

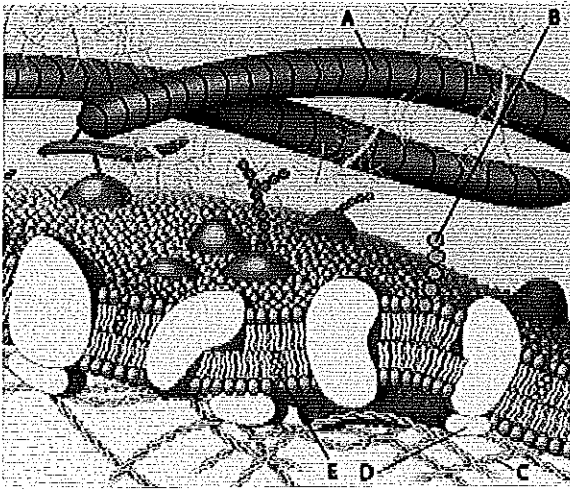
Big Idea 2.B-C Formative

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. Which of the following types of molecules are the major structural components of the cell membrane?
- a. phospholipids and cellulose
 - b. nucleic acids and proteins
 - c. phospholipids and proteins
 - d. proteins and cellulose
 - e. glycoproteins and cholesterol

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



- _____ 2. peripheral protein
- a. A
 - b. B
 - c. C
 - d. D
 - e. E
- _____ 3. cholesterol
- a. A
 - b. B
 - c. C
 - d. D
 - e. E

Name: _____

ID: A

- _____ 4. fiber of the extracellular matrix
- A
 - B
 - C
 - D
 - E
- _____ 5. microfilament of the cytoskeleton
- A
 - B
 - C
 - D
 - E
- _____ 6. glycolipid
- A
 - B
 - C
 - D
 - E
- _____ 7. The presence of cholesterol in the plasma membranes of some animals
- enables the membrane to stay fluid more easily when cell temperature drops.
 - enables the animal to remove hydrogen atoms from saturated phospholipids.
 - enables the animal to add hydrogen atoms to unsaturated phospholipids.
 - makes the membrane less flexible, allowing it to sustain greater pressure from within the cell.
 - makes the animal more susceptible to circulatory disorders.
- _____ 8. According to the fluid mosaic model of cell membranes, which of the following is a *true statement about membrane phospholipids*?
- They can move laterally along the plane of the membrane.
 - They frequently flip-flop from one side of the membrane to the other.
 - They occur in an uninterrupted bilayer, with membrane proteins restricted to the surface of the membrane.
 - They are free to depart from the membrane and dissolve in the surrounding solution.
 - They have hydrophilic tails in the interior of the membrane.
- _____ 9. What is one of the ways that the membranes of winter wheat are able to remain fluid when it is extremely cold?
- by increasing the percentage of unsaturated phospholipids in the membrane
 - by increasing the percentage of cholesterol molecules in the membrane
 - by decreasing the number of hydrophobic proteins in the membrane
 - A and B only
 - A, B, and C
- _____ 10. All of the following are functions of integral membrane proteins *except*
- protein synthesis.
 - active transport.
 - hormone reception.
 - cell adhesion.
 - cytoskeleton attachment.

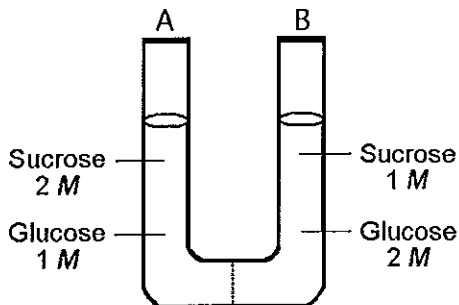
Name: _____

ID: A

- _____ 11. Which of the following is a reasonable explanation for why unsaturated fatty acids help keep any membrane more fluid at lower temperatures?
- The double bonds form a kink in the fatty acid tail, forcing adjacent lipids to be further apart.
 - Unsaturated fatty acids have a higher cholesterol content.
 - Unsaturated fatty acids permit more water in the interior of the membrane.
 - The double bonds block interaction among the hydrophilic head groups of the lipids.
 - The double bonds result in a shorter fatty acid tail.
- _____ 12. What membrane-surface molecules are thought to be most important as cells recognize each other?
- phospholipids
 - integral proteins
 - peripheral proteins
 - cholesterol
 - glycoproteins
- _____ 13. What kinds of molecules pass through a cell membrane most easily?
- large and hydrophobic
 - small and hydrophobic
 - large polar
 - ionic
 - monosaccharides such as glucose
- _____ 14. Which of the following statements is *correct about diffusion*?
- It is very rapid over long distances.
 - It requires an expenditure of energy by the cell.
 - It is a passive process in which molecules move from a region of higher concentration to a region of lower concentration.
 - It is an active process in which molecules move from a region of lower concentration to one of higher concentration.
 - It requires integral proteins in the cell membrane.

Use the diagram of the U-tube in the figure below to answer the following questions.

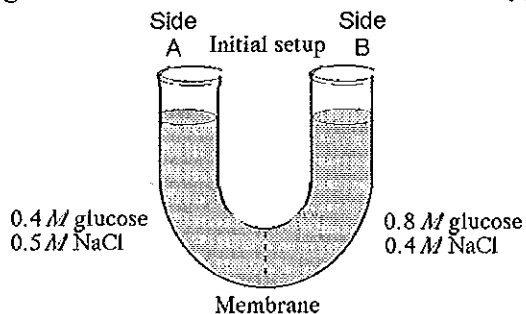
The solutions in the two arms of this U-tube are separated by a membrane that is permeable to water and glucose but not to sucrose. Side A is half filled with a solution of 2 M sucrose and 1 M glucose. Side B is half filled with 1 M sucrose and 2 M glucose. Initially, the liquid levels on both sides are equal.



- _____ 15. Initially, in terms of tonicity, the solution in side A with respect to that in side B is
- hypotonic.
 - plasmolyzed.
 - isotonic.
 - saturated.
 - hypertonic.
- _____ 16. After the system reaches equilibrium, what changes are observed?
- The molarity of sucrose and glucose are equal on both sides.
 - The molarity of glucose is higher in side A than in side B.
 - The water level is higher in side A than in side B.
 - The water level is unchanged.
 - The water level is higher in side B than in side A.
- _____ 17. A cell whose cytoplasm has a concentration of 0.02 molar glucose is placed in a test tube of water containing 0.02 molar glucose. Assuming that glucose is not actively transported into the cell, which of the following terms describes the tonicity of the external solution relative to the cytoplasm of the cell?
- isotonic
 - hypertonic
 - hypotonic
 - flaccid
 - turgid

Use the figure below to answer the following questions.

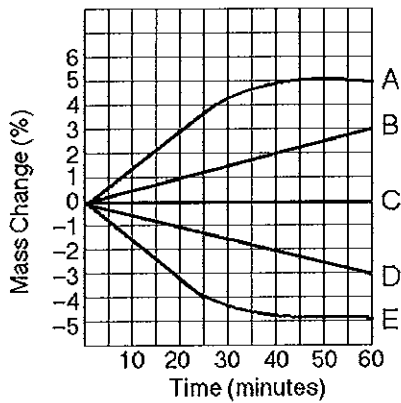
The solutions in the arms of a U-tube are separated at the bottom of the tube by a selectively permeable membrane. The membrane is permeable to sodium chloride but not to glucose. Side A is filled with a solution of 0.4 M glucose and 0.5 M sodium chloride (NaCl), and side B is filled with a solution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



18. At the beginning of the experiment,
- side A is hypertonic to side B.
 - side A is hypotonic to side B.
 - side A is isotonic to side B.
 - side A is hypertonic to side B with respect to glucose.
 - side A is hypotonic to side B with respect to sodium chloride.

Read the following information and refer to the figure below to answer the following questions.

Five dialysis bags, constructed from a semi-permeable 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.



- _____ 19. Which line represents the bag that contained a solution isotonic to the 0.6 molar solution at the beginning of the experiment?
- A
 - B
 - C
 - D
 - E
- _____ 20. What is (are) the best explanation(s) for the shape of line E after 50 minutes?
- The bag is isotonic with the solution around it.
 - Water is entering and leaving the bag at the same rate.
 - Sucrose is entering and leaving the bag at the same rate.
 - A and B only
 - A, B, and C
- _____ 21. All of the following membrane activities require energy from ATP hydrolysis *except*
- facilitated diffusion.
 - active transport.
 - Na⁺ ions moving out of the cell.
 - proton pumps.
 - translocation of potassium into a cell.
- _____ 22. The movement of a substance across a biological membrane against its concentration gradient with the help of energy input is
- diffusion.
 - active transport.
 - osmosis.
 - facilitated diffusion.
 - exocytosis.

Name: _____

ID: A

- _____ 23. What is the voltage across a membrane called?
- water potential
 - chemical gradient
 - membrane potential
 - osmotic potential
 - electrochemical gradient
- _____ 24. All of the following processes take material into cells *except*
- pinocytosis.
 - endocytosis.
 - exocytosis.
 - active transport.
 - carrier-facilitated diffusion.
- _____ 25. In addition to exporting materials from the cytoplasm of the cell, the process of exocytosis is also important in
- the production of cell walls by plant cells.
 - the increase in the size of cells.
 - maintaining the osmotic balance between the cytoplasm and the cell exterior.
 - A and B only
 - A, B, and C
- _____ 26. Which of the following cell components is *not directly involved in synthesis or secretion*?
- ribosome
 - rough endoplasmic reticulum
 - Golgi body
 - smooth endoplasmic reticulum
 - lysosome
- _____ 27. In animal cells, hydrolytic enzymes are packaged to prevent general destruction of cellular components. Which of the following organelles functions in this compartmentalization?
- chloroplast
 - lysosome
 - central vacuole
 - peroxisome
 - glyoxysome
- _____ 28. Which of the following statements *correctly* describes some aspect of protein excretion in prokaryotic cells?
- Prokaryotes are unlikely to be able to excrete proteins because they lack an endomembrane system.
 - The mechanism of protein excretion in prokaryotes is probably the same as that in eukaryotes.
 - Proteins that are excreted by prokaryotes are synthesized on ribosomes that are bound to the cytoplasmic surface of the plasma membrane.
 - In prokaryotes, the ribosomes that are used for the synthesis of secreted proteins are located outside of the cell.
 - Prokaryotes contain large pores in their plasma membrane that permit the movement of proteins out of the cell.

- _____ 29. Grana, thylakoids, and stroma are all components found in
- vacuoles.
 - chloroplasts.
 - mitochondria.
 - lysosomes.
 - nuclei.
- _____ 30. Organelles other than the nucleus that contain DNA include
- ribosomes.
 - mitochondria.
 - chloroplasts.
 - B and C only
 - A, B, and C
- _____ 31. The chemical reactions involved in respiration are virtually identical between prokaryotic and eukaryotic cells. In eukaryotic cells, ATP is synthesized primarily on the inner membrane of the mitochondria. Where are the corresponding reactions likely to occur in prokaryotic respiration?
- in the cytoplasm
 - on the inner mitochondrial membrane
 - on the endoplasmic reticulum
 - on the plasma membrane
 - on the nuclear envelope
- _____ 32. 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, while organelles in the lighter fraction could produce ATP in the dark. The heavier and lighter fractions are most likely to contain, respectively,
- mitochondria and chloroplasts.
 - chloroplasts and peroxisomes.
 - peroxisomes and chloroplasts.
 - chloroplasts and mitochondria.
 - mitochondria and peroxisomes.
- _____ 33. A cell has the following molecules and structures: enzymes, DNA, ribosomes, plasma membrane, and mitochondria. It could be a cell from
- a bacterium.
 - an animal, but not a plant.
 - a plant, but not an animal.
 - a plant or an animal.
 - any kind of organism.
- _____ 34. Once labor begins in childbirth, contractions increase in intensity and frequency until delivery. The increasing labor contractions of childbirth are an example of
- a bioinformatic system.
 - positive feedback.
 - negative feedback.
 - feedback inhibition.
 - both C and D

- _____ 35. When blood glucose level rises, the pancreas secretes insulin, and as a result blood glucose level declines. When blood glucose level is low, the pancreas secretes glucagon, and as a result blood glucose level rises. Such regulation of blood glucose level is the result of
- catalytic feedback.
 - positive feedback.
 - negative feedback.
 - bioinformatic regulation.
 - both A and B
- _____ 36. Blood samples taken from an individual who had been fasting for 24 hours would have which of the following?
- high levels of insulin
 - high levels of glucagon
 - low levels of insulin
 - low levels of glucagon
 - both B and C

The following phrases refer to the five terms below. Each term can be used as an answer once, more than once, or not at all.

- low-density lipoproteins
- immunoglobulins
- erythropoietin
- epinephrine
- platelets

- _____ 37. involved in the early stages of blood clotting
- A
 - B
 - C
 - D
 - E
- _____ 38. If you were shipping green bananas to a supermarket thousands of miles away, which of the following chemicals would you want to eliminate from the plants' environment?
- CO₂
 - cytokinins
 - ethylene
 - auxin
 - gibberellic acids
- _____ 39. Which common event most closely resembles negative feedback?
- The water shuts off when the float rises in the tank of a toilet.
 - The chlorine level of a swimming pool decreases when the chlorinator is turned off.
 - The flame size on a gas stove changes when the gas is turned off.
 - There is a continual buildup of moisture in a basement with a dehumidifier running.
 - There is a decrease in water pressure when the faucet is slowly turned off.

- _____ 40. Which example best describes a homeostatic control system?
- The core body temperature of a runner is allowed to gradually rise from 37°C to 45°C.
 - The kidneys excrete salt into the urine when dietary salt levels rise.
 - A blood cell shrinks when placed in a solution of salt and water.
 - The blood pressure increases in response to an increase in blood volume.
 - Motility in the digestive tract increases following a meal.
- _____ 41. Which of the following is the best example of an effector's response in negative feedback?
- an increase in body temperature resulting from shivering
 - an increase in body temperature resulting from exercise
 - an increase in body temperature resulting from exposure to the sun
 - an increase in body temperature resulting from fever
 - a decrease in body temperature resulting from shock
- _____ 42. How does positive feedback differ from negative feedback?
- Positive feedback benefits the organism, whereas negative feedback is detrimental.
 - In positive feedback, the effector's response is in the same direction as the initiating stimulus rather than opposite to it.
 - In positive feedback, the effector increases some parameter (such as temperature), whereas in negative feedback it decreases.
 - Positive feedback systems have effectors, whereas negative feedback systems utilize receptors.
 - Positive feedback systems have control centers that are lacking in negative feedback systems.
- _____ 43. Consider a husband and wife sharing a bed, with each one having an electric blanket. Their controls become switched. When the husband feels cold, he turns up the control. This warms up his spouse, who turns down her control. This chills the husband, who turns up his control even more. The process continues. For both the wife and the husband, this would be an example of
- negative feedback.
 - positive feedback.
 - homeostasis.
 - regulated change.
 - integrated control.
- _____ 44. Which of the following statements concerning the evolution of behavior is *correct*?
- Natural selection will favor behavior that enhances survival and reproduction.
 - An animal may show behavior that maximizes reproductive fitness.
 - If a behavior is less than optimal, it is not yet completely evolved but will eventually become optimal.
 - A and B only
 - A, B, and C
- _____ 45. You turn on a light and observe cockroaches scurrying to dark hiding places. What have you observed?
- taxis
 - learned behavior
 - migration
 - visual communication
 - operant conditioning

- _____ 46. Vines in tropical rain forests must grow toward large trees before being able to grow toward the sun. To reach a large tree, the most useful kind of growth movement for a tropical vine presumably would be the *opposite* of
- positive thigmotropism.
 - positive phototropism.
 - positive gravitropism.
 - sleep movements.
 - circadian rhythms.
- _____ 47. If the range of a species of plants expands to a higher latitude, which of the following processes is the most *likely* to be modified by natural selection?
- circadian rhythm
 - photoperiodic response
 - phototropic response
 - biological clock
 - thigmomorphogenesis
- _____ 48. In nature, poinsettias bloom in early March. Research has shown that the flowering process is triggered three months before blooming occurs. In order to make poinsettias bloom in December, florists change the length of the light-dark cycle in September. Given the information and clues above, which of the following is a *false* statement about poinsettias?
- They are short-day plants.
 - They require a light period shorter than some set maximum.
 - They require a longer dark period than is available in September.
 - The dark period can be interrupted without affecting flowering.
 - They will flower even if there are brief periods of dark during the daytime.
- _____ 49. If a short-day plant has a critical night length of 15 hours, then which of the following 24-hour cycles will prevent flowering?
- 8 hours light/16 hours dark
 - 4 hours light/20 hours dark
 - 6 hours light/2 hours dark/light flash/16 hours dark
 - 8 hours light/8 hours dark/light flash/8 hours dark
 - 2 hours light/20 hours dark/2 hours light
- _____ 50. A long-day plant will flower if
- the duration of continuous light exceeds a critical length.
 - the duration of continuous light is less than a critical length.
 - the duration of continuous darkness exceeds a critical length.
 - the duration of continuous darkness is less than a critical length.
 - it is kept in continuous far-red light.
- _____ 51. Suppose there is a large deciduous ornamental tree on your campus and the city places a very bright street light right next to it on a tall pole. A botanist on the faculty complains to the city council and asks them to remove the light. Most likely the botanist is concerned because the light
- will alter the photosynthetic rate of the tree and keep it growing at night.
 - may cause the stomata to close because of increased ABA synthesis. This could starve the tree for CO₂ and it could die.
 - may change the photoperiod and cause the tree to retain its leaves during the winter. This could cause dehydration and loss of the tree.
 - will cause the tree to bend toward the light on the pole, and the tree could fall.
 - will stimulate ethylene production, premature senescence, and early death of the tree.

**Big Idea 2.B-C Formative
Answer Section****MULTIPLE CHOICE**

- | | |
|------------|-------------------|
| 1. ANS: C | TOP: Concept 7.1 |
| 2. ANS: D | TOP: Concept 7.1 |
| 3. ANS: E | TOP: Concept 7.1 |
| 4. ANS: A | TOP: Concept 7.1 |
| 5. ANS: C | TOP: Concept 7.1 |
| 6. ANS: B | TOP: Concept 7.1 |
| 7. ANS: A | TOP: Concept 7.1 |
| 8. ANS: A | TOP: Concept 7.1 |
| 9. ANS: A | TOP: Concept 7.1 |
| 10. ANS: A | TOP: Concept 7.1 |
| 11. ANS: A | TOP: Concept 7.1 |
| 12. ANS: E | TOP: Concept 7.1 |
| 13. ANS: B | TOP: Concept 7.2 |
| 14. ANS: C | TOP: Concept 7.2 |
| 15. ANS: C | TOP: Concept 7.3 |
| 16. ANS: C | TOP: Concept 7.3 |
| 17. ANS: A | TOP: Concept 7.3 |
| 18. ANS: B | TOP: Concept 7.3 |
| 19. ANS: C | TOP: Concept 7.3 |
| 20. ANS: D | TOP: Concept 7.3 |
| 21. ANS: A | TOP: Concept 7.4 |
| 22. ANS: B | TOP: Concept 7.4 |
| 23. ANS: C | TOP: Concept 7.4 |
| 24. ANS: C | TOP: Concept 7.5 |
| 25. ANS: A | TOP: Concept 7.5 |
| 26. ANS: E | TOP: Concept 6.4 |
| 27. ANS: B | TOP: Concept 6.4 |
| 28. ANS: C | TOP: Concept 6.4 |
| 29. ANS: B | TOP: Concept 6.5 |
| 30. ANS: D | TOP: Concept 6.5 |
| 31. ANS: D | TOP: Concept 6.5 |
| 32. ANS: D | TOP: Concept 6.5 |
| 33. ANS: D | TOP: Concept 6.5 |
| 34. ANS: B | TOP: Concept 1.2 |
| 35. ANS: C | TOP: Concept 1.2 |
| 36. ANS: E | TOP: Concept 45.4 |
| 37. ANS: E | TOP: Concept 42.4 |
| 38. ANS: C | TOP: Concept 39.2 |
| 39. ANS: A | TOP: Concept 40.4 |

- | | |
|------------|-------------------|
| 40. ANS: B | TOP: Concept 40.4 |
| 41. ANS: A | TOP: Concept 40.4 |
| 42. ANS: B | TOP: Concept 40.4 |
| 43. ANS: B | TOP: Concept 40.4 |
| 44. ANS: D | TOP: Concept 51.4 |
| 45. ANS: A | TOP: Concept 51.1 |
| 46. ANS: B | TOP: Concept 39.2 |
| 47. ANS: B | TOP: Concept 39.3 |
| 48. ANS: D | TOP: Concept 39.3 |
| 49. ANS: D | TOP: Concept 39.3 |
| 50. ANS: D | TOP: Concept 39.3 |
| 51. ANS: C | TOP: Concept 39.3 |