Student Name _____

Teacher Name _____

School _____

System _____

BIOLOGY I

Item Sampler

Tennessee End of Course Assessment
Biology I Form 2

Reporting Category 2: Cells

PEARSON

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Introduction to Biology I

Content of tests

The testing program titled the *Tennessee End of Course Assessment* was established to meet the Tennessee mandate for end of course assessments in Tennessee secondary schools. These tests measure the Tennessee State Performance Indicators. Subject areas covered by the end of course assessments include Mathematics, Language Arts, History, and Science.

Test development

For the *Tennessee End of Course Assessment*, a staff of writers – composed of both teachers and professional test developers experienced in each of the content areas – researched and wrote the items. Professional editors and content specialists carefully reviewed all items and test directions for content and accuracy. To provide a large pool of items for final test selection, the test developers created approximately twice as many items as were needed in the final editions of the tests.

After tryout tests were administered, student responses were analyzed. Professional content editors and researchers carefully reviewed items, their data, and test directions for content, suitability, and accuracy before including particular items and test directions in operational tests.

Test administration

Tennessee End of Course Assessments are given to students as they near the end of courses that are included in the program. Tests may be given midyear for block schedules or near the end of the school year.

You will have ample time to read and answer each of the questions. The Biology I test has been designed to be administered in one session and is not timed.

Tips for Taking the Test

Preparing for the test

- Review this Tennessee End of Course Item Sampler for Biology I carefully and thoroughly.
- Acquire the Tennessee End of Course Practice Test for Biology I, and take the test several times.
- Become familiar with the correct way to mark answers on the answer sheet.

Before the test

- Get a good night's sleep. To do your best, you need to be rested.

During the test

- Relax. It is normal to be somewhat nervous before the test. Try to relax and not worry.
- Listen. Listen to and read the test directions carefully. Ask for an explanation of the directions if you do not understand them.
- Plan your time. Do not spend too much time on any one question. If a question seems to take too long, skip it and return to it later. First answer all questions that you are sure about.
- Think. If you are not sure how to answer a question, read it again and try your best to answer the question. Rule out answer choices that you know are incorrect and choose from those that remain.

Directions for Using the Item Sampler

This Item Sampler for Biology I provides specific information to students and teachers. It contains examples of different item types for each Performance Indicator that may be tested in any given end of course test administration. Performance Indicators have been grouped by Reporting Categories. These Reporting Categories will be used to report information regarding performance on the end of courts test to students, teachers, schools, and systems.

The items in this Item Sampler will not be found in the end of course tests. The number of items in this Item Sampler does not reflect the emphasis of content on the test. In order to identify the emphasis of content, the End of Course Assessment Practice Test for Biology I should be used. The Practice Test gives a better representation of content emphasis across Reporting Categories and Performance Indicators.

An Answer Key is located in Page 32. Use it to check your answers. Review items that you get wrong.

Reporting Category: Cells

Numbers 1 through 46

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

1.

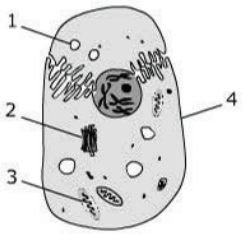
Which organelle modifies proteins before they are either used by the cell or transported out of the cell?

- **A** endoplasmic reticulum
- **B** Golgi complex
- **C** mitochondrion
- **D** ribosome

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

2.

A cell must be able to take in food and remove waste products from the surrounding environment.



Which organelle regulates the movement of materials in and out of the cell?

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

Go On ▶

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

3.

Through cellular respiration, cells convert chemical energy in certain foods to a useable form for cellular functions. Which organelle performs cellular respiration?

- **A** chloroplast
- **B** Golgi complex
- **C** mitochondrion
- **D** nucleus

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

4.

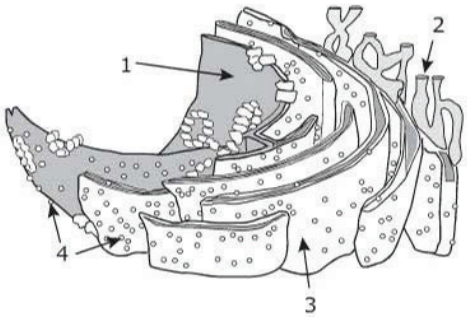
A plant cell's rate of oxygen release decreases steadily over the course of several hours. A decreasing rate of activity in which organelle could directly explain this change?

- **A** vacuole
- **B** ribosome
- **C** chloroplast
- **D** mitochondrion

Go On ▶

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

5. **The diagram shown depicts structures found in a cell.**



What cellular process takes place in the structures labeled number 4?

- **A** DNA replication
- **B** lipid packaging
- **C** protein synthesis
- **D** energy production

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

6. **Which cellular organelle contains enzymes that are necessary for intracellular digestion?**

- **A** flagella
- **B** lysosomes
- **C** ribosomes
- **D** vacuoles

Go On ▶

Performance Indicator: 3210.1.2 Distinguish between prokaryotic and eukaryotic cells.

7.

Characteristics of four organisms are shown in the table below.

Organism	Cell Wall	DNA	Ribosome	Central Vacuole	Chloroplast	Nucleus
1	Yes	Yes	Yes	Some	No	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Some	Yes	Yes	No	No	No
4	Some	Yes	Yes	No	Some	Yes

Which organism is classified as a prokaryote?

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

Performance Indicator: 3210.1.2 Distinguish between prokaryotic and eukaryotic cells.

8.

Which of these characteristics <u>best</u> describe a difference between eukaryotic and prokaryotic cells?

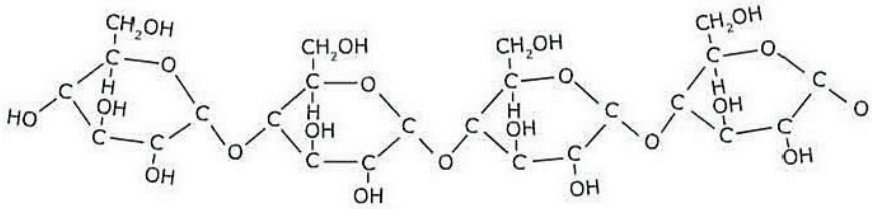
- **A** Eukaryotic DNA has deoxyribose, and prokaryotic DNA has ribose.
- **B** Eukaryotic DNA is free floating in the cell, and prokaryotic DNA is in a nucleus.
- **C** Eukaryotic cells reproduce asexually, and prokaryotic cells reproduce sexually.
- **D** Eukaryotic cells are usually larger and more complex than prokaryotic cells.

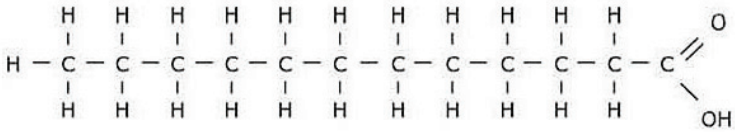
Go On ▶

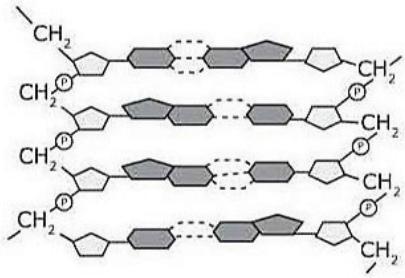
Performance Indicator: 3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.

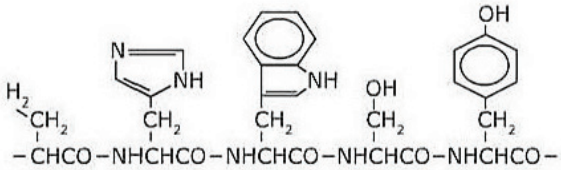
9.

Which of these molecules is a nucleic acid?

A 

B 

C 

D 

Performance Indicator: 3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.

10. **Why do animals need a regular supply of carbohydrates?**

- **A** to provide body structure
- **B** to control cell reproduction
- **C** to regulate the body's water supply
- **D** to provide a source of cellular energy

Performance Indicator: 3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.

11. **Lipids are often found in plant and animal cell vacuoles. Compared to lipids in cell membranes, what is the main function of lipids found in vacuoles?**

- **A** provide cell structure
- **B** store energy for cell functions
- **C** supply cell genetic information
- **D** remove waste materials from the cell

Go On ▶

Performance Indicator: 3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.

12.

A student tested different foods for the presence of carbohydrates and proteins. The student's observations are shown in the table.

Substance	Benedict's Solution	Biuret Reagent	Lugol's Reagent
Apple	Orange	Blue	Purple
Chicken Broth	Blue	Purple	Brown
Potato	Red	Blue	Black
Yogurt	Orange	Purple	Brown

Which substances contained <u>only</u> carbohydrates?

- **A** Potato and Apple
- **B** Potato and Yogurt
- **C** Chicken Broth and Apple
- **D** Chicken Broth and Potato

Performance Indicator: 3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.

13.

The table below shows the results on four unknown substances from compositional tests for biological macromolecules.

Unknown	Test			
	Benedict's Solution	Biuret Reagent	Iodine Solution	Brown Bag
1	Positive	Negative	Positive	Negative
2	Negative	Positive	Negative	Positive
3	Positive	Negative	Positive	Negative
4	Positive	Positive	Positive	Negative

Which unknown substance is <u>most</u> likely primarily composed of protein?

- **A** Unknown 1
- **B** Unknown 2
- **C** Unknown 3
- **D** Unknown 4

Go On ▶

Performance Indicator: 3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.

14. **When a student adds Sudan red to a solution, the solution turns reddish orange. The student can conclude that the solution has a high concentration of which biomolecules?**

- **A** carbohydrates
- **B** lipids
- **C** proteins
- **D** nucleic acids

Performance Indicator: 3210.1.5 Identify how enzymes control chemical reactions in the body.

15. **The enzyme amylase begins reacting with starch during the chewing of food. When the food enters the stomach, amylase is no longer active and starch decomposition stops. When the food leaves the stomach and enters the small intestine, starch decomposition continues. Why is amylase inactive in the stomach?**

- **A** The pH of the stomach is not optimum for amylase.
- **B** The concentration of sugar is great and inactivates amylase.
- **C** The temperature of the stomach is too low for amylase to function.
- **D** The amylase has been degraded by the reaction with the starch molecules.

Go On ▶

Performance Indicator: 3210.1.5 Identify how enzymes control chemical reactions in the body.

16. **Enzymes are catalysts. How do enzymes increase the reaction rate?**

- **A** transfer inhibitors away from reactants
- **B** provide a site for substrates to react
- **C** transfer substrates to ribosomes
- **D** provide energy to reactants

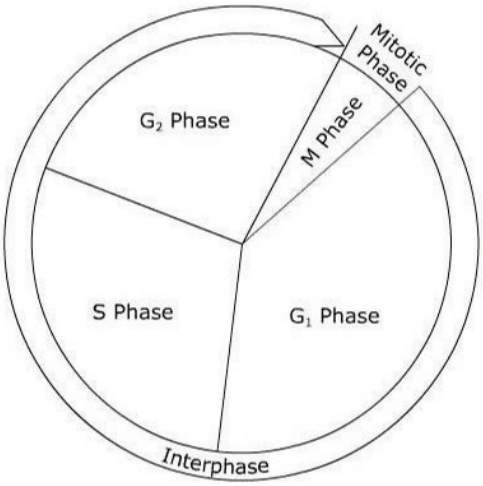
Performance Indicator: 3210.1.6 Determine the relationship between cell growth and cell reproduction.

17. **Which process in the cell cycle is responsible for the nucleus of each new cell having the same number and kinds of chromosomes as the original cell?**

- **A** mitosis
- **B** meiosis
- **C** interphase
- **D** cytokinesis

Performance Indicator: 3210.1.6 Determine the relationship between cell growth and cell reproduction.

18. **The cell cycle is shown in the diagram.**



In which stage of the cell cycle does the amount of DNA double?

- **A** G_1 Phase
- **B** G_2 Phase
- **C** M Phase
- **D** S Phase

Performance Indicator: 3210.1.6 Determine the relationship between cell growth and cell reproduction.

19.

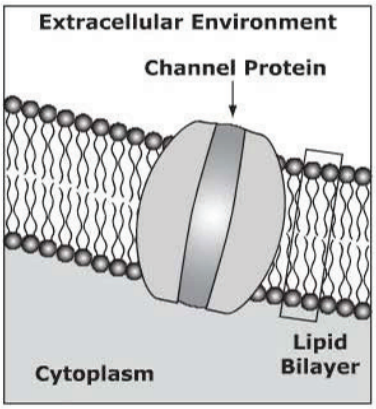
A number of different drugs are available for use when studying the cell cycle and mitosis. One of these, vincristine, interferes with the formation of microtubules. If microtubules are unable to form, which is the best explanation for how vincristine affects mitosis?

- **A** The cells would be unable to replicate the DNA to allow for cell division.
- **B** The cells would be unable to undergo cytokinesis following the completion of mitosis.
- **C** The spindle fibers could not form to move the chromosomes to opposite poles during mitosis.
- **D** The chromosomes would not align at the center of the cell to allow for movement during mitosis.

Performance Indicator: 3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.

20.

A representation of a cell membrane is shown in the diagram below.



How does the channel protein aid in the movement of particles through the cell membrane?

- **A** It helps ions to bond and form larger compounds inside the cell.
- **B** It causes ions inside the cell to attract water molecules from outside the cell.
- **C** It enables ions to be removed from the cell against the concentration gradient.
- **D** It allows ionic compounds to move freely through the membrane to reach equilibrium.

Go On ▶

Performance Indicator: 3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.

21.

A cell is placed in a solution with a salt concentration much higher than the cell cytoplasm. What will most likely happen to the cell?

- **A** The cell will burst.
- **B** The cell will swell.
- **C** The cell will shrink.
- **D** The cell will remain unchanged.

Performance Indicator: 3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.

22.

Water is a solvent that forms solutions when mixed with solutes such as salt and sugar. The table describes four cells and the surrounding liquid in which they are placed.

Beaker	Cell and the Environment
1	A cell with 50% water is placed in a solution that is 90% water.
2	A cell with 70% water is placed in a solution that is 50% water.
3	A cell with a small amount of salt is placed in pure water.
4	A cell with a large amount of salt is placed in pure water.

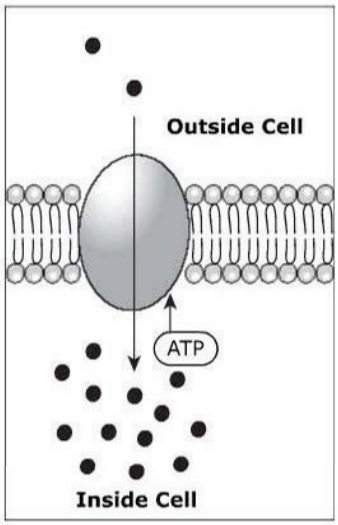
In which beaker will water move from the cell to the surrounding solution?

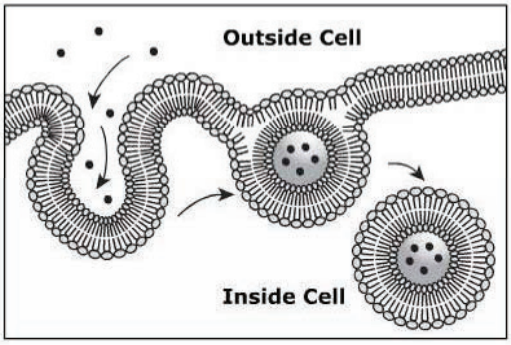
- **A** beaker 1
- **B** beaker 2
- **C** beaker 3
- **D** beaker 4

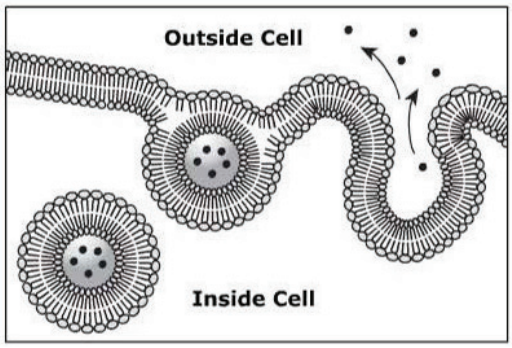
Go On ▶

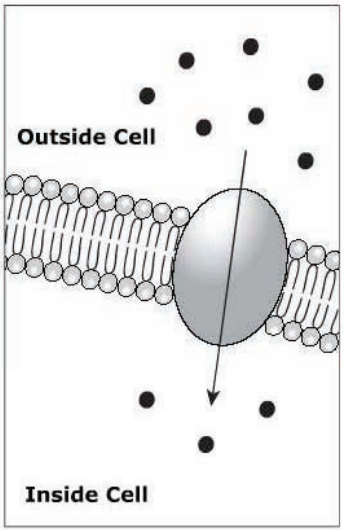
Performance Indicator: 3210.1.8 Compare and contrast active and passive transport.

23. **Certain molecules are able to move across the cell membrane. Which diagram shows the process of passive transport?**

A


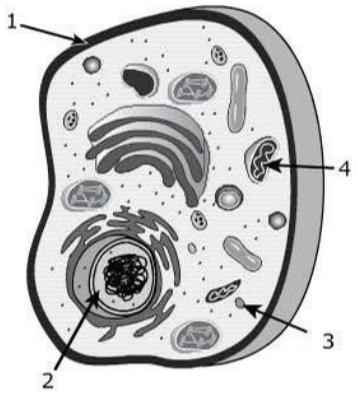
C


B


D


Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

24. **A diagram of a cell is shown below.**



Which organelle stores the information that codes for protein structure?

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

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

25. **In which organelle does photosynthesis take place?**

- **A** ribosome
- **B** mitochondrion
- **C** chloroplast
- **D** central vacuole

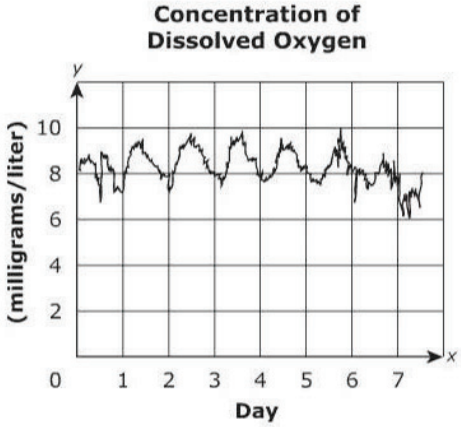
Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

26. **During exercise, muscle cells consume large amounts of energy. Which organelles increase their activity in muscle cells during exercise to make more energy available?**

- **A** nuclei
- **B** ribosomes
- **C** mitochondria
- **D** Golgi complexes

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

27. **The graph below illustrates changes in dissolved oxygen at a monitoring station in Chesapeake Bay.**



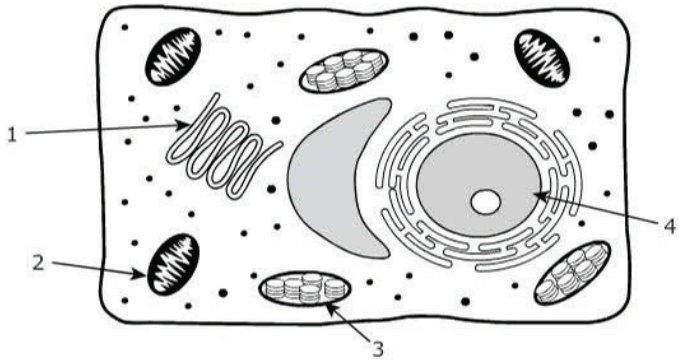
The graph shows evidence of change in the activity of which organelle in algae in Chesapeake Bay?

- **A** chloroplast
- **B** Golgi complex
- **C** mitochondrion
- **D** ribosome

Go On ▶

Performance Indicator: 3210.1.1 Identify the cellular organelles associated with major cell processes.

28. **A typical plant cell is shown.**

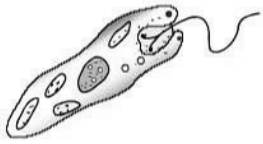


Which organelle is responsible for cellular respiration?

- **A** organelle 1
- **B** organelle 2
- **C** organelle 3
- **D** organelle 4

Performance Indicator: 3210.1.2 Distinguish between prokaryotic and eukaryotic cells.

29. **Which diagram shows a eukaryotic cell?**

- **A**
- **C**
- **B** 
- **D**

Go On ▶

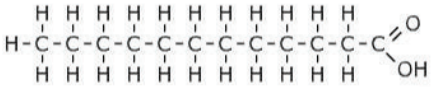
Performance Indicator: 3210.1.2 Distinguish between prokaryotic and eukaryotic cells.

30. **Which structure is found in prokaryotic and eukaryotic cells?**

- **A** nucleus
- **B** ribosome
- **C** Golgi apparatus
- **D** endoplasmic reticulum

Performance Indicator: 3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.

31. **The diagram below shows a macromolecule.**



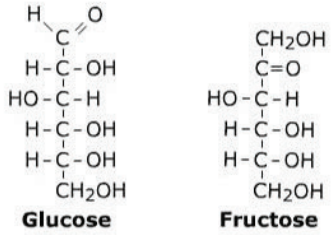
What is one of the functions of this macromolecule?

- **A** energy storage
- **B** structural support
- **C** regulating cellular functions
- **D** controlling immune responses

Go On ▶

Performance Indicator: 3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.

32. **The diagram below shows the structure of glucose and fructose molecules.**



What structure makes glucose and fructose carbohydrates rather than lipids?

- **A** These molecules contain fewer oxygen atoms than hydrogen atoms.
- **B** These molecules contain no double-bonded carbon atoms.
- **C** These molecules contain double-bonded oxygen atoms.
- **D** These molecules contain no carboxylic acid groups.

Performance Indicator: 3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.

33. **Which macromolecule has a structure made up of an amino acid chain?**

- **A** carbohydrate
- **B** nucleic acid
- **C** protein
- **D** lipid

Performance Indicator: 3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.

34. **A student tests for the presence of biomolecules in four unknown liquids. The results of the tests are in the table.**

Unknown	Benedict's Reagent	Biuret Reagent	Sudan IV Reagent
1	+	-	-
2	-	-	+
3	-	+	-
4	-	-	-

Key
+ = Positive result
- = Negative result

What is the most reasonable conclusion why Unknown 4 displayed all negative results?

- **A** This unknown contained lipids.
- **B** This unknown contained proteins.
- **C** This unknown contained distilled water.
- **D** This unknown contained simple carbohydrates.

Performance Indicator: 3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.

35. **Students tested four unknown solutions for the presence of biomolecules. The results are shown in the table below.**

Unknown	Benedict's Solution	Biuret Reagent	Lugol's Solution	Sudan IV Reagent
1	Negative	Positive	Negative	Negative
2	Positive	Negative	Negative	Negative
3	Negative	Negative	Negative	Positive
4	Negative	Negative	Positive	Negative

Which unknown tested positive for simple sugars?

- **A** Unknown 1
- **B** Unknown 2
- **C** Unknown 3
- **D** Unknown 4

Performance Indicator: 3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.

36. **There are reagents that identify the presence of specific organic compounds. Which result indicates the presence of starch?**

- **A** Iodine turns black.
- **B** Iodine turns brick red.
- **C** Biuret reagent turns purple.
- **D** Biuret reagent turns yellow.

Performance Indicator: 3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.

37. **Students are testing for organic compounds in unknown liquids. A student adds Sudan IV to an unknown liquid and observes a red color disperse through the liquid. What organic compound does this identify?**

- **A** carbohydrate
- **B** lipid
- **C** nucleic acid
- **D** protein

Go On ▶

Performance Indicator: 3210.1.5 Identify how enzymes control chemical reactions in the body.

38. **Enzymes are proteins. What is the function of enzymes?**

- **A** reduce the activation energy needed for reactions
- **B** serve as building blocks for amino acids
- **C** provide structural support to cells
- **D** cause all reactions to occur

Performance Indicator: 3210.1.6 Determine the relationship between cell growth and cell reproduction.

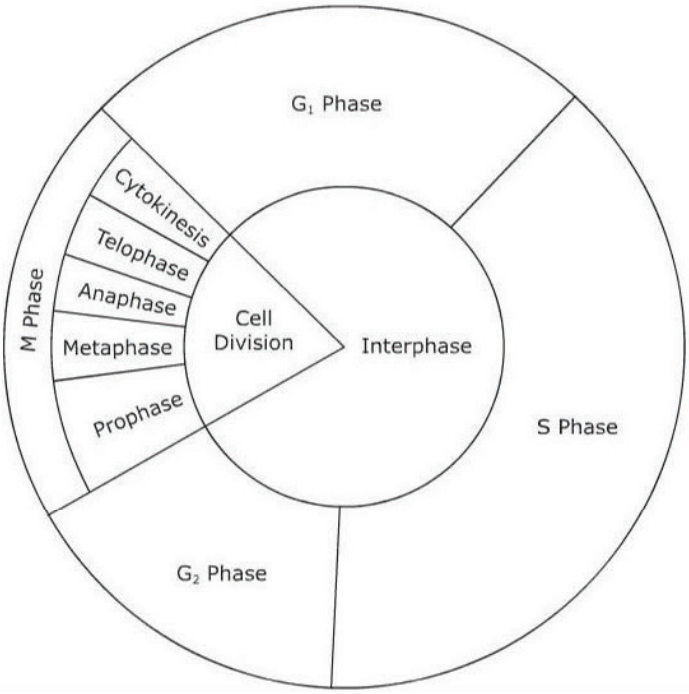
39. **Which statement <u>best</u> describes the outcome of mitosis?**

- **A** Mitosis prevents genetic variation by precisely duplicating parent cell genetic material and passing it on unchanged to daughter cells.
- **B** Mitosis reduces the number of genes by half every time it occurs, forcing offspring to copy remaining genes and reducing diversity.
- **C** Mitosis suppresses genetic variation by segregating new gene forms from established gene forms and failing to pass on new gene forms to daughter cells.
- **D** Mitosis exchanges genetic diversity for dependability by using extensive error-checking to reduce inheritance of both mutations and genetic variations.

Go On ▶

Performance Indicator: 3210.1.6 Determine the relationship between cell growth and cell reproduction.

40. **The cell cycle is shown in the diagram.**



Which phase indicates the part of the cell cycle in which the cell is preparing for mitosis?

- **A** G_1 Phase
- **B** S Phase
- **C** G_2 Phase
- **D** M Phase

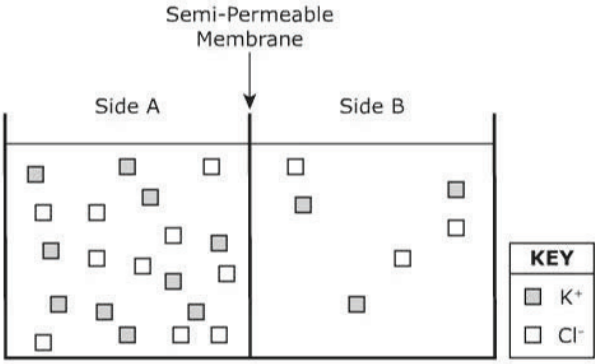
Performance Indicator: 3210.1.6 Determine the relationship between cell growth and cell reproduction.

41. **The cell cycle is the sequence of growth and division that cells go through. When does the cell cycle begin for each individual cell?**

- **A** at the completion of DNA replication
- **B** at the completion of cytokinesis
- **C** at the beginning of mitosis
- **D** at the end of interphase

Performance Indicator: 3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.

42. **The diagram shows dissolved sodium chloride (KCl) particles separated by a semi-permeable membrane.**



After diffusion is complete, how will the contents of Side A and Side B compare?

- **A** Side A will contain most of the K^+ and Cl^- particles.
- **B** Side B will contain most of the K^+ and Cl^- particles.
- **C** Sides A and B will contain approximately equal amounts of K^+ and Cl^- particles.
- **D** Side A will contain mostly K^+ particles, and Side B will contain mostly Cl^- particles.

Performance Indicator: 3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.

43. **A piece of potato is placed in a beaker of distilled water. How will this environment affect the movement of water in the cells of the potato?**

- **A** Water will leave the cells by exocytosis.
- **B** Water will be removed from cell vacuoles.
- **C** Water will move into the cells through the cell membrane.
- **D** Water will move out of the cells through the cell membrane.

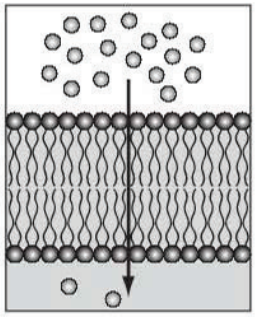
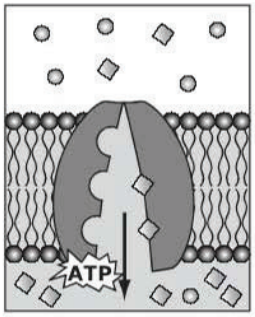
Performance Indicator: 3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.

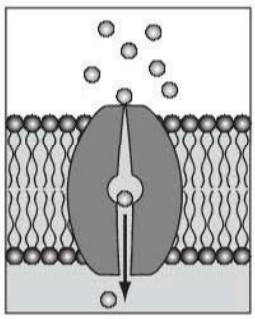
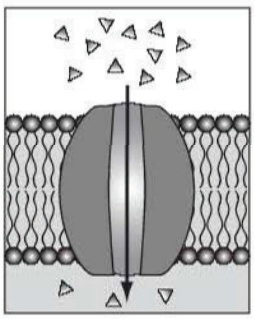
44. **People should not drink sea water. How does drinking sea water affect the cells in the body?**

- **A** Water flows into the cells and the cells expand.
- **B** Water flows out of the cells and the cells shrink.
- **C** The cell membrane prevents water flow and pumps ions in.
- **D** The cell membrane allows water to flow and pumps ions out.

Performance Indicator: 3210.1.8 Compare and contrast active and passive transport.

45. **Materials move through the cell membrane by active and passive transport. Which diagram illustrates active transport?**

- **A**

- **C**


- **B**

- **D**


Performance Indicator: 3210.1.8 Compare and contrast active and passive transport.

46. **What is a characteristic of active transport and not passive transport?**

- **A** energy use
- **B** a cell membrane
- **C** transport protein
- **D** a concentration gradient

Reporting Category 2: Cells		
Item Number	**Correct Answer**	**Performance Indicator**
1	B	3210.1.1 Identify the cellular organelles associated with major cell processes.
2	D	3210.1.1 Identify the cellular organelles associated with major cell processes.
3	C	3210.1.1 Identify the cellular organelles associated with major cell processes.
4	C	3210.1.1 Identify the cellular organelles associated with major cell processes.
5	C	3210.1.1 Identify the cellular organelles associated with major cell processes.
6	B	3210.1.1 Identify the cellular organelles associated with major cell processes.
7	C	3210.1.2 Distinguish between prokaryotic and eukaryotic cells.
8	D	3210.1.2 Distinguish between prokaryotic and eukaryotic cells.
9	C	3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.
10	D	3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.
11	B	3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.
12	A	3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.
13	B	3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.
14	B	3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.
15	A	3210.1.5 Identify how enzymes control chemical reactions in the body.
16	B	3210.1.5 Identify how enzymes control chemical reactions in the body.
17	A	3210.1.6 Determine the relationship between cell growth and cell reproduction.

18	D	3210.1.6 Determine the relationship between cell growth and cell reproduction.
19	C	3210.1.6 Determine the relationship between cell growth and cell reproduction.
20	D	3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.
21	C	3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.
22	B	3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.
23	D	3210.1.8 Compare and contrast active and passive transport.
24	B	3210.1.1 Identify the cellular organelles associated with major cell processes.
25	C	3210.1.1 Identify the cellular organelles associated with major cell processes.
26	C	3210.1.1 Identify the cellular organelles associated with major cell processes.
27	A	3210.1.1 Identify the cellular organelles associated with major cell processes.
28	B	3210.1.1 Identify the cellular organelles associated with major cell processes.
29	B	3210.1.2 Distinguish between prokaryotic and eukaryotic cells.
30	B	3210.1.2 Distinguish between prokaryotic and eukaryotic cells.
31	A	3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.
32	D	3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.
33	C	3210.1.3 Distinguish among proteins, carbohydrates, lipids, and nucleic acids.
34	C	3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.
35	B	3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.

36	A	3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.
37	B	3210.1.4 Identify positive tests for carbohydrates, lipids, and proteins.
38	A	3210.1.5 Identify how enzymes control chemical reactions in the body.
39	A	3210.1.6 Determine the relationship between cell growth and cell reproduction.
40	C	3210.1.6 Determine the relationship between cell growth and cell reproduction.
41	B	3210.1.6 Determine the relationship between cell growth and cell reproduction.
42	C	3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.
43	C	3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.
44	B	3210.1.7 Predict the movement of water and other molecules across selectively permeable membranes.
45	C	3210.1.8 Compare and contrast active and passive transport.
46	A	3210.1.8 Compare and contrast active and passive transport.