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

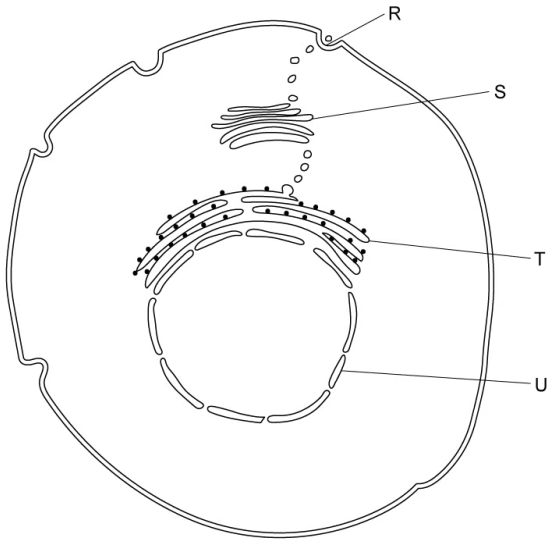
b)
List **three** factors that affect the rate of diffusion of substances across a membrane.

[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

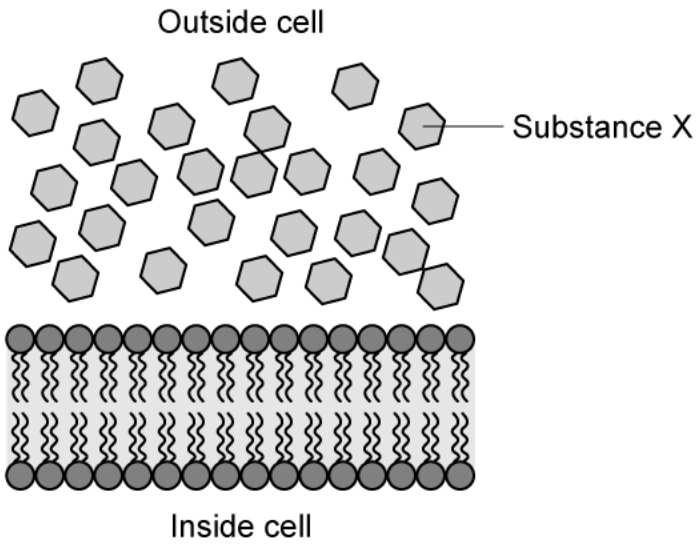
d)
Name **one** material that could be transported from structure **S** to **R**.

[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.

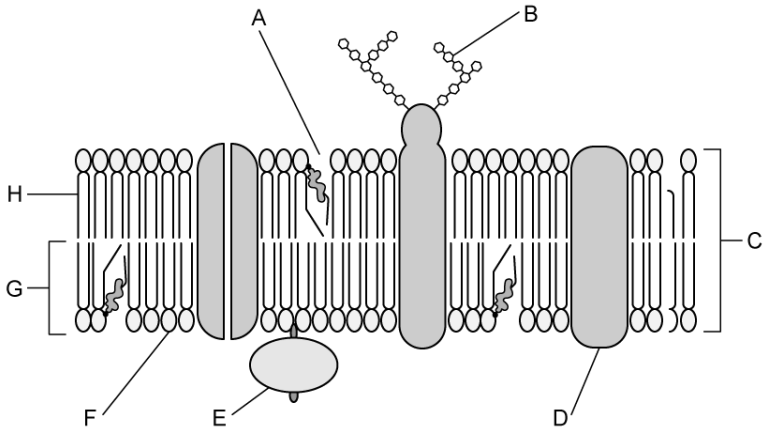
State the process used to engulf the bacteria.

[1 mark]

[1 mark]

Question 4a

a)
Label the diagram below.

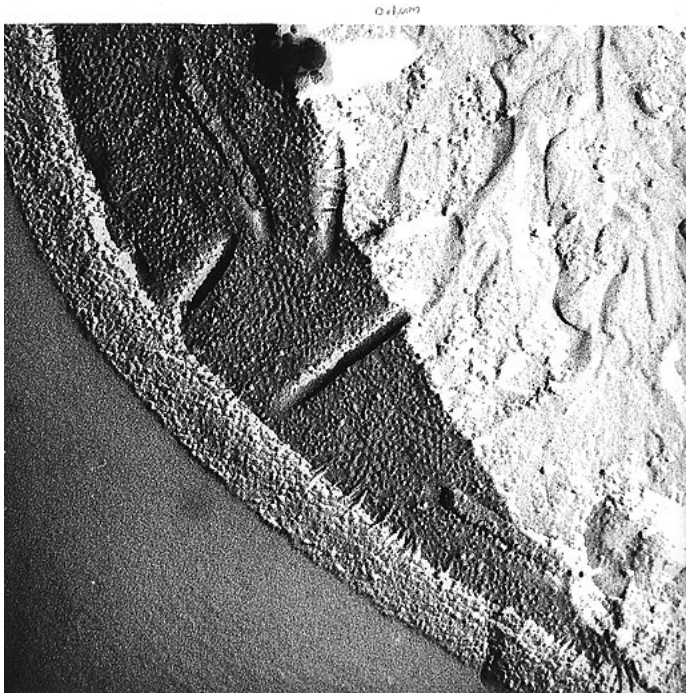


[4 marks]

[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 / mol dm^{-3}	Initial mass / g	Final mass / g	Mass change / 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 mol dm^{-3}

[1 mark]

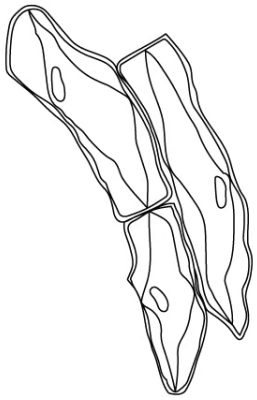
ii) Estimate, with a reason, the osmolarity of the celery tissue

[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]