

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.

prokaryotic	eukaryotic
→ no nucleus	- nucleus
- less complex/organized	- more complex/organized
→ no organelles	- membrane-bound organelles
- smaller	- larger

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

Biology tries to increase surface area at the expense of volume. We see this in the size of cells, presence of folds in membranes, and small projections. ex: inner-folds of mitochondria,

c) Describe the difference between free and bound ribosomes.

Free ribosomes translate intracellular proteins, while bound ribosomes translate extracellular proteins - protein that are transported outside the cell. Bound to endoplasmic reticulum.

intestines, microvilli, root hairs...

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

rough ER → translate extracellular proteins, modifies proteins (add carb, fat) → vesicle (cis) → Golgi → modifies protein (add (trans) carbohydrates, lipids.) → vesicle → membrane vesicle anneals with membrane, protein is released

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

Rough ER

translation of
extracellular protein
protein modification
has ribosomes

Smooth ER

synthesizes lipids
detoxifies drugs, poisons
no ribosomes

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

Endosymbiotic theory

inside
helping
supportive

Mitochondria and chloroplast
Back in the day... Eukaryotic cells ingested but
did not digest prokaryotic cells. Instead, the
prokaryotic cell was subjugated, given nutrients and
protection, in exchange for energy (ATP).

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

extracellular side

carbohydrates

intracellular side

protein cytoskeleton

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

animal

centriole
flagella
lysosomes

plant

central vacuole
chloroplast
cell wall



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

Club bouncer Selective permeability - allows
only certain things through.

Passive diffusion: small, nonpolar
facilitated diffusion: requires protein intermediary
(channels, ports) allows some polar/charged
objects into cell.

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

Fluid → lateral, functional movement of lipids
throughout the membrane → moves like the
ocean.

Mosaic → membrane is a composite of proteins,
lipid, carbohydrates (>50% protein)

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



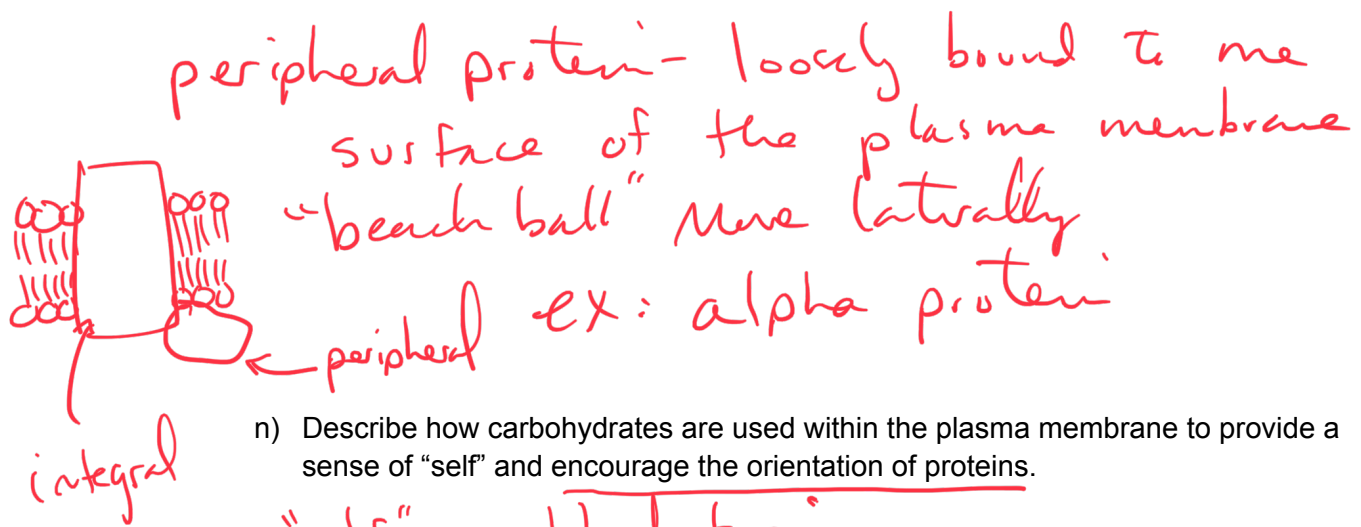
Contains polar head group and nonpolar
tail. Head groups orient outward and
form phospholipid bilayer.

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

As temp ↑, movement ↑. As temp ↓, movement ↓
Cholesterol serves as a temperature and fluidity
buffer that resists change in movement.

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

Integral protein — span the membrane — have
an extracellular and intracellular surface.
ex: receptors, ports, channels,



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

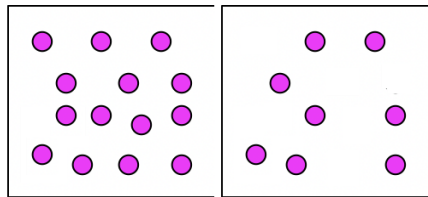
"self" → blood typing

Carbohydrate extend outward toward the 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.

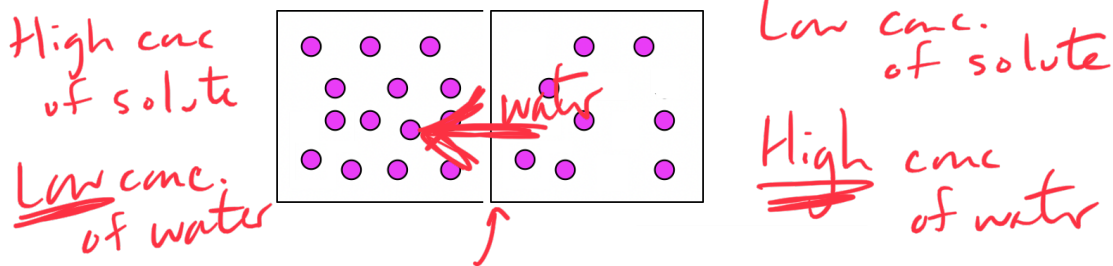
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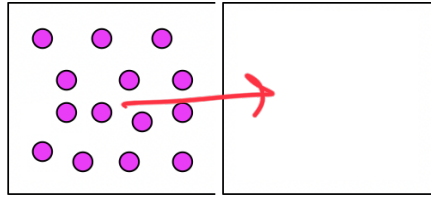
In diffusion substances move from a high concentration to a low concentration – following their natural concentration gradient. Diffusion of water is called osmosis.

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

Permeable to water only.



Permeable to solute only.

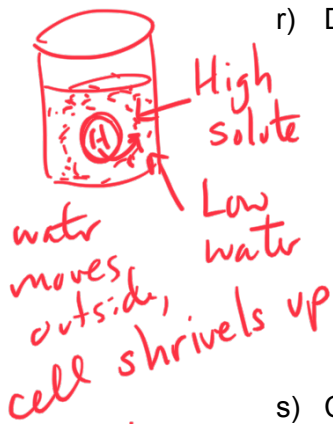


- q) Describe what is meant by a hypertonic/hypotonic solution. What would happen to a blood cell placed in this environment? (The actual test will only include one of the two terms)

hypertonic
surrounding solution
has a high relative
concentration

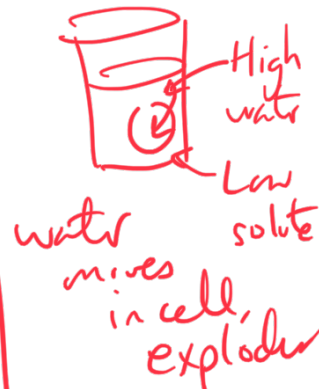
hypotonic
surrounding solution
has a low relative
concentration

- r) Describe facilitated diffusion. Provide an example.



Facilitated diffusion movement from
high to low concentration through
a protein channel.

Ex: GLUT4, aquaporin, ion
channel



- s) Compare and contrast active and passive transport. Provide an example of each.

Passive transport → High → Low concentration
requiring no energy or intermediary.

Active transport - low → high concentration.
Requires energy and an intermediary.

- t) Describe the general function of the sodium-potassium (Na^+/K^+) ATPase pump.
What is its purpose?

Active
trans:
Sodium-potassium
ATPase





Balance sodium and potassium ions to maintain an electrical and concentration gradient (electrochemical)

u) What is the difference between endocytosis and exocytosis? Provide at least one specific example of endocytosis.

Endocytosis — goes into the cell
Exocytosis — goes out of the cell

EX: of endocytosis — phagocytosis "cell eating"
pinocytosis "cell drinking"

v) Describe the difference between paracrine and endocrine signaling.

paracrine
local signaling
immediate area

endocrine
long-distance signaling
require circulation

w) Describe the process of signal transduction. Be sure to include the three major stages.

signal transduction

Reception → transduction → Response

Section 2: Matching

2.) (1 pt each, 15 pts total) Match the organelle with its description.

 b cell wall
 h chloroplasts
 e chromatin
 f cytoskeleton
 a gap junctions
 k golgi body
 c lysosomes
 d mitochondria
 o nuclear pore
 g nucleolus
 Lg nucleus
 j ribosomes
 m rough ER
 n smooth ER
 i vacuole

~~a) channels through which ions, sugars, and small molecules can pass~~

~~b) protects plants, helps maintain shape~~

~~c) responsible for intracellular digestion and chromatin recycling of cellular materials~~

~~d) site of cellular respiration~~

~~e) complex of DNA and proteins~~

~~f) supports cell, regulates activities~~

~~g) region where ribosome are formed~~

~~h) site of photosynthesis~~

~~i) responsible for storage of materials~~

~~j) translates proteins~~

~~k) modifies and packages proteins for transport~~

~~l) control center of cell, contains DNA~~

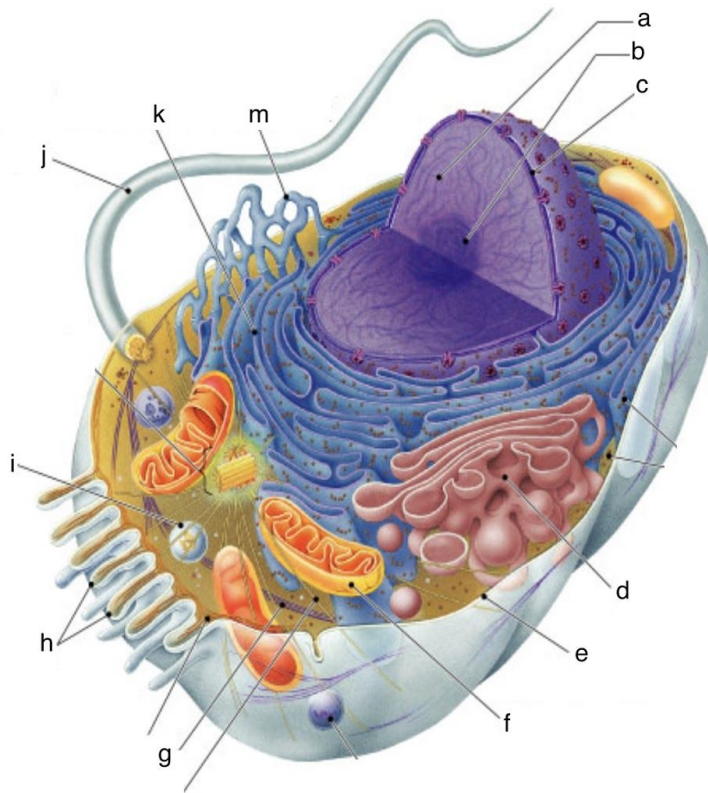
~~m) site of protein translation~~

~~n) synthesize lipids, detoxifies drugs and poisons~~

~~o) controls what enters and leaves the nucleus~~

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

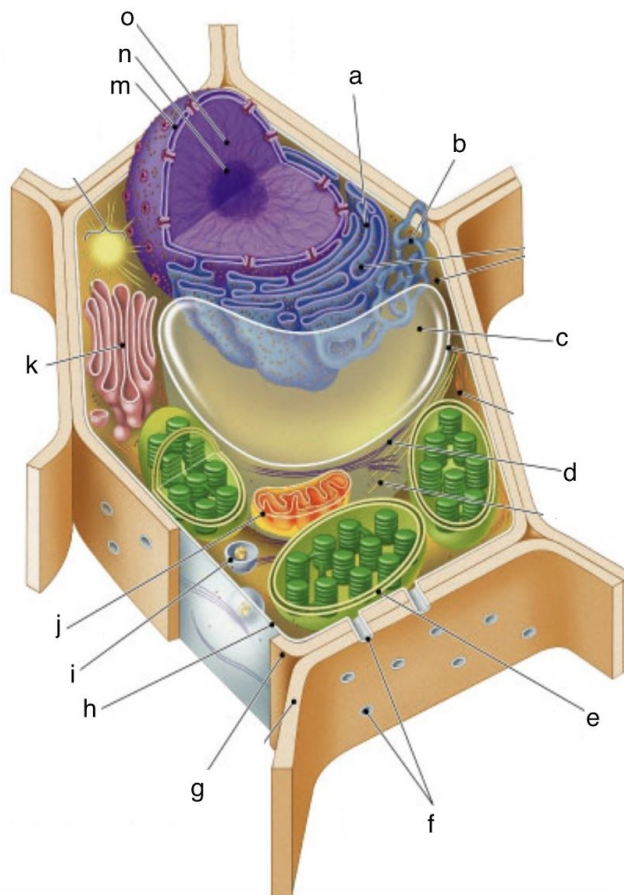
Plasma membrane e

Rough ER k

Smooth ER m

Section 3: Diagram

4.) (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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Cell wall g

Central vacuole c

Chloroplast e

Chromatin o

Golgi body k

Mitochondria j

Nuclear envelope m

Nucleolus n

Rough ER a

Smooth ER b