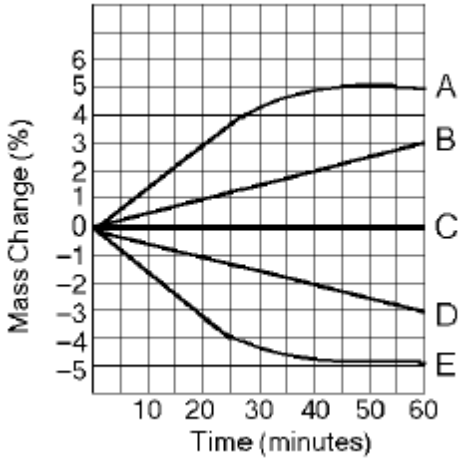
Name: _____ **Class:** _____ **Date:** _____ **ID: B**

Unit 1 Test: Cells

Multiple Choice
Identify the choice that best completes the statement or answers the question.

_____ 1) Which of the following is true of integral membrane proteins?
A) They lack tertiary structure.
B) They are usually transmembrane proteins.
C) They serve only a structural role in membranes.
D) They are loosely bound to the surface of the bilayer.
E) They are not mobile within the bilayer.

Five dialysis bags, constructed from a semipermeable membrane that is impermeable to sucrose, were filled with various concentrations of sucrose and then placed in separate beakers containing an initial concentration of 0.6 *M* sucrose solution. At 10-minute intervals, the bags were massed (weighed) and the percent change in mass of each bag was graphed.



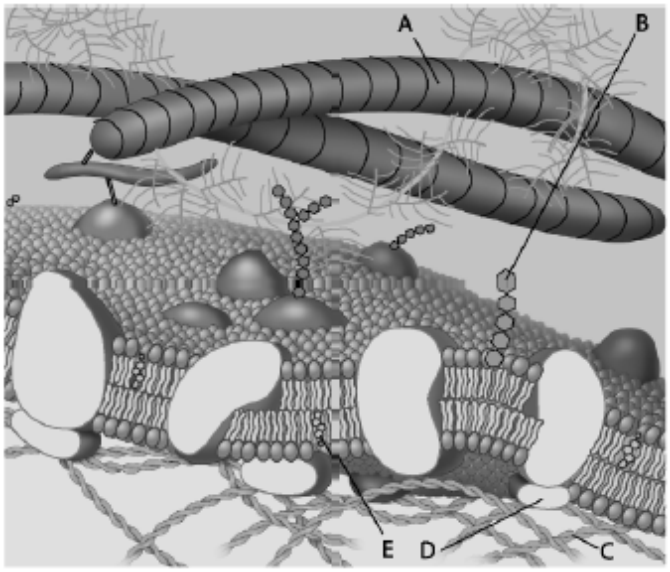
_____ 2) Which line in the graph represents the bag that contained a solution isotonic to the 0.6 *M* solution at the beginning of the experiment?
A) A
B) B
C) C
D) D
E) E

_____ 3) Which line in the graph represents the bag with the highest initial concentration of sucrose?
A) A
B) B
C) C
D) D
E) E

_____ 4) Which line or lines in the graph represent(s) bags that contain a solution that is hypertonic at 50 minutes?

A) A and B
B) B
C) C
D) D
E) D and E

For the following questions, match the labeled component of the cell membrane in the figure with its description.



_____ 5) Which component is the peripheral protein?

A) A
B) B
C) C
D) D
E) E

_____ 6) Which component is a glycolipid?

A) A
B) B
C) C
D) D
E) E

_____ 7) Which component is cholesterol?

A) A
B) B
C) C
D) D
E) E

_____ 8) One of the major categories of receptors in the plasma membrane reacts by forming dimers, adding phosphate groups, and then activating relay proteins. Which type does this?
A) ligand–gated ion channels
B) G protein–coupled receptors
C) steroid receptors
D) receptor tyrosine kinases

_____ 9) Ions diffuse across membranes through specific ion channels
A) down their chemical gradients.
B) down the electrical gradients.
C) down their electrochemical gradients.
D) down their concentration gradients.
E) down the osmotic potential gradients.

_____ 10) Which plant cell organelle contains its own DNA and ribosomes?
A) peroxisome
B) glyoxysome
C) Golgi apparatus
D) mitochondrion
E) vacuole

_____ 11) When a neuron responds to a particular neurotransmitter by opening gated ion channels, the neurotransmitter is serving as which part of the signal pathway?
A) relay molecule
B) transducer
C) endocrine molecule
D) signal molecule
E) receptor

_____ 12) Which structure is the site of the synthesis of proteins that may be exported from the cell?
A) plasmodesmata
B) free cytoplasmic ribosomes
C) Golgi vesicles
D) lysosomes
E) rough ER

The following questions are based on the figure below:

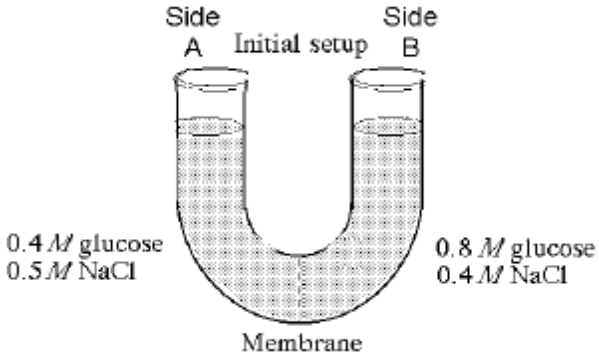
_____ 13) In the figure, the dots in the space between the two structures represent which of the following?

A) signal transducers
B) pheromones
C) hormones
D) neurotransmitters
E) receptor molecules

_____ 14) Which of the following types of signaling is represented in the figure?

A) long distance
B) autocrine
C) hormonal
D) synaptic
E) paracrine

The solutions in the arms of a U-tube are separated at the bottom of the tube by a selectively permeable membrane. The membrane is permeable to sodium chloride and water but not to glucose. Side A is filled with a solution of 0.4 *M* glucose and 0.5 *M* sodium chloride (NaCl), and side B is filled with a solution containing 0.8 *M* glucose and 0.4 *M* sodium chloride. Initially, the volume in both arms is the same. Refer to the figure to answer the following questions.



_____ 15) If you examine side A after three days, you should find
A) a decrease in the concentration of NaCl and glucose and an increase in the water level.
B) no change in the concentration of NaCl and glucose and an increase in the water level.
C) a decrease in the concentration of NaCl, an increase in water level, and no change in the concentration of glucose.
D) no net change in the system.
E) a decrease in the concentration of NaCl and a decrease in the water level.

_____ 16) In general, a signal transmitted via phosphorylation of a series of proteins
A) brings a conformational change to each protein.
B) allows target cells to change their shape and therefore their activity.
C) requires binding of a hormone to a cytosol receptor.
D) requires phosphorylase activity.
E) cannot occur in yeasts because they lack protein phosphatases.

_____ 17) Which organelle or structure is absent in plant cells?
A) peroxisomes
B) microtubules
C) mitochondria
D) centrosomes
E) Golgi vesicles

_____ 18) Which of the following is characterized by a cell releasing a signal molecule into the environment, followed by a number of cells in the immediate vicinity responding?
A) synaptic signaling
B) autocrine signaling
C) hormonal signaling
D) endocrine signaling
E) paracrine signaling

_____ 19) Singer and Nicolson's fluid mosaic model of the membrane proposed that
A) membranes are a phospholipid bilayer.
B) membranes consist of a mosaic of polysaccharides and proteins.
C) membranes are a single layer of phospholipids and proteins.
D) membranes consist of protein molecules embedded in a fluid bilayer of phospholipids.
E) membranes are a phospholipid bilayer between two layers of hydrophilic proteins.

_____ 20) Celery stalks that are immersed in fresh water for several hours become stiff and hard. Similar stalks left in a 0.15 *M* salt solution become limp and soft. From this we can deduce that
A) the fresh water is hypotonic and the salt solution is hypertonic to the cells of the celery stalks.
B) the fresh water and the salt solution are both hypotonic to the cells of the celery stalks.
C) the fresh water is hypertonic and the salt solution is hypotonic to the cells of the celery stalks.
D) the fresh water and the salt solution are both hypertonic to the cells of the celery stalks.
E) the fresh water is isotonic and the salt solution is hypertonic to the cells of the celery stalks.

_____ 21) Which of the following types of molecules are the major structural components of the cell membrane?
A) nucleic acids and proteins
B) glycoproteins and cholesterol
C) phospholipids and cellulose
D) proteins and cellulose
E) phospholipids and proteins

_____ 22) In yeast signal transduction, a yeast cell
A) secretes molecules that result in responses by other yeast cells.
B) mates with another cell, after which the new cells secrete hybrid signals.
C) must physically and directly interact with the other yeast cell.
D) produces signal molecules that change the cell itself, allowing it to interact with the other cell.
E) produces response molecules that diffuse to other yeast cells.

_____ 23) Large numbers of ribosomes are present in cells that specialize in producing which of the following molecules?
A) lipids
B) cellulose
C) proteins
D) glycogen
E) nucleic acids

_____ 24) Tay–Sachs disease is a human genetic abnormality that results in cells accumulating and becoming clogged with very large, complex, and undigested lipids. Which cellular organelle must be involved in this condition?
A) the Golgi apparatus
B) the endoplasmic reticulum
C) membrane–bound ribosomes
D) mitochondrion
E) the lysosome

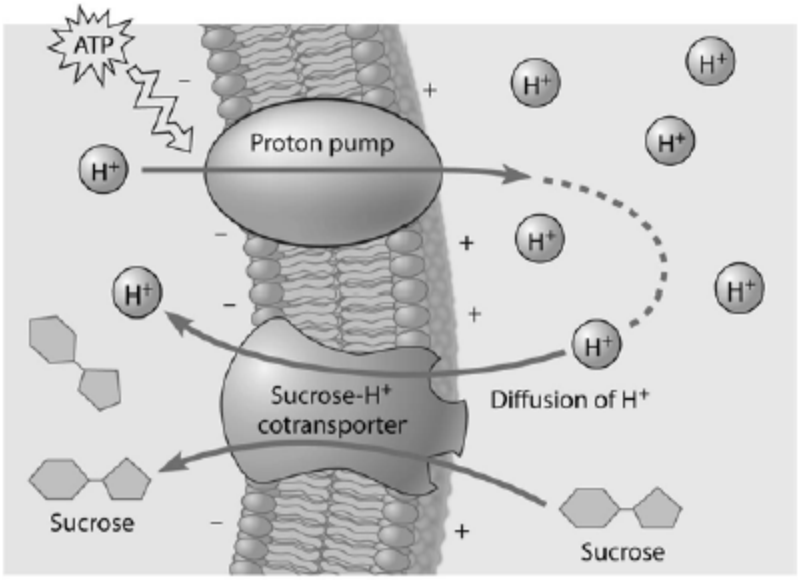
_____ 25) When a plant cell, such as one from a peony stem, is submerged in a very hypotonic solution, what is likely to occur?

A) The cell will burst.
B) The cell will become flaccid.
C) Plasmolysis will shrink the interior.
D) The cell membrane will lyse.
E) The cell will become turgid.

_____ 26) Which of the following is true for the signaling system in an animal cell that lacks the ability to produce GTP?

A) It could activate only the epinephrine system.
B) It would not be able to activate and inactivate the G protein on the cytoplasmic side of the plasma membrane.
C) It would employ a transduction pathway directly from an external messenger.
D) It would be able to carry out reception and transduction but would not be able to respond to a signal.
E) It would use ATP instead of GTP to activate and inactivate the G protein on the cytoplasmic side of the plasma membrane.

_____ 27)



Based on the figure above, which of these experimental treatments would increase the rate of sucrose transport into the cell?

A) decreasing cytoplasmic pH
B) decreasing extracellular sucrose concentration
C) adding an inhibitor that blocks the regeneration of ATP
D) adding a substance that makes the membrane more permeable to hydrogen ions
E) decreasing extracellular pH

_____ 28) The movement of potassium into an animal cell requires
A) low cellular concentrations of sodium.
B) a potassium channel protein.
C) a cotransport protein.
D) high cellular concentrations of potassium.
E) an energy source such as ATP.

_____ 29) All of the following are part of a prokaryotic cell *except*
A) DNA.
B) a cell wall.
C) a plasma membrane.
D) ribosomes.
E) an endoplasmic reticulum.

_____ 30) Which organelle is the primary site of ATP synthesis in eukaryotic cells?
A) peroxisome
B) vacuole
C) lysosome
D) mitochondrion
E) Golgi apparatus

_____ 31) Which type of organelle is found in plant cells but *not* in animal cells?
A) ribosomes
B) nuclei
C) plastids
D) mitochondria
E) none of these

_____ 32) A cell has the following molecules and structures: enzymes, DNA, ribosomes, plasma membrane, and mitochondria. It could be a cell from
A) a bacterium.
B) an animal, but not a plant.
C) any kind of organism.
D) any multicellular organism, like a plant or an animal.
E) nearly any eukaryotic organism.

_____ 33) A patient has had a serious accident and lost a lot of blood. In an attempt to replenish body fluids, distilled water–equal to the volume of blood lost–is transferred directly into one of his veins. What will be the most probable result of this transfusion?

A) It will have no unfavorable effect as long as the water is free of viruses and bacteria.
B) The patient's red blood cells will burst because the blood fluid has become hypertonic compared to the cells.
C) The patient's red blood cells will shrivel up because the blood fluid has become hypertonic compared to the cells.
D) The patient's red blood cells will swell because the blood fluid has become hypotonic compared to the cells.
E) The patient's red blood cells will shrivel up because the blood fluid has become hypotonic compared to the cells.

_____ 34) Which type of organelle or structure is primarily involved in the synthesis of oils, phospholipids, and steroids?

A) contractile vacuole
B) ribosome
C) lysosome
D) mitochondrion
E) smooth endoplasmic reticulum

_____ 35) Which structure–function pair is *mismatched*?

A) microtubule; muscle contraction
B) nucleolus; production of ribosomal subunits
C) Golgi; protein trafficking
D) lysosome; intracellular digestion
E) ribosome; protein synthesis

_____ 36) Phosphorylation cascades involving a series of protein kinases are useful for cellular signal transduction because

A) they always lead to the same cellular response.
B) they counter the harmful effects of phosphatases.
C) the number of molecules used is small and fixed.
D) they amplify the original signal manyfold.
E) they are species specific.

_____ 37) A biologist ground up some plant leaf cells and then centrifuged the mixture to fractionate the organelles. Organelles in one of the heavier fractions could produce ATP in the light, whereas organelles in the lighter fraction could produce ATP in the dark. The heavier and lighter fractions are most likely to contain, respectively,

A) peroxisomes and chloroplasts.
B) chloroplasts and peroxisomes.
C) chloroplasts and mitochondria.
D) mitochondria and peroxisomes.
E) mitochondria and chloroplasts.

_____ 38) Which of the following contains hydrolytic enzymes?
A) lysosome
B) mitochondrion
C) vacuole
D) Golgi apparatus
E) peroxisome

_____ 39) Binding of a signaling molecule to which type of receptor leads directly to a change in the distribution of ions on opposite sides of the membrane?
A) receptor tyrosine kinase
B) phosphorylated receptor tyrosine kinase dimer
C) ligand–gated ion channel
D) intracellular receptor
E) G protein–coupled receptor

_____ 40) What are scaffolding proteins?
A) relay proteins that orient receptors and their ligands in appropriate directions to facilitate their complexing
B) proteins that can reach into the nucleus of a cell to affect transcription
C) microtubular protein arrays that allow lipid–soluble hormones to get from the cell membrane to the nuclear pores
D) large molecules to which several relay proteins attach to facilitate cascade effects
E) ladderlike proteins that allow receptor–ligand complexes to climb through cells from one position to another

_____ 41) The termination phase of cell signaling requires which of the following?
A) activation of a different set of relay molecules
B) dissociation of the signaling molecule from the receptor
C) apoptosis
D) converting ATP to cAMP
E) removal of the receptor

_____ 42) The evolution of eukaryotic cells most likely involved
A) an endosymbiotic fungal cell evolved into the nucleus.
B) anaerobic archaea taking up residence inside a larger bacterial host cell to escape toxic oxygen–the anaerobic bacterium evolved into chloroplasts.
C) endosymbiosis of an aerobic bacterium in a larger host cell–the endosymbiont evolved into mitochondria.
D) acquisition of an endomembrane system, and subsequent evolution of mitochondria from a portion of the Golgi.

_____ 43) Which of the following processes includes all others?
A) facilitated diffusion
B) diffusion of a solute across a membrane
C) transport of an ion down its electrochemical gradient
D) passive transport
E) osmosis

_____ 44) Which structure is common to plant *and* animal cells?
A) chloroplast
B) mitochondrion
C) wall made of cellulose
D) centriole
E) central vacuole

_____ 45) Which organelle often takes up much of the volume of a plant cell?
A) peroxisome
B) lysosome
C) vacuole
D) Golgi apparatus
E) mitochondrion

_____ 46) Which of the following describes the events of apoptosis?
A) The cell's DNA and organelles become fragmented, the cell dies, and it is phagocytized.
B) The cell's DNA and organelles become fragmented, the cell shrinks and forms blebs, and the cell's parts are packaged in vesicles that are digested by specialized cells.
C) The cell dies, it is lysed, its organelles are phagocytized, and its contents are recycled.
D) The cell dies, and the presence of its fragmented contents stimulates nearby cells to divide.
E) The cell's nucleus and organelles are lysed, and the cell enlarges and bursts.

_____ 47) Which of the following is the best explanation for the fact that most transduction pathways have multiple steps?
A) Each individual step can remove excess phosphate groups from the cytoplasm.
B) Multiple steps provide for greater possible amplification of a signal.
C) Multiple steps in a pathway require the least amount of ATP.
D) Each step can be activated by several G proteins simultaneously.
E) Most of the steps were already in place because they are steps in other pathways.

_____ 48) Which of the following statements is correct about diffusion?
A) It is an active process in which molecules move from a region of lower concentration to one of higher concentration.
B) It is very rapid over long distances.
C) It requires integral proteins in the cell membrane.
D) It is a passive process in which molecules move from a region of higher concentration to a region of lower concentration.
E) It requires an expenditure of energy by the cell.

_____ 49) White blood cells engulf bacteria through what process?
A) phagocytosis
B) receptor–mediated exocytosis
C) osmosis
D) pinocytosis
E) exocytosis