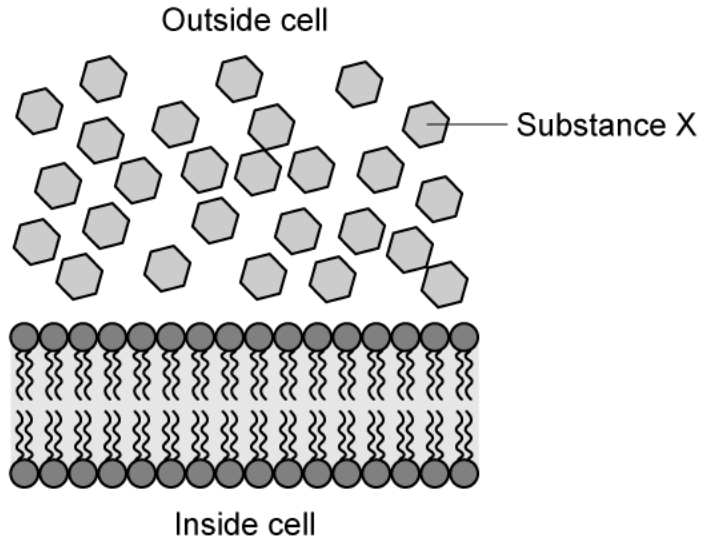
[1 mark]

[1 mark]

### Question 3a

a)

The below diagram shows the plasma membrane of an *Amoeba* sp and some molecules of a small, nonpolar substance known as substance X.



State:

- i) the direction substance X would move
- ii) the process by which substance X would move

[2 marks]

[2 marks]

### Question 3b

b)

List two possible examples of substance X.

[2 marks]

[2 marks]

**Question 3c**

c)  
Amoeba requires potassium ions to assist with detecting prey.

Outline how these ions would be transported across the membrane shown in part (a).

[2 marks]

[2 marks]

**Question 3d**

d)  
To feed upon bacteria, *Amoeba* uses pseudopodia to engulf the bacteria.

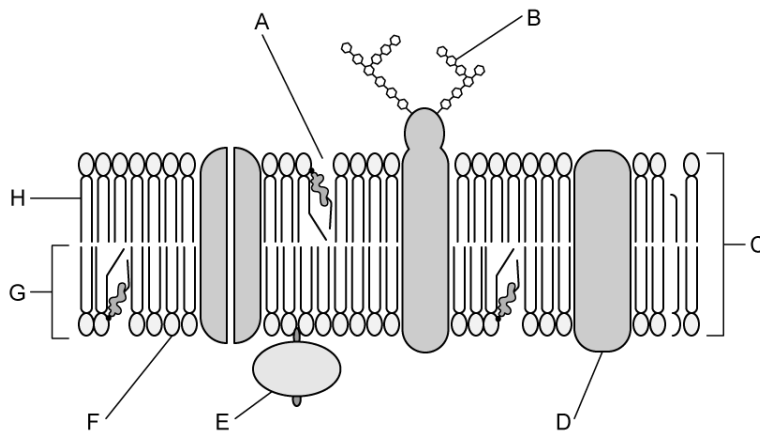
State the process used to engulf the bacteria.

[1 mark]

[1 mark]

**Question 4a**

a)  
Label the diagram below.



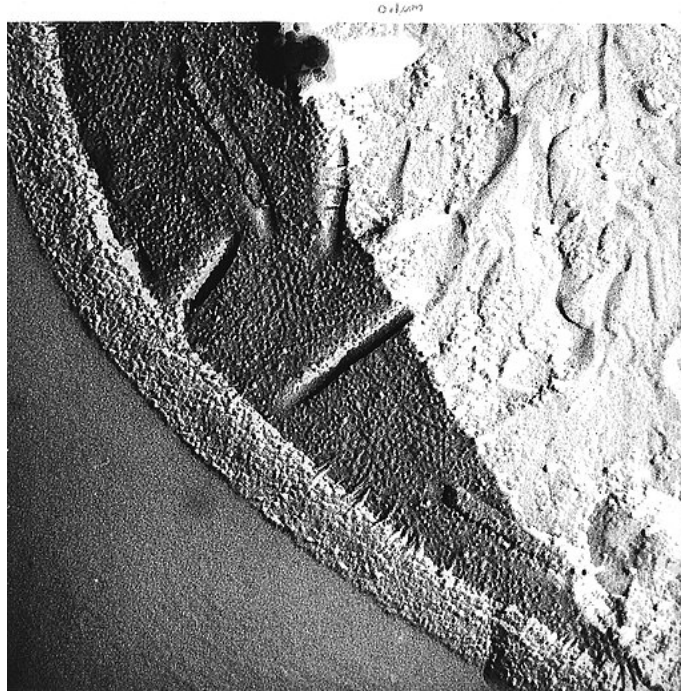
[4 marks]

[4 marks]

### Question 4b

b)

The electron micrograph below shows part of a yeast cell's membrane and cytoplasm.



Tgru001, CC0, via Wikimedia Commons

Outline how micrographs like this were used as evidence to falsify the Davson-Danielli model.

[2 marks]

[2 marks]

**Question 4c**

c)

During class, a group of students investigating the impact of different salt concentrations on the mass of celery, collected the results into the table below.

| Concentration of salt /<br>$\text{mol dm}^{-3}$ | Initial mass /<br>g | Final mass /<br>g | Mass change /<br>g | Mass change / % |
|---|---------------------|-------------------|--------------------|-----------------|
| 0.0   | 12.2                | 14.5              | +2.3               | +18.9           |
| 0.2   | 10.0                | 11.7              | +1.7               | +17.0           |
| 0.4   | 9.6                 | 9.3               | -0.3               | -3.1            |
| 0.6   | 11.3                | 10.5              | -0.8               |                 |
| 0.8   | 12.5                | 11.2              | -1.3               | -10.4           |
| 1.0   | 10.7                | 8.5               | -2.2               | -20.6           |

i) Calculate the percentage change in mass for  $0.6 \text{ mol dm}^{-3}$

[1 mark]

ii) Estimate, with a reason, the osmolarity of the celery tissue

[2 marks]

[3 marks]



### Question 4d

d)

The diagram below is a student's drawing of three celery cells seen under a light microscope at the end of the investigation from part (c).



Deduce, with a reason, which salt concentration/s these cells have been immersed in.

[2 marks]

[2 marks]

### Question 5a

a)

*One mark is available for clarity of communication throughout this question.*

Outline the functions of five different membrane proteins.

[5 marks]

[5 marks]

### Question 5b

b)

Distinguish between the following two models of the plasma membrane:

**Davson–Danielli** and **Singer–Nicolson**.

[4 marks]

[4 marks]

### Question 5c

c)

Compare the passive transport of substances across membranes, using **named** examples.

[6 marks]

[6 marks]

