

General Biology

Unit 2 Pre-Test

Section 1: Short Answer Essays

1.) (5 pts each, 75 pts total) Write a short answer essay for each of the following questions. The actual test will contain 15 of these questions.

a) List 3 major differences between prokaryotic and eukaryotic cells.

mostly single cell prokaryotic      eukaryotic      mostly multi-cell

- no nucleus
- no organelles
- smaller, less complex, lack some organized

- has nucleus
- have membrane-bound organelles
- large, more complex - more organized

b) Explain the relationship between surface area and volume in biological systems. Provide at least one specific example.

Maximize surface area, lessen volume  
See this in folding - small intestine, endoplasmic reticulum, cristae in mitochondria, root hairs

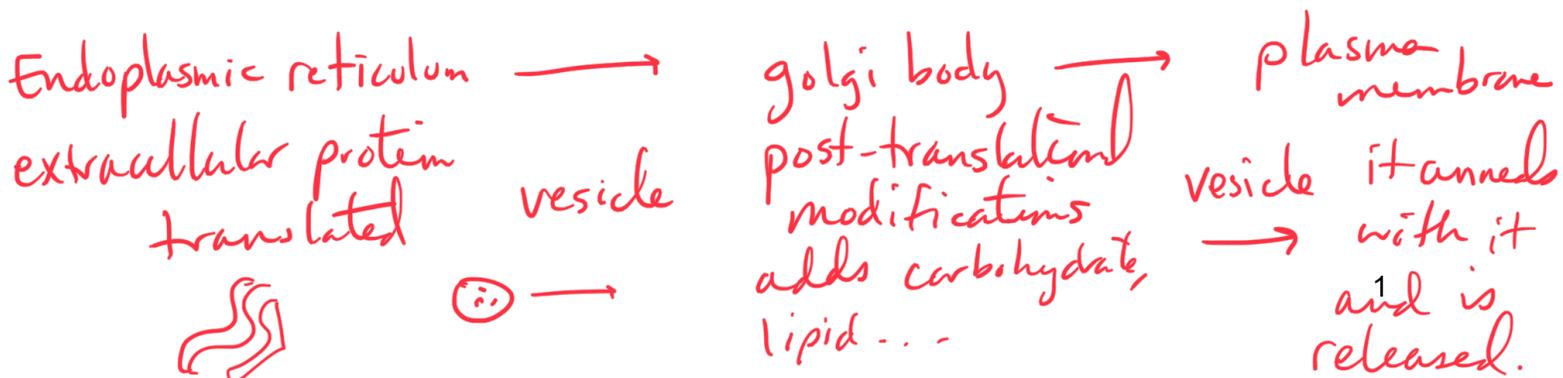
c) Describe the difference between free and bound ribosomes.

free ribosomes      bound ribosomes

translate intracellular protein      translate extracellular proteins

lives in the cytoplasm      live docked on the rough ER

d) Describe how endoplasmic reticulum and golgi bodies coordinate the production and distribution of extracellular proteins. Be as specific as possible.



e) Describe the difference between rough and smooth endoplasmic reticulum. Be sure to include the function of each in your answer.

rough ER

- site of extracellular protein synthesis/translation
- post-translational modification

smooth ER

synthesizes lipid  
detoxifies

f) Describe the endosymbiotic theory. What organelle(s) are involved?

Eukaryotic organism ingested but did not digest an early prokaryotic organism. Instead eukaryotic organism provided nutrients, protection, oxygen, and homeostasis, while prokaryote provided ATP/energy.

g) Explain how one can differentiate between the extracellular and intracellular sides of the plasma membrane.

extracellular - carbohydrates

intracellular - cytoskeleton proteins

mitochondria  
chloroplast

h) Which organelles are exclusive to either animal or plant cells? Please include at least five examples.

animals

lysosomes  
centriole  
"flagella"

plant

cell wall  
central vacuole  
chloroplast

i) Describe in detail how the concept of selective permeability applies to the plasma membrane. Please include properties and characteristics of compounds involved.

Passive diffusion  $\rightarrow$  small, nonpolar

Facilitated diffusion  $\rightarrow$  larger, more polar compounds  
can go through via a protein intermediary,  
 $\rightarrow$  "mosaic" in fluid mosaic model,  
gateway, channel, port - - -

j) Describe the fluid mosaic model. What is meant by each term in the phrase?

Fluid - lateral movement of lipids throughout  
the membrane.

Mosaic  $\rightarrow$  comprised of different macromolecules  
lipid, carbohydrate, protein  $\geq 50\%$

k) Describe how phospholipids are amphipathic. How does this help the formation of the plasma membrane?

amphipathic has polar + nonpolar part.

Polar head groups orient themselves outward  
and integrated with polar environment to  
form the plasma membrane

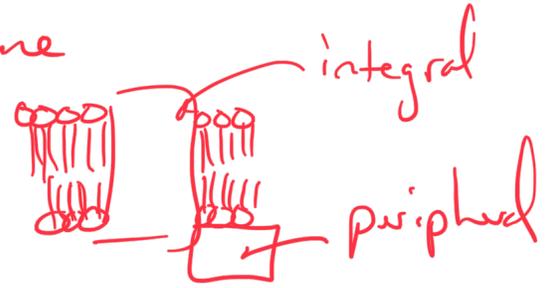
l) Describe the correlation between lipid movement and temperature within the plasma membrane. How does cholesterol influence this dynamic?

temp  $\uparrow$  lipid movement  $\uparrow$  temp  $\downarrow$  lipid movement  $\downarrow$   
Cholesterol - temperature  $\left\{ \begin{array}{l} \text{fluidity} \\ \text{Buffer} \end{array} \right.$

m) Describe the difference between integral and peripheral proteins. Where would each be found and how would they be used? Provide examples.

integral - spans the entire plasma membrane -  
transmembrane - has extracellular + intracellular  
surface. EX: Receptor, port, channels.

peripheral - loosely binds to one side/surface of the plasma membrane  
EX:  $\alpha$  protein



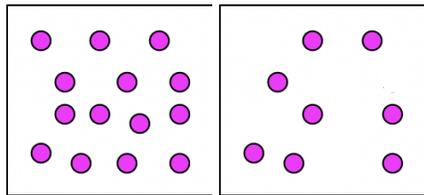
n) Describe how carbohydrates are used within the plasma membrane to provide a sense of "self" and encourage the orientation of proteins.

"self"  $\rightarrow$  blood typing  
carbohydrates orient proteins by extending outward to extracellular environment.

o) What is diffusion? How does it relate to concentration? What specific term is used to describe the diffusion of water?

p) Describe the movement of compounds in each of the following scenarios:

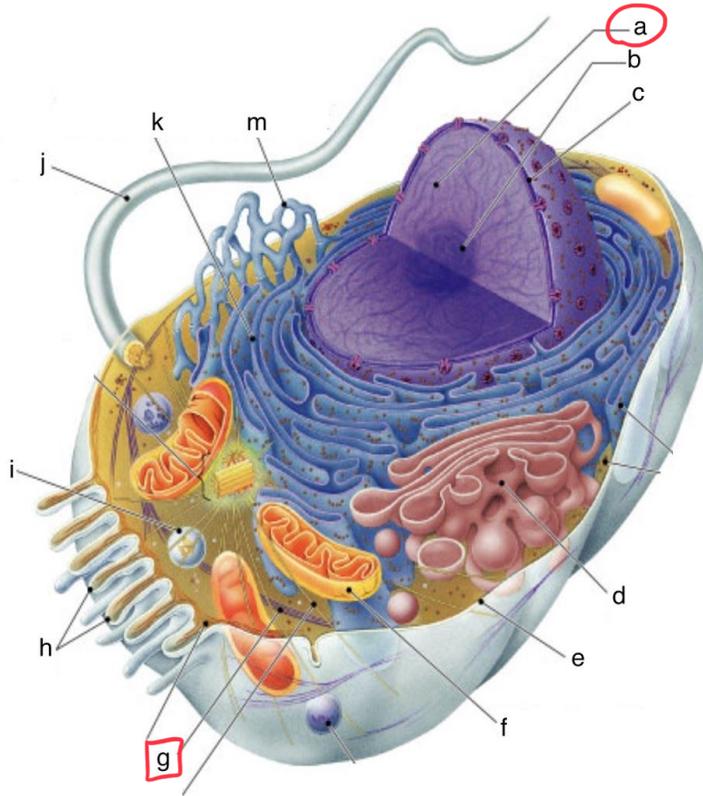
Permeable to water only.



Permeable to solute only.

Section 3: Diagram

3.) (1 pt each, 10 pts total) Write the letter that corresponds with each of the following structures. The actual test will feature either an animal or plant cell, not both.



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Chromatin a

Cytoskeleton g

Flagellum j

Golgi body d

Mitochondria f

Nuclear envelope c

Nucleolus b

Plasma membrane e

Rough ER k

Smooth ER m