

Test 4 - Cell Transport and Division

For questions 1 – 21, choose the one option that best answers each question or completes each statement.

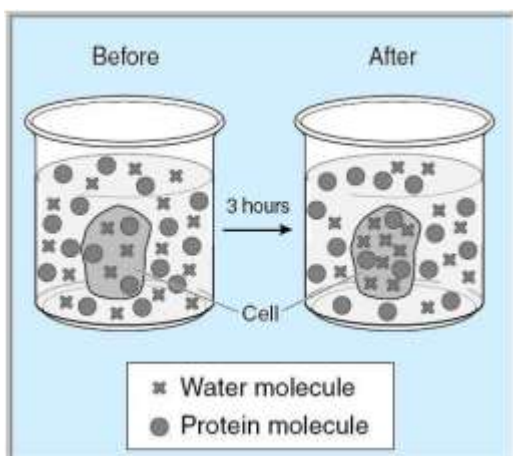
1. **Some peeled pieces of apple were placed in distilled (pure) water and some in very salty water. The cells in the apple pieces will —**
 - a. lose water in both solutions
 - b. gain water in the distilled water and lose water in the salty water
 - c. gain water in both solutions
 - d. lose water in the distilled water and gain water in the salty water

2. **Bacteria are tremendously successful unicellular organisms, yet all large organisms are multicellular. Unicellular organisms cannot grow very large because the —**
 - a. diffusion of nutrients into the cell's interior would be too slow
 - b. locomotion of the organisms would be too slow
 - c. respiratory rate would be too high
 - d. energy expenditures would be too low

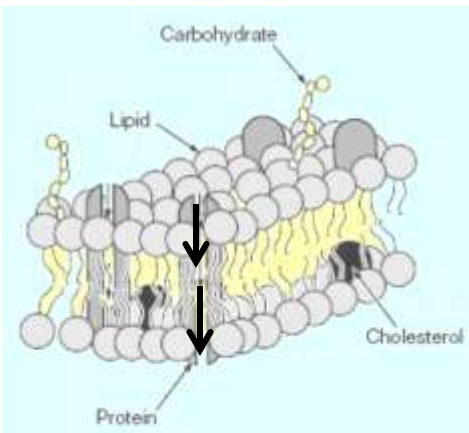
3. **Which of the following is most likely an example of diffusion?**
 - a. A cell that maintains a high concentration of glucose inside, regardless of conditions in the surrounding environment.
 - b. A plant closing the pores in its leaves so it does not lose water.
 - c. An oxygen-depleted muscle cell absorbing oxygen from an oxygen-rich red blood cell.
 - d. A white blood cell engulfing a bacterium through endocytosis.

4. **What is the main difference between active and passive transport?**
 - a. Active transport occurs more often.
 - b. Active transport is driven by diffusion.
 - c. Passive transport does not require ATP.
 - d. Passive transport always requires transport proteins.

5. **Which of the following describes a state of dynamic equilibrium?**
 - a. Carbon dioxide molecules move into and out of the cell at equal rates.
 - b. Oxygen molecules diffusing across the cell membrane “down” their concentration gradient.
 - c. Protein pumps use energy to move nutrients from the soil into the root cells of plants.
 - d. Water molecules stop moving across a cell membrane.



6. **The above diagram shows the process of osmosis. Only the water molecules could enter the cell because water molecules —**
 - a. have more energy than the protein molecules
 - b. are smaller than the protein molecules
 - c. contain more hydrogen atoms than the protein molecules
 - d. are more numerous than the protein molecules



7. In the cell membrane model shown above, the molecules which move large molecules into and out of the cell are known as –

- a. cholesterol
- b. proteins
- c. lipids
- d. carbohydrates

8. If ATP were not present in a cell, what would most likely happen to the functioning of the cell membrane?

- a. Active transport would stop.
- b. Diffusion would slow down.
- c. Passive transport would speed up.
- d. The phospholipids would stop moving.

9. The lipid bilayer arrangement of phospholipid molecules in the cell membrane is mainly the result of –

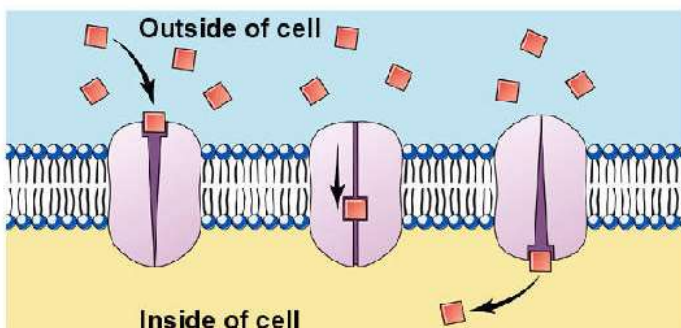
- a. atoms of carbon and hydrogen in the molecules
- b. more than one fatty acid tail on each molecule
- c. polar and nonpolar regions on each end of each molecule
- d. the overall hydrophobic nature of each molecule

10. The surface of intestinal cells is covered in hundreds of thin, microscopic extensions of the cell membrane called microvilli. These structures increase the surface area of the cell, which _____.

- a. decreases the surface area : volume ratio
- b. impedes nutrient absorption
- c. slows down diffusion
- d. speeds up membrane transport

11. A red blood cell holds an oxygen concentration of 95%, while the surrounding environment has an oxygen concentration of 20%. In this situation, oxygen is most likely going to _____.

- a. be absorbed by the red blood cell from the surrounding environment
- b. be actively transported from inside the cell to the surrounding environment
- c. diffuse out of the cell, into the environment
- d. remain at the same concentration gradient because red blood cells need oxygen

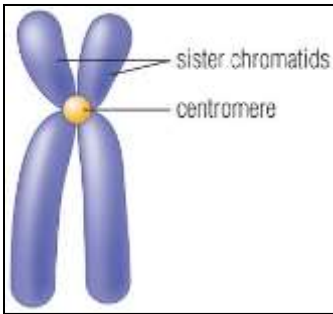


12. What type of plasma membrane transport is pictured at left?

- a. active transport
- b. facilitated diffusion
- c. osmosis
- d. simple diffusion

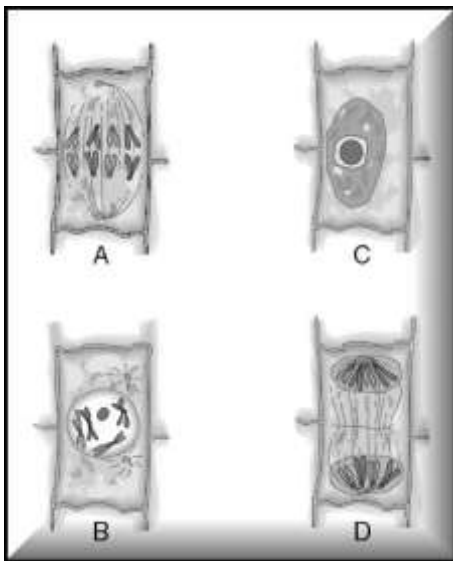
13. What is the outcome of mitosis?

- a. Four identical diploid cells
- b. Four unique haploid cells
- c. Two identical diploid cells
- d. Two unique diploid cells



14. The image shows a diagram of a chromosome. How are the sister chromatids related?

- a. They are both random in order to increase genetic diversity.
- b. They are identical.
- c. They do not resemble each other at all.
- d. They hold different versions of the same genes, known as alleles.



15. What is the correct sequence for plant cell mitosis (shown at left)?

- a. A, B, D, C
- b. C, B, A, D
- c. B, A, D, C
- d. D, C, B, A

16. Interphase of the cell cycle consists of G₁, S, and G₂ phase. If G₂ phase did not occur, the cell would most likely _____.

- a. fail to become specialized after cytokinesis
- b. not enter S-phase
- c. not prepare properly for mitosis
- d. not replicate its DNA

17. The weed known as *Datura stramonium* normally has 12 chromosomes in the body cells. How many chromosomes will an egg cell of the weed have?

- a. 6 chromosomes
- b. 12 chromosomes
- c. 24 chromosomes
- d. 48 chromosomes

18. Which of the following is a difference between mitosis and meiosis?

- a. Meiosis occurs in most body cells of multicellular organisms; mitosis occurs only in germ cells.
- b. Meiosis is required for asexual reproduction; mitosis is used for sexual reproduction.
- c. Mitosis occurs after DNA replication; meiosis does not.
- d. Mitosis involves one (1) round of cell division; meiosis involves two (2).

19. Centrioles are usually duplicated before cell division. What would most likely occur if the centrioles were not duplicated prior to mitosis?

- a. Chromosomes would not condense.
- b. DNA would never be replicated.
- c. The nuclear membrane would not disappear.
- d. Chromosomes would not move or separate properly.

20. The reduction of the chromosome number during meiosis is most important for:

- a. keeping the amount of DNA in the cell at a minimum level
- b. preventing the nucleus from becoming larger with each cell division
- c. maintaining the same chromosome number in offspring during sexual reproduction
- d. allowing the growth of the cell without increasing the DNA content

21. Meiosis is the process by which gametes are produced. In which of the following human organs does meiosis occur?

- a. Skin
- b. Pancreas
- c. Liver
- d. Testis

For questions 22 - 25, choose ALL correct answers.

22. Which 3 of the following are possible functions of mitosis? Choose ALL correct answers.

- a. Asexual reproduction
- b. Gametogenesis
- c. Multicellular growth
- d. Regeneration
- e. Sexual reproduction

23. Which 2 processes during meiosis can contribute to the genetic diversity of the gametes produced?

- a. Chromosome condensation
- b. Crossing over
- c. Independent assortment of homologous chromosomes
- d. Sister chromatid separation
- e. Spindle fiber formation

24. Which three of the following are examples of passive transport? Choose ALL correct answers.

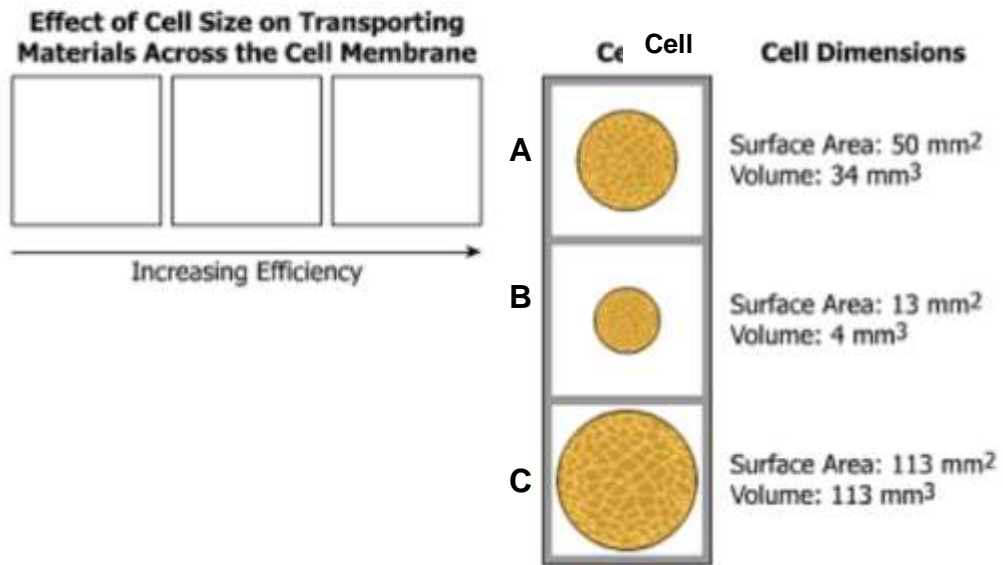
- a. Diffusion
- b. Endocytosis
- c. Facilitated diffusion
- d. Osmosis
- e. Proton Pumps

25. Which 3 of the following are functions of proteins embedded in the cell membrane? Choose ALL correct answers.

- a. They can move molecules against their concentration gradient into or out of the cell.
- b. They can move molecules too large to diffuse across the phospholipid bilayer.
- c. They facilitate the diffusion of oxygen and carbon dioxide.
- d. They help cells identify other cells and sense changes in the environment.
- e. They prevent phospholipids from sticking together.

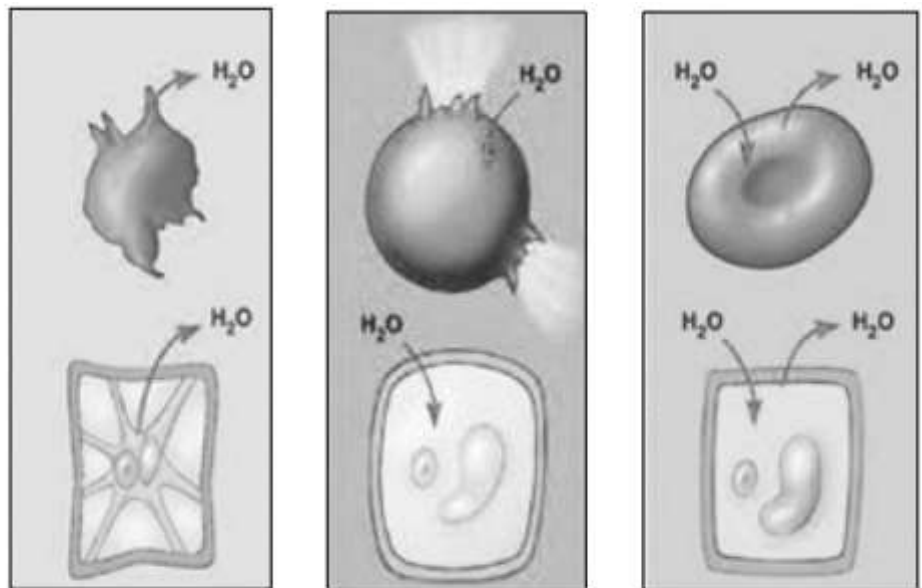
For questions 26-30, answer each question as directed.

26. Write each letter for the corresponding cell in the correct box. Each letter will only be used once.



27. Label the diagram at right correctly using the following terms:

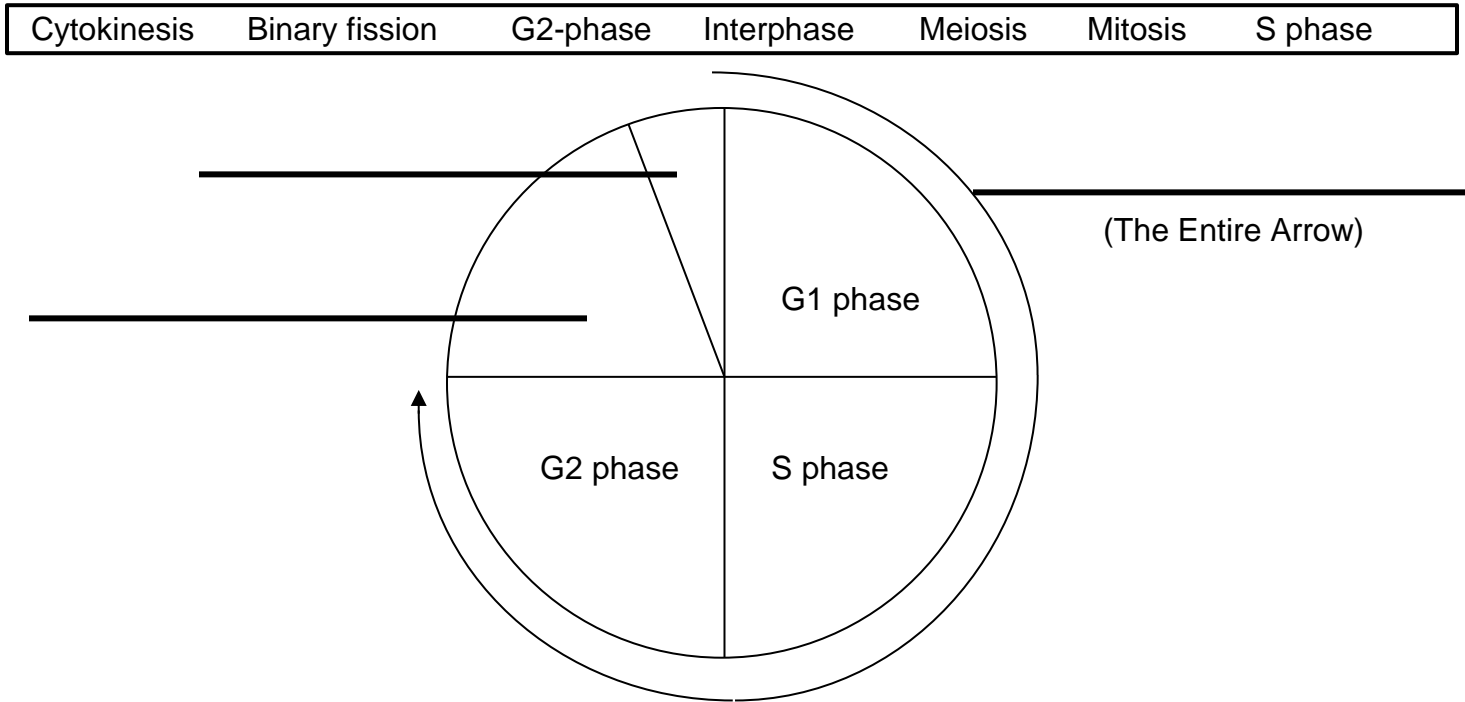
- Equal solute
- Higher solute
- Lower solute



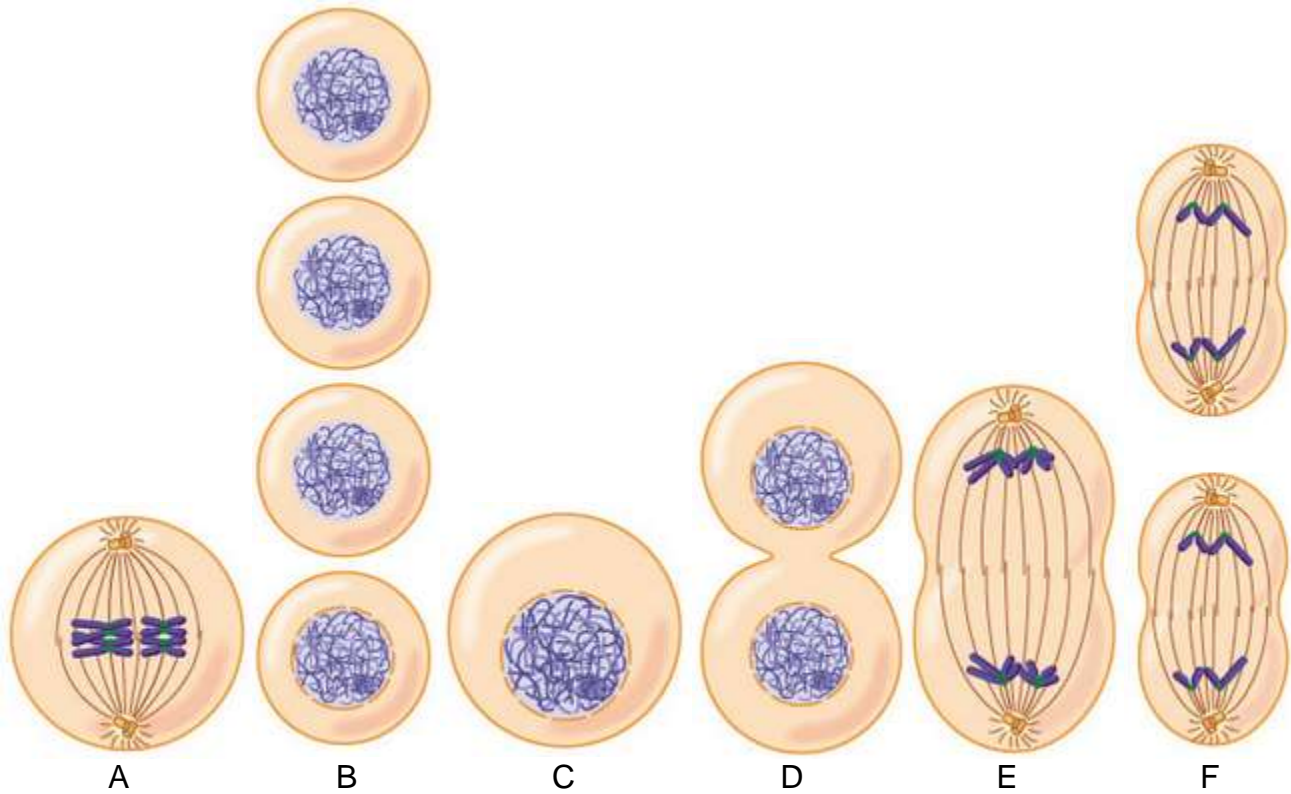
Solution surrounding the cells:
(Compared to inside)

28. Describe one example of cell specialization. Identify the cell type, describe its function, and explain how its structure is specialized for its function.

29. Place the following terms in the appropriate portions of the cell cycle modeled below. Not all words will be used.



30. The stages of meiosis are diagrammed below, but they are out of order.



In the space provided below, write the letters of the stages in chronological order. Most have already been filled in for you. Each letter will only be used once.