

Skills Worksheet

# Directed Reading

## Section: Passive Transport

Read each question, and write your answer in the space provided.

1. What is passive transport? Why is diffusion an example of passive transport?

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2. How does the cell membrane help cells maintain homeostasis?

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3. What determines the direction in which a substance diffuses across a membrane?

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4. Describe the state of equilibrium.

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In the space provided, explain how the terms in each pair differ in meaning.

5. osmosis, diffusion

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**Directed Reading *continued***

**6.** hypertonic solution, hypotonic solution

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**7.** isotonic solution, equilibrium

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**In the space provided, write the letter of the description that best matches the term or phrase.**

\_\_\_\_\_ **8.** hypertonic solution

\_\_\_\_\_ **9.** selective permeability

\_\_\_\_\_ **10.** osmosis

\_\_\_\_\_ **11.** negatively charged

\_\_\_\_\_ **12.** facilitated diffusion

\_\_\_\_\_ **13.** concentration gradient

\_\_\_\_\_ **14.** ion channel

**a.** difference in the concentration of a substance across a space

**b.** the inside of a typical cell

**c.** diffusion of water through a cell membrane

**d.** allows charged molecules to pass through the cell membrane

**e.** enables a cell to control what enters and leaves

**f.** will cause a cell to shrivel up

**g.** involves carrier proteins

# Directed Reading

## Section: Active Transport

Complete each statement by writing the correct term or phrase in the space provided.

1. The transport of a substance across the cell membrane against its concentration gradient is called \_\_\_\_\_ .
2. Active transport requires the cell to use \_\_\_\_\_ .
3. The energy needed for active transport is usually supplied by \_\_\_\_\_ .
4. The sodium-potassium pump is a(n) \_\_\_\_\_ protein.
5. The concentration of sodium ions inside the cell is usually \_\_\_\_\_ than the concentration of sodium ions outside the cell.
6. The concentration of potassium ions inside the cell is usually \_\_\_\_\_ than the concentration of potassium ions outside the cell.
7. The sodium-potassium pump picks up \_\_\_\_\_ ions outside the cell.
8. The sodium-potassium pump releases \_\_\_\_\_ ions inside the cell.

Read each question, and write your answer in the space provided.

9. Explain why proteins and polysaccharides cannot diffuse through the membrane like water does.

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**Directed Reading** *continued*

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**10.** What is the difference between endocytosis and exocytosis?

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**11.** How is a vesicle formed in endocytosis?

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**12.** What happens to a vesicle in exocytosis?

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**13.** How do sodium-potassium pumps support the efficient functioning of cells?

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**In the space provided, write the letter of the description that best matches the term or phrase.**

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|--|---|
| _____ <b>14.</b> signal molecule         | <b>a.</b> a large protein in the cell membrane that transports a specific ion                               |
| _____ <b>15.</b> receptor protein        | <b>b.</b> acts as a signal molecule in the cytoplasm  |
| _____ <b>16.</b> ion channel             | <b>c.</b> a protein that binds to a specific signal molecule  |
| _____ <b>17.</b> second messenger        | <b>d.</b> speeds up chemical reactions in the cell  |
| _____ <b>18.</b> enzyme action           | <b>e.</b> a drug that interferes with the binding of signal molecules to receptor proteins in heart muscles |
| _____ <b>19.</b> beta blocker            | <b>f.</b> carries information throughout the body and to other cells  |
| _____ <b>20.</b> changes in permeability | <b>g.</b> occur when a receptor protein is coupled with an ion channel                                      |

# Active Reading

## Section: Passive Transport

Read the passage below. Notice that the sentences are numbered. Then answer the questions that follow.

<sup>1</sup> The diffusion of water through a selectively permeable membrane is called **osmosis**. <sup>2</sup> Like other forms of diffusion, osmosis involves the movement of a substance—water—down its concentration gradient. <sup>3</sup> Osmosis is a type of passive transport.

<sup>4</sup> If the solutions on either side of the cell membrane have different concentrations of dissolved particles, they will also have different concentrations of “free” water molecules. <sup>5</sup> Osmosis will occur as water molecules diffuse into the solution with the lower concentration of free water molecules.

### SKILL: READING EFFECTIVELY

Read each question, and write your answer in the space provided.

1. What key term is defined in this passage? What does this term mean?

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2. How are diffusion and osmosis related?

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3. What does the word *water* in Sentence 2 tell you about osmosis?

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In the space provided, write the letter of the term or phrase that best completes the statement.

- \_\_\_\_\_ 4. Osmosis is a type of
- a. passive transport.
  - b. diffusion.
  - c. active transport.
  - d. Both (a) and (b)

Skills Worksheet

# Active Reading

## Section: Active Transport

Read the passage below. Then answer the questions that follow.

The movement of a substance into a cell by a vesicle is called **endocytosis**. During endocytosis, the cell membrane forms a pouch around a substance outside the cell. The pouch then closes up and pinches off from the membrane to form a vesicle. Vesicles formed by endocytosis may fuse with lysosomes or other organelles.

The movement of a substance by a vesicle to the outside of a cell is called **exocytosis**. During exocytosis, vesicles in the cell fuse with the cell membrane, releasing their contents. Cells use exocytosis to export proteins that are modified by the Golgi apparatus. Nerve cells and cells of various glands, for example, release proteins by exocytosis.

### SKILL: RECOGNIZING SIMILARITIES AND DIFFERENCES

Complete the table below. In the first column, write two characteristics of cells in endocytosis. In the second column, write two characteristics of cells in exocytosis.

Endocytosis	Exocytosis
1.	3.
2.	4.

## Skills Worksheet

**Vocabulary Review**

In the space provided, write the letter of the description that best matches the term or phrase.

- |                                 |  |
|---------------------------------|--|
| _____ 1. passive transport      | a. movement of a substance down the substance's concentration gradient             |
| _____ 2. concentration gradient | b. causes a cell to shrink because of osmosis                                      |
| _____ 3. equilibrium            | c. movement of a substance by a vesicle to the outside of a cell                   |
| _____ 4. diffusion              | d. carrier protein used in active transport  |
| _____ 5. osmosis                | e. protein used to transport specific substances                                   |
| _____ 6. hypertonic solution    | f. transport protein through which ions can pass                                   |
| _____ 7. hypotonic solution     | g. movement of a substance by a vesicle to the inside of a cell                    |
| _____ 8. isotonic solution      | h. does not require energy from the cell   |
| _____ 9. ion channel            | i. concentration of a substance is equal throughout a space                        |
| _____ 10. carrier protein       | j. difference in the concentration of a substance across a space                   |
| _____ 11. facilitated diffusion | k. diffusion of water through a selectively permeable membrane                     |
| _____ 12. active transport      | l. causes a cell to swell because of osmosis                                       |
| _____ 13. sodium-potassium pump | m. passive transport using carrier proteins  |
| _____ 14. endocytosis           | n. produces no change in cell volume because of osmosis                            |
| _____ 15. exocytosis            | o. movement of a substance against the substance's concentration gradient          |
| _____ 16. receptor protein      | p. acts as a signal molecule in the cytoplasm                                      |
| _____ 17. second messenger      | q. binds to a signal molecule, enabling the cell to respond to the signal molecule |

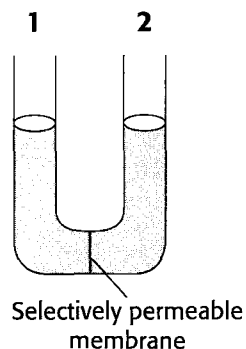
# Science Skills

## Predicting

Use the information below and the figure at right to answer questions 1–3.

### EXPERIMENT A

A selectively permeable membrane separates the solutions in the arms of the U-tube shown at right. The membrane is permeable to water and to substance A but not to substance B. Forty grams of substance A and 20 g of substance B have been added to the water on side 1 of the U-tube. Twenty grams of substance A and 40 g of substance B have been added to the water on side 2 of the U-tube. Assume that after a period of time, the solutions on either side of the membrane have reached equilibrium.



Read each question, and write your answer in the space provided.

1. How many grams of substance A will be in solution on side 1 of the U-tube? How many grams of substance A will be in solution on side 2? Explain.

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2. How many grams of substance B will be in solution on side 1 of the U-tube? How many grams of substance B will be in solution on side 2? Explain.

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3. What has happened to the water level in the U-tube? Explain.

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**Science Skills** *continued*

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**Use the information below to answer questions 4–6.**

**EXPERIMENT B**

The cell membrane of red blood cells is permeable to water but not to sodium chloride, NaCl. Suppose that you have three flasks:

- Flask X contains a solution that is 0.5 percent NaCl.
- Flask Y contains a solution that is 0.9 percent NaCl.
- Flask Z contains a solution that is 1.5 percent NaCl.

To each flask, you add red blood cells, which contain a solution that is 0.9 percent NaCl.

**Read each question, and write your answer in the space provided.**

**4.** Predict what will happen to the red blood cells in flask X.

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**5.** Predict what will happen to the red blood cells in flask Y.

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**6.** Predict what will happen to the red blood cells in flask Z.

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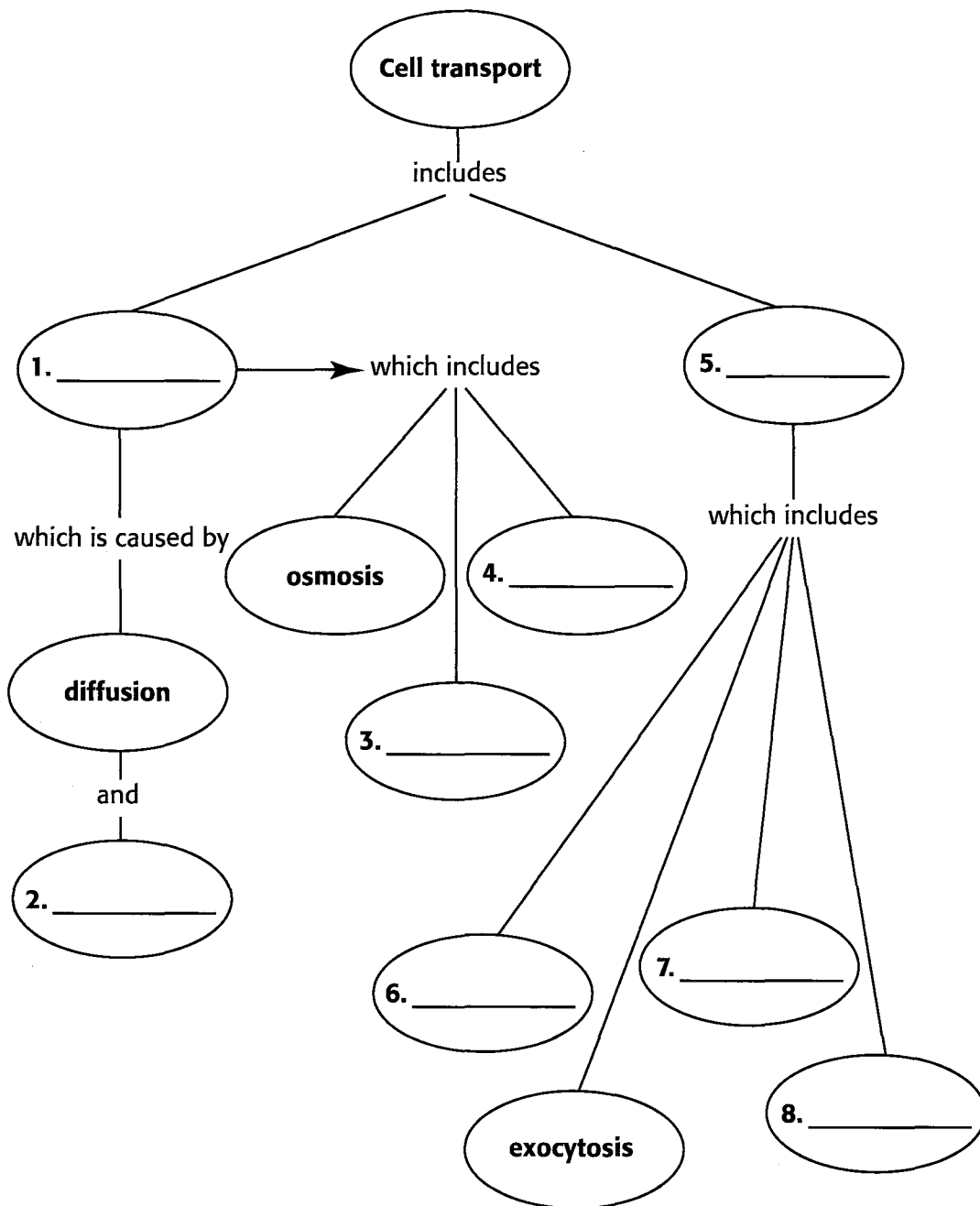
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Skills Worksheet

# Concept Mapping

Using the terms and phrases provided below, complete the concept map showing the characteristics of cell transport.

- |                         |                       |                       |
|-------------------------|-----------------------|-----------------------|
| active transport        | facilitated diffusion | receptor proteins     |
| concentration gradients | ion channels          | sodium-potassium pump |
| endocytosis             | passive transport     |                       |



## Skills Worksheet

**Test Prep Pretest**

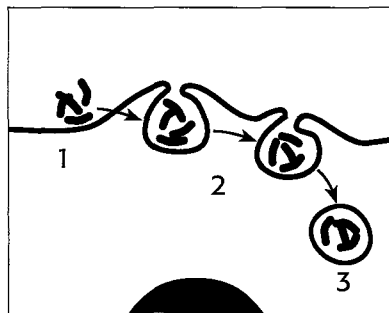
**In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.**

- \_\_\_\_\_ 1. When a receptor protein in a cell membrane acts as an enzyme, the receptor protein
- changes its shape to allow the signal molecule to enter the cell.
  - causes chemical changes in the cell.
  - activates a second messenger that acts as a signal molecule within the cell.
  - changes the permeability of the cell membrane.
- \_\_\_\_\_ 2. Which of the following is NOT a characteristic of an ion channel?
- It extends from one side of the cell membrane to the other.
  - It may or may not have a gate.
  - It is polar, so charged substances, such as ions, can pass through the nonpolar lipid bilayer.
  - It allows ions to move against their concentration gradient.
- \_\_\_\_\_ 3. When a cell uses energy to transport a particle through the cell membrane to an area of higher concentration, the cell is using
- diffusion.
  - active transport.
  - osmosis.
  - facilitated diffusion.
- \_\_\_\_\_ 4. The excretion of materials to the outside of a cell by discharging them from vesicles is called
- exocytosis.
  - endocytosis.
  - osmosis.
  - diffusion.
- \_\_\_\_\_ 5. The mechanism that prevents sodium ions from building up inside the cell is called
- the sodium-potassium pump.
  - endocytosis.
  - diffusion.
  - exocytosis.

**Complete each statement by writing the correct term or phrase in the space provided.**

**Question 6 refers to the figure at right.**

6. The process shown in the figure is \_\_\_\_\_.



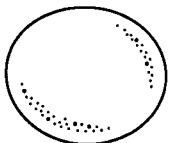
**Test Prep Pretest *continued***

- 7. Cell-surface proteins allow a cell to \_\_\_\_\_ with other cells.
- 8. The \_\_\_\_\_ \_\_\_\_\_ requires energy to function.
- 9. When a substance moves from an area of low concentration to an area of higher concentration, the substance moves \_\_\_\_\_ its concentration gradient.
- 10. The movement of particles down their concentration gradient through carrier proteins is known as \_\_\_\_\_.
- 11. A(n) \_\_\_\_\_ amplifies the communication from a signal molecule.
- 12. A(n) \_\_\_\_\_ in the cell membrane may be opened or closed.

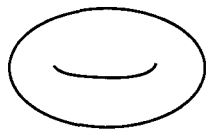
**Questions 13–15 refer to the figures below.**



**A**



**B**



**C**

- 13. Figure A illustrates a cell in a(n) \_\_\_\_\_ solution.
- 14. Figure B illustrates a cell in a(n) \_\_\_\_\_ solution.
- 15. Figure C illustrates a cell in a(n) \_\_\_\_\_ solution.

**Read each question, and write your answer in the space provided.**

- 16. Describe the electrical charge inside and outside a typical cell. Then explain how this affects an ion's ability to move into the cell.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Test Prep Pretest** *continued*

**17.** Suppose you want to explain a concentration gradient to someone. Create a scenario that illustrates passive transport down the concentration gradient.

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**18.** Using your understanding of osmosis, describe why putting salt on a pork chop before cooking it on a grill is likely to result in a dry, tough piece of meat.

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**19.** How is facilitated diffusion different from the other passive transport processes?

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**20.** How does a cell consume a food particle that is too large to pass through a protein channel?

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