

Week 1
EOC Review
Cell Theory, Cell Structure, Cell Transport

Benchmarks:

SC.912.L.14.1 Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the processes of science
SC.9.12.L.14.3 Compare and contrast the general structure of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.2 Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport)

Summary:

You need to know the following:

- The cell theory and how continuous investigations and/or new scientific information influenced the development of cell theory.
- How scientific claims are evaluated through scientific argumentation, critical and logical thinking and consideration of alternative explanations, in the context of cell theory.
- The difference between theories and laws and be able to explain how a theory is developed.
- The general structures of prokaryotic and eukaryotic cells and how they are alike and different.
- The general structures of plant and animal cells and how plant and animal cells are alike and different.
- How the structure relates to the function for the components of plant or animals cells. Structures you need to know are the cell wall, cell membrane, cytoplasm, ribosomes, cilia, flagella, nucleus, nuclear envelope, chromatin, ribosomes, endoplasmic reticulum, vacuoles, mitochondria, Golgi apparatus, chloroplasts, lysosomes
- To understand the role of the cell membrane as a highly selective barrier that carries out passive and active transport. In addition, you need to differentiate between diffusion and osmosis and those types of transport affect the cells.

Additional Support

- Holt McDougal Biology Interactive Reader:
 - Chapter 3, Sections 3.1, 3.2, 3.3, 3.4, 3.5
- Everglades Biology End-Of-Course Review
 - Pages 67-86
- Web Sites:
 - <http://www.ecsd-fl.schoolloop.com/BiologyEOCReview>
 - <http://fcats.fldoe.org/eoc/>

Sample Questions

SC.912.L.14.1 Cell Theory

1. Cell theory was first proposed in 1838. Evidence obtained through additional scientific investigations resulted in the current cell theory. Which statement describes a component of the original cell theory that was removed because of the new scientific knowledge?
 - A. All living things are made of cells.
 - B. All cells come from other preexisting cells.
 - C. Cells form through spontaneous generation.
 - D. Cells are the basic structural and functional units of life.

2. Which invention from the 17th century allowed for the development of modern cell theory?
 - A. X-rays
 - B. computers
 - C. the light microscope
 - D. the scanning electron microscope

3. A plant and an animal are both living things. According to the Cell Theory, what can you conclude about these two very different organisms?
 - A. Plants have cells but animals do not.
 - B. They are both made of one or more cells.
 - C. They both come from the same kind of cell.
 - D. They both come from a non-living organism.

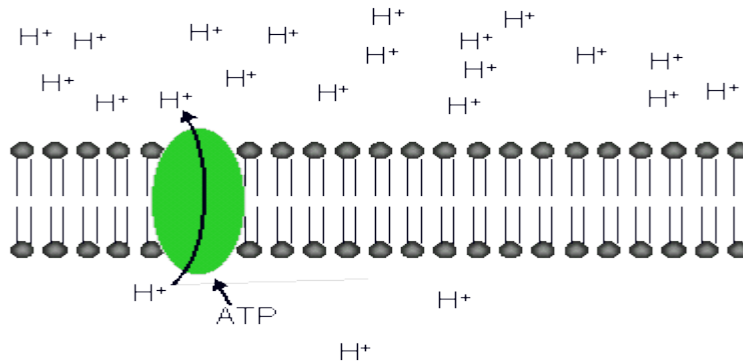
4. The combined observations of Mattias Schleiden, Theodor Schwann and Rudolph Virchow resulted in the formation of the cell theory. Which of the following is not part of the cell theory?
 - A. All cells contain a nucleus.
 - B. All cells come from other living cells.
 - C. All living organisms are made of one or more cells.
 - D. Cells are the basic unit of structure and function of all living things.

SC.9.12.L.14.3 Cell Structure, Function and Transport

1. There are some similarities between prokaryotic and eukaryotic cells. Which of the following structures is found in both prokaryotic and eukaryotic cells?

- A. lysosome
- B. mitochondrion
- C. nucleus
- D. ribosome

2. Look at the cross section of a cell membrane of a eukaryotic cell. H^+ ions are being pumped from a low concentration to a high concentration.



How do you describe this type of transport across the cell membrane?

- A. active transport
- B. passive transport
- C. facilitated diffusion
- D. co-transport

3. Which type(s) of cells have genetic material that is contained in a nucleus?

- A. bacteria
- B. plants only
- C. animals only
- D. both plant and animal cells

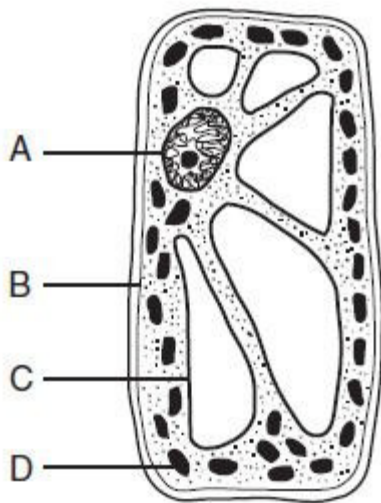
4. Which characteristic do most plants have in common?

- A. they are unicellular
- B. they are prokaryotic
- C. they produce seeds
- D. they are autotrophic

5. Which cell structure is correctly paired with its primary function?

- A. ribosome - protein synthesis
- B. mitochondrion - movement
- C. vacuole - cell division
- D. nucleus - storage of nutrients

6. The diagram below represents a cell of a green plant.



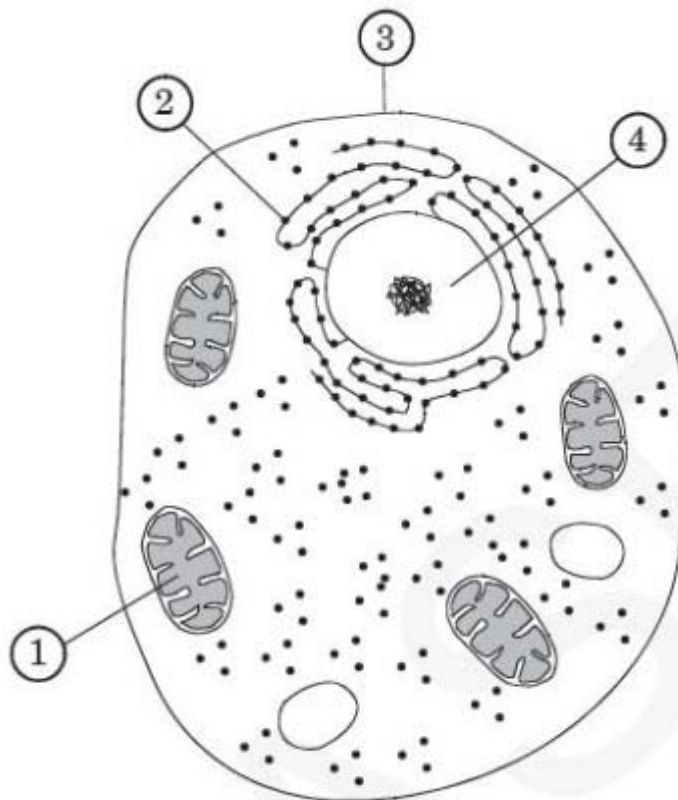
Solar energy is used to produce energy-rich compounds in which structure?

- A. A
- B. B
- C. C
- D. D

7. A person with swollen gums rinses his mouth with warm salt water, and the swelling decreases. Which of the following has occurred?

- A. The swollen gums have absorbed the saltwater solution.
- B. The saltwater solution lowers the temperature of the water in the gums.
- C. The salt in the solution has moved against the concentration gradient.
- D. The water in the gums has moved out due to the high concentration of salt in the solution.

8. The diagram below represents a cell.



Which organelle is the site where amino acids are synthesized into proteins?

- A. 1
- B. 2
- C. 3
- D. 4

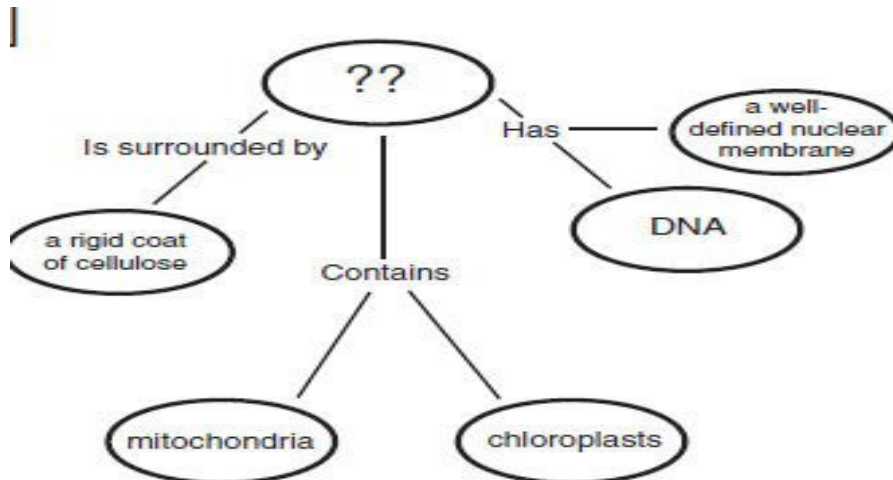
9. Joy took the notes shown below while learning about cells.

- Forms boundary between a cell and the outside environment
- Controls the movement of materials into and out of the cell
- Consists of double layer of phospholipids

She forgot to write the name of the cell structure that her class was studying that day. What structure is described in her notes?

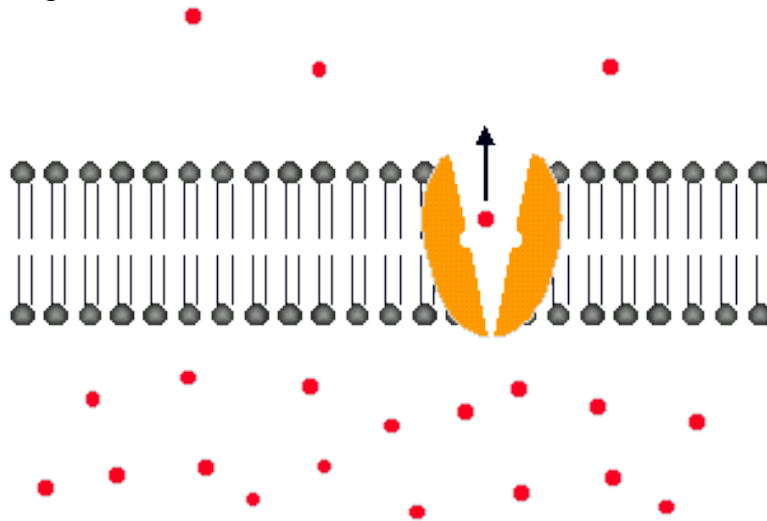
- A. endoplasmic reticulum
- B. cell membrane
- C. cell wall
- D. nucleus

10. Which of these best completes this concept map?



- A. an animal cell
- B. a prokaryotic cell
- C. a virus
- D. a plant cell

11. Look at the diagram of a cross-section of a cell membrane below.



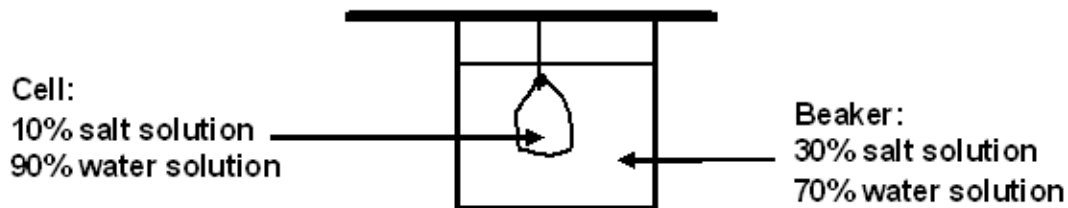
The cell membrane controls movement of materials into and out of the cell. The following particles are moving from high concentration to low concentration and are using a carrier protein. How would you describe this type of movement across the membrane?

- A. simple osmosis
- B. active transport
- C. simple diffusion
- D. facilitated diffusion

12 The cell membrane of the red blood cell will allow water, oxygen, and carbon dioxide to pass through. Because other substances are blocked from entering, this membrane is called

- A. perforated
- B. semi-permeable
- C. non-conductive
- D. permeable

13. Osmosis occurs when there is a different concentration of solute molecules on each side of the membrane. The drawing below shows a beaker containing a 30% salt solution and a suspended cell containing a 10% salt solution.



What statement best describes the cell after 20 minutes?

- A. Water will move from the cell into the beaker, resulting in a smaller cell.
- B. Water will move from the beaker into the cell, resulting in a larger cell.
- C. Salt will move from the cell into the beaker, resulting in a smaller cell.
- D. Salt will move from the beaker into the cell, resulting in a larger cell.

14. Muscle cells are responsible for obtaining energy so the body can perform voluntary and involuntary movement. Using your knowledge about organelles and muscles, how would a muscle cell differ from other types of animal cells?

- A. The muscle cell would have larger centrioles than the other types of animal cells.
- B. The muscle cell would have more mitochondria than the other types of animal cells.
- C. The muscle cell would have a larger golgi apparatus than other types of animal cells.
- D. The muscle cell would have more endoplasmic reticulum than the other types of animal cells.

15. Cells found in plants and animals have similarities but can differ in function. Consider the following two organisms: a corn plant cell (*Zea mays*) and a camel cell (*Bactrianus ferus*). What is the best explanation for the difference in the cellular vacuole size between these two biotic organisms?

- A. The corn cells' have a small vacuole size because it does not need long term water and electrolyte storage.
- B. The camel cells' have a small vacuole size because it does not need long term water and electrolyte storage.
- C. The camel cells' have a small vacuole size because it is not in contact with toxins that need to be removed from the cell.
- D. The corn cells' have a large vacuole size because it is in contact with many toxins in the soil which need to be removed from the cell.

16. Cells can be classified into two different categories: prokaryotic and eukaryotic. Which of the following information is needed in order to determine if an organism is prokaryotic?

- A. The organism's color and mass.
- B. The organism's internal structures.
- C. If the organism is unicellular or multicellular.
- D. The methods the organism uses to feed and move.

17. A specific type of cell is being studied by a scientist. She notices the cell contains a nucleus, lysosomes, a cell membrane and cell wall. What is the correct classification of this cell?

- A. A prokaryotic animal cell
- B. A prokaryotic plant cell
- C. A eukaryotic animal cell
- D. A eukaryotic plant cell

18. Using a microscope in the science lab, Jill observed two unknown cell: Cell 1 and Cell 2. Cell 1 she identified as a plant cell and Cell 2 as an animal cell. Her teacher told her she identified the cells correctly. What did Jill most likely observe to correctly identify the cells?

- A. Cell 2 had a cell membrane and Cell 1 did not.
- B. Cell 1 had a cell wall and Cell 2 did not.
- C. Cell 2 had a chloroplast and Cell 1 did not.
- D. Cell 1 had a nucleus and Cell 2 did not.

19. Which of the following contain complex, membrane-bound organelles?

1. bacteria
2. viruses
3. eukaryotic
4. prokaryotic

- A. 1 and 2
- B. 2 and 4
- C. 3 only
- D. 4 only

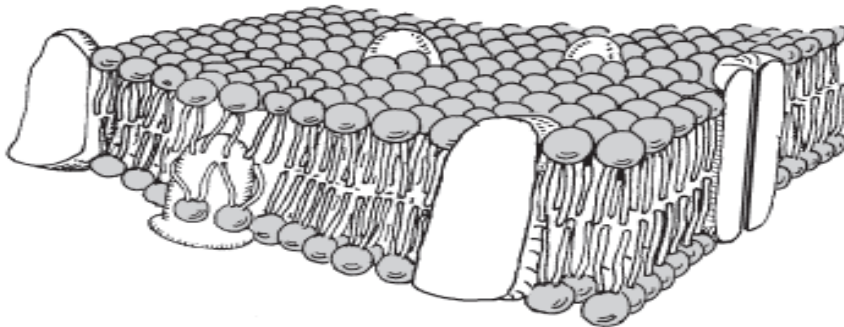
20. A lab technician needs to determine whether cells in a test tube are prokaryotic or eukaryotic. The technician has several dyes she could use to stain the cells. Four of the dyes are described in the table below:

INDICATOR DYE	TEST
acridine orange	stains DNA and RNA
osmium tetroxide	stains lipids
eosin	stains cell cytoplasm
Nile Blue	stains cell nuclei

Which dye could the technician use to determine whether the cells are prokaryotic or eukaryotic?

- A. acridine orange
- B. osmium tetroxide
- C. eosin
- D. Nile blue

21. Look at the cell membrane model below:



What is the name of the macromolecule that makes up the majority of the cell membrane?

- A. nucleotide
- B. lipid

- C. carbohydrate
- D. protein

22. What is the advantage of cells being so small?

- A. Small cells contain a greater quantity of enzymes than large cells.
- B. Small cells do not require energy and get everything they need from osmosis.
- C. The cell has a smaller surface area to volume ratio which means it can move nutrients into the cell and waste out more efficiently.
- D. The cell then has a larger surface area to volume ratio which means it can move nutrients into the cell and waste out more efficiently.

23. The rough endoplasmic reticulum is a cell structure that consists of folded membranes that contain ribosomes. What is the advantage of the folded membranes?

- A. increases surface area in order to produce more proteins
- B. decreases surface area in order to produce more proteins
- C. increases volume of the endoplasmic reticulum in order to produce more energy
- D. decreases volume of the endoplasmic reticulum in order to make more energy

24. If a cell's lysosomes were damaged, which of the following would **most likely** occur?

- A. The cell would produce more proteins than it needs.
- B. The cell would have chloroplasts that appear yellow rather than green.
- C. The cell would be less able to break down molecules in its cytoplasm.
- D. The cell would be less able to regulate the amount of fluid in its cytoplasm.

25. When *Streptococcus pneumoniae* are exposed to an antibiotic, the bacteria try to pump the antibiotic out of their cells. Which of the following mechanisms is **most likely** used by the *Streptococcus pneumoniae* to pump the antibiotic out of their cells?

- A. active transport
- B. diffusion
- C. facilitated diffusion
- D. osmosis

26. In pure water, a red blood cell from an animal will swell and burst, but a leaf cell from a plant will not. Which structure in the leaf cell is responsible for this difference?

- A. cell membrane
- B. cell wall
- C. mitochondrion
- D. nucleus

27. Which of the following functions does active transport perform in a cell?

- A. packaging proteins for export from the cell
- B. distributing enzymes throughout the cytoplasm
- C. moving substances against a concentration gradient
- D. equalizing the concentration of water inside and outside the cell

28. Carrot sticks that are left in a dish of freshwater for several hours become stiff and hard. Similar sticks left in a saltwater solution become limp and soft. From this we can deduce that the freshwater is _____ and the saltwater is _____ to the cells of the carrot sticks.

- A. hypotonic, hypertonic
- B. hypotonic, hypotonic
- C. hypertonic, hypertonic
- D. hypertonic, hypertonic

29. In an emergency trauma room, a doctor accidentally gives a patient a large transfusion of distilled water directly into one of his veins instead of blood. Predict what might happen if distilled water was given to the patient instead of blood.

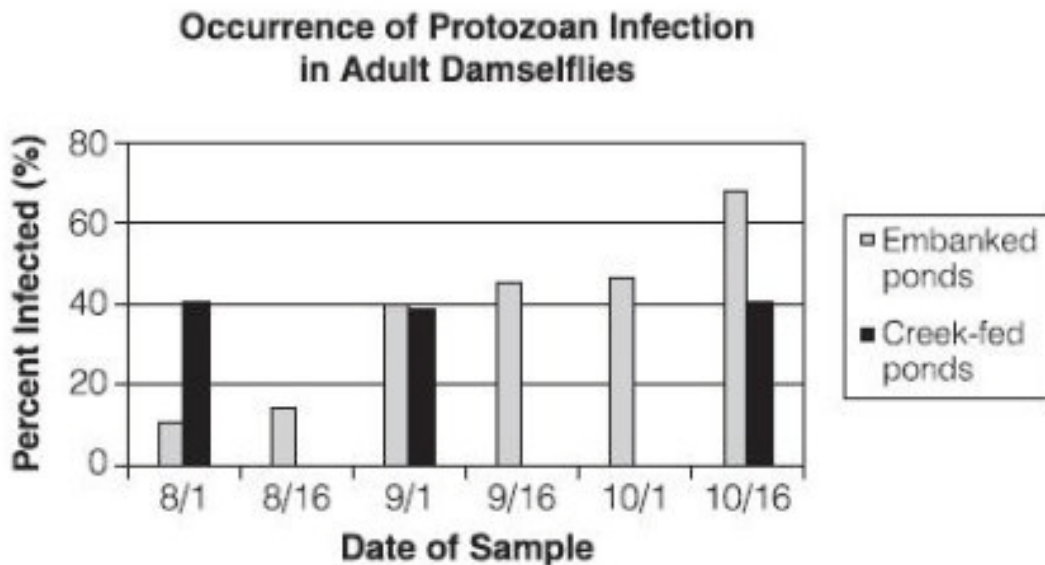
- A. have no unfavorable effect as long as the water was sterile
- B. have serious, perhaps fatal effects because there would be too much fluid for the heart to pump.
- C. have serious, perhaps fatal effects because the red blood cells would tend to shrivel
- D. have serious, perhaps fatal effects because the red blood cells would tend to burst

30. A beaker is divided into two halves, A & B, by a membrane that is freely permeable to the water and NaCl but not to protein. Side A is half-filled with a solution of 8% protein, while side B is half filled with a 2% protein solution. Predict what would happen to side A after a few hours.

- A. The number of protein molecules has increased.
- B. The number of water molecules has decreased.
- C. The number of water molecules has increased.
- D. The percentage of water has decreased.

SC.9.1.1.1 Nature of Science

1. A research group has discovered that damselflies, a type of dragonfly, are being infected by a particular type of aquatic protozoan. Both young and adult damselflies are not directly infected by the protozoan but contract the infection from the prey they eat. The graph shows the percentage of adult damselflies infected by protozoans during the summer and early fall.



Which of the following conclusions is supported by the graph?

- A. Infection in embanked ponds increased during the sampling period.
- B. Protozoans were more common in creek-fed ponds than embanked ponds.
- C. Protozoans reproduce more quickly in embanked ponds than creek-fed ponds.
- D. Infection in creek-fed ponds remained constant throughout the sampling period.

2. An osmosis investigation was conducted using chicken eggs to represent cells with semi permeable membranes. The mass of each egg was measured to determine how much water diffused into or out of the eggs. The eggs were first soaked in vinegar to dissolve the shell. Each egg was then placed in one of three different solutions for 24 hours. The table below shows the results of the investigation.

Osmosis in Cells				
Solution	Average Mass of Eggs Before Soaking (grams)	Average Mass of Eggs After Soaking (grams)	Difference in Average Mass (grams)	Percent Change in Average Mass
Vinegar (95% water)	71.2	98.6	27.4	+38.5
Corn Syrup (5% water)	98.6	64.5	34.1	-34.6
Distilled Water (100% water)	64.5	105.3	40.8	+63.3

Based on this experiment, which of the following should be inferred about cells with semi permeable membranes?

- A. Substances other than water may also cross the cell membrane.
- B. Substances other than water may block pores in the cell membrane.
- C. Water enters the cell when placed in environments of high water concentration.
- D. Water leaves the cell when placed in environments with a low concentration of solutes

QUESTIONS 3-4:

A Team of biology students performed an experiment to test the effects of four different solutions on a de-shelled, raw chicken egg. Each raw, unbroken chicken egg of the same size was placed in each of four different solutions. Twenty-four hours later the following results we obtained.

Effects of Unknown Solution Concentrations on the Volume of a Hen's Egg Cell		
Solution	Initial Mass of Egg	Final Mass of Egg
A	55 grams	48 grams
B	47 grams	43 grams
C	41 grams	48 grams
D	45 grams	45 grams

3. Using the data table above and your knowledge about the process of science, which solution would represent the control in this experiment?

- A. Solution A
- B. Solution B
- C. Solution C
- D. Solution D

4. What is the independent variable in this experiment?

- A. Solution A, B & C.
- B. Solution D only
- C. The eggs
- D. Mass