Alabama High School Graduation Exam Student Review Guide:

Biology

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by
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Cecilia Lowery Boles

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Preface

The ***Alabama High School Graduation Exam Student Review Guide: Biology*** is written to help students review the skills needed to pass the Science (Biology) portion of the Alabama High School Graduation Exam, Third Edition (AHSGE). This comprehensive guide is based on the content standards of the Alabama Biology Core developed by the Alabama State Department of Education.

How To Use This Book

Students:
Passing the Alabama High School Graduation Exam (AHSGE) is required for graduation. The AHSGE is a multiple-choice exam given in five subject areas: Language, Reading Comprehension, Mathematics, Science (Biology), and Social Studies. This book is a review for the Science portion of the AHSGE.

① Take the pre-test found in the front of this book. The pre-test covers all the science skills tested on the AHSGE in a format similar to the actual test. The pre-test is designed to identify areas that you need to review.

② Score the pre-test. Using the pre-test evaluation chart, circle the questions that you answered incorrectly.

③ For each question that you missed on the pre-test, review the corresponding sections in the book. Read the instructional material, do the practice exercises, and take the section review test at the end of each section.

④ After reviewing the skills, take the two practice tests (provided as separate booklets). These practice tests are written to look similar to the actual AHSGE; therefore, they will give you practice in taking the test.

⑤ After taking Practice Test A and/or Practice Test B, use the practice test evaluation charts, which are found directly after each practice test, to identify areas for further review and practice. The practice test evaluation charts can be used in the same way as the pre-test evaluation chart.

Teachers:
This review guide is also intended to save you, the teacher, time in the classroom. It can be used for classroom instruction or for individual student review. Since this student guide offers review for ALL of the science skills necessary for passing the AHSGE in science, it provides you one consolidated resource of materials to help your students prepare for the exam.

① When teaching or tutoring individual students, use the strategies outlined above for students. By taking the pre-test, students can identify areas that need improvement. The pre-test evaluation chart directs the students to the sections they need to review for instruction and additional practice.

② For classroom study, use this guide to supplement lesson plans and to give additional review for skills tested on the AHSGE. Purchase a class set of guides for use in the classroom or assign guides to students for out-of-classroom work.

③ Assign the practice tests (provided in separate booklets) as comprehensive review tests.

④ Use the practice test evaluation charts found after each practice test to identify areas needing further review.

⑤ You may want to use the pre-test to establish a benchmark for each student. Score the pre-test by counting each question as 1 point. Then, after the students have completed all the exercises in the workbook, use one or both practice tests to gauge progress. You should see marked improvement between the initial and final benchmarks.

⑥ Please **DO NOT** photocopy materials from these guides or the practice test booklets. These guides are intended to be used as student workbooks, and individual pages should not be duplicated by any means without permission from the copyright holder. To purchase additional or specialized copies of sections in this book, please contact the publisher at 1-800-745-4706.

The Authors

Kelly Davis Berg graduated from Clemson University in Clemson, South Carolina, where she earned a Bachelor of Science degree in Chemical Engineering. Besides her background in industrial research, she has worked in the field of educational publishing for ten years, and she has taught chemistry laboratory skills to students at the high school and college levels. In addition to her role as project coordinator and executive editor for educational publications in several subject areas, she has also co-authored books in science and mathematics.

Cecilia Lowery Boles graduated from Winthrop College in Rock Hill, South Carolina, where she earned her Bachelor's and Master's degrees as well as the degree of Educational Specialist in Secondary Curriculum and Instruction. In addition to her certification in science, she holds certifications in Learning Disabilities, in Secondary Administration, and as Secondary Science Supervisor. She has taught biology, anatomy and physiology, and Advanced Placement and International Baccalaureate Biology for ten years at Rock Hill High School in Rock Hill, South Carolina. Mrs. Boles began teaching at South Pointe High School in Rock Hill in the 2005-2006 school year.

Acknowledgments

The authors and publisher wish to thank the following people: Cathy L. Beck of Spartanburg, SC, for the SEM images used in this book and the Greenwood Genetic Center for the use of karyotype images. We also thank the teachers in Alabama who gave us feedback and suggestions on what should be included in these materials.

Cecilia Boles
I would like to express my gratitude to my parents, who are still showing me the meaning of "life-long learners." A special thanks also goes to the Thespians at South Pointe High School for their constant support and encouragement.

Kelly Berg
I especially appreciate my mother Becky Davis for proofreading this entire text and catching mistakes that no one else saw. Thanks also to Laura Silvernale for her assistance in formatting and editing this book. These people, along with my husband Jeff, helped me to keep my sanity during this project.

Table of Contents

Biology Pre-Test

Introduction

Introduction
The pre-test that follows is designed to identify areas where you, the student, can improve your skills before or after taking the Alabama High School Graduation Exam (AHSGE) in Science.

Directions
Read each question carefully and darken the circle corresponding to your answer choice. Once you have completed this pre-test, circle the questions you answered incorrectly on the pre-test evaluation chart on page 26. For each question that you missed on the pre-test, review the corresponding sections in the book as given in the evaluation chart. Read the instructional material, do the practice exercises, and take the section review test at the end of each section.

Purpose of the Pre-Test
The following pre-test can be used as practice for the AHSGE in Science, but it is primarily a diagnostic tool to help you identify which skills you can improve in order to prepare better for the actual test. Any pre-test question answered incorrectly may identify a skill needing improvement or mastery. Review the corresponding skill(s) indicated in the Pre-Test Evaluation Chart by reading the instructional material on the given pages and completing the practice exercises and reviews. By reviewing each skill, you will improve mastery of the material to be tested on the Science portion of the AHSGE and potentially increase the score you receive on that exam. (The practice tests, which are given in separate booklets, are provided to give you additional practice taking tests similar to the actual AHSGE in Science.)

General Information About the AHSGE in Science
The AHSGE in Science will consist of 100 multiple-choice questions. You must obtain a score of 491 or higher on the exam to pass.

9. A cell moves glucose across its cell membrane from an area of lower concentration to an area of higher concentration by expending energy to do so. This movement is an example of

A osmosis.
B active transport.
C diffusion.
D passive transport.

Ⓐ Ⓑ Ⓒ Ⓓ

10. The cell membrane is made primarily of

A phospholipids.
B nucleic acids.
C carbohydrates.
D water.

Ⓐ Ⓑ Ⓒ Ⓓ

11. Which of the following is the main function of nucleic acids in cells?

A to create ATP
B to store genetic information
C to store long-term energy
D to form structural components of the body

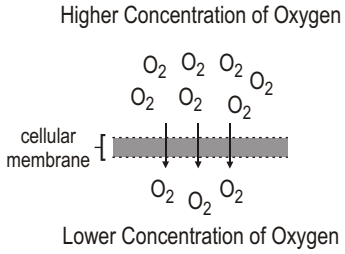
Ⓐ Ⓑ Ⓒ Ⓓ

12. The concentration of CO_2 (carbon dioxide) must be maintained within a narrow range in the blood of most mammals. Maintaining the correct concentration of CO_2 in the blood is an example of

A excretion.
B glycolysis.
C homeostasis.
D transpiration.

Ⓐ Ⓑ Ⓒ Ⓓ

13. Study the diagram below.



The movement of oxygen as diagramed above is an example of

A osmosis.
B active transport.
C diffusion.
D photosynthesis.

Ⓐ Ⓑ Ⓒ Ⓓ

14. Which of the following is NOT a function of protein?

A forming the main component of muscle
B forming enzymes
C storing and transporting substances
D storing and passing on genetic information

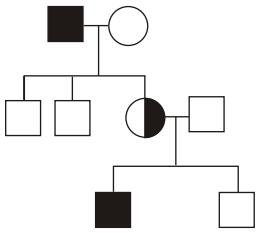
Ⓐ Ⓑ Ⓒ Ⓓ

15. A plant that normally grows near a freshwater pond is transplanted near a saltwater marsh. What will MOST likely happen to the plant?

A Its cells will gain turgor pressure.
B The plant will wilt and possibly die.
C Its cells will burst.
D The plant will experience no change.

Ⓐ Ⓑ Ⓒ Ⓓ

39. Look at the pedigree graphic below.



This pedigree shows that only males are affected by a certain disorder. What type of inheritance is indicated by the pedigree?

A recessive
B dominant
C incomplete
D sex-linked

Ⓐ Ⓑ Ⓒ Ⓓ

40. Certain breeds of cattle have a gene for red hair and a gene for white hair. If a white bull is crossed with a red cow, the offspring will have roan hair. Roan is a combination of some red and some white. The genes that cause roan hair color are an example of

A incomplete dominance.
B codominance.
C recessive.
D homozygous dominance.

Ⓐ Ⓑ Ⓒ Ⓓ

41. The trait for brown eyes (B) in humans is dominant to blue eyes (b). Two parents with brown eyes have a child with blue eyes. What can you conclude about the genotypes of the parents?

A Both parents are heterozygous for eye color.
B One parent is homozygous for brown eyes, and the other parent is heterozygous.
C Both parents are homozygous for brown eyes.
D One parent is homozygous for brown eyes, and the other parent is homozygous for blue eyes.

Ⓐ Ⓑ Ⓒ Ⓓ

42. If a certain trait is present even if only one allele for that trait is present, that trait is said to be

A a sex-linked trait.
B a pedigree trait.
C a dominant trait.
D a recessive trait.

Ⓐ Ⓑ Ⓒ Ⓓ

43. Which of the following would be the LEAST likely to cause birth defects in offspring?

A repeated exposure to x-rays
B prolonged skin contact with pesticides
C losing a limb in an industrial accident
D breathing second-hand tobacco smoke

Ⓐ Ⓑ Ⓒ Ⓓ

44. What is the function of messenger RNA?

A to transfer the code from the DNA in the nucleus to the cytoplasm
B to store and pass on genetic information
C to assist in building proteins by adding amino acids in the ribosome
D to create the energy needed for cellular processes

Ⓐ Ⓑ Ⓒ Ⓓ

45. A chemical company that produces a weed killing chemical also produces a genetically modified corn plant that is not harmed by the weed killer. The company created the new corn plant by adding an herbicide resistant gene. These new corn plants are examples of

A plasmids.
B transgenic organisms.
C transformations.
D recombinants.

Ⓐ Ⓑ Ⓒ Ⓓ

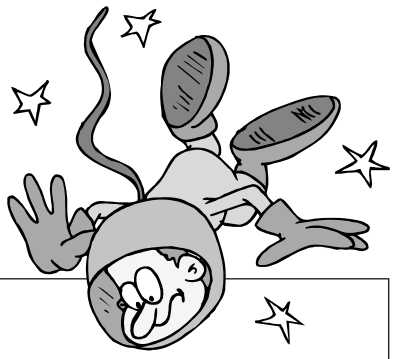
Biology Pre-Test

Evaluation Chart

If you missed question #:	Go to section(s):	If you missed question #:	Go to section(s):	If you missed question #:	Go to section(s):
1	1.1, 1.3, 2.2	35	9.2, 9.3	69	17.3
2	3.1	36	10.1, 10.2	70	17.5
3	3.1	37	10.1, 10.2	71	17.1, 17.3, 17.5, 18.2, 18.3
4	1.1, 1.3	38	10.1, 10.2	72	18.3
5	2.3, 2.4	39	10.3, 11.4	73	17.2
6	3.1, 3.2	40	11.2	74	18.4
7	3.1, 3.2	41	10.1, 10.2	75	20.1, 20.2
8	2.1, 2.3, 2.4, 5.2	42	10.1	76	18.4
9	7.1, 7.2, 7.3, 7.4	43	12.4	77	17.4, 18.4
10	6.3, 7.1	44	12.3	78	18.3
11	6.5	45	12.5	79	20.2
12	7.1, 7.5	46	12.1, 12.2	80	22.3, 22.4
13	7.1, 7.2	47	12.5	81	22.1, 22.5
14	6.4, 6.6	48	12.3, 12.4	82	22.3
15	7.3	49	12.1	83	13.3, 15.1
16	7.3	50	9.2	84	5.5, 13.3
17	7.6	51	20.2	85	22.4
18	6.6	52	10.1, 10.2, 10.3	86	22.3
19	7.5	53	10.1, 10.2, 11.3	87	22.1, 22.5
20	8.3, 8.5	54	8.3, 13.3, 14.1, 14.2, 15.1	88	23.4
21	8.1, 8.2	55	14.1, 14.3	89	21.4
22	5.4, 5.5	56	13.4	90	21.2
23	5.4	57	13.3	91	22.2, 22.5
24	5.3, 5.4	58	13.2	92	23.3
25	5.1	59	13.1	93	23.4
26	5.3, 13.3, 14.1	60	13.1	94	21.1
27	5.2	61	13.1	95	23.1
28	5.6	62	15.1, 15.2, 15.3	96	23.1
29	22.1	63	15.1, 15.4, 15.5	97	22.2
30	5.6	64	15.3	98	22.2
31	9.1	65	16.2	99	23.2
32	9.2	66	15.6	100	22.6
33	9.4	67	15.5		
34	9.2	68	16.2, 16.4		

Laboratory Equipment, Safety, and Procedures

Section 2.2
Scientific Measurements



Pre-View 2.2

- **Mass** – the measure of how much matter is in an object
- **Gram** – SI unit for mass
- **Scale balance** – used to measure mass
- **Triple beam balance** – a type of scale balance commonly used in high school laboratories
- **Weight** – the measurement of *force* exerted by gravity on an object
- **Newton** – SI unit for force (and weight)
- **Spring scale** – equipment used to find force or weight
- **Ruler** or **meter stick** – equipment used in the laboratory to measure length in millimeters, centimeters, or meters
- **Meter** – SI unit for length

We mentioned in Section 1.3 that mass and weight are not the same, but what is the difference between the two? You've already seen that **mass** is the measurement of how much matter is in an object. It is measured in **grams** using a scale balance such as a triple beam balance. Weight is a measurement of the force of gravity on an object, and it is measured in newtons using a spring scale. If you went to the moon where the gravity is only about 20% of the earth's gravity, your mass would not change since your body would contain the same amount of matter, but your weight would be less on the moon than on earth due to gravity.

Equipment for Measuring Mass

To find the mass of an object, a **scale balance** is used. The most common types of scale balances are the **triple beam balance** (figure 2-10) and the electronic balance (figure 2-11). Both types of balances measure mass in grams. The triple beam balance is commonly found in high schools, so let's review how to use one to get a mass.

Triple Beam Balance

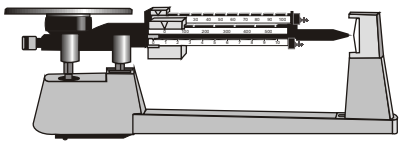


Fig. 2-10

Electronic Balance

Fig. 2-11

Using a Triple Beam Balance

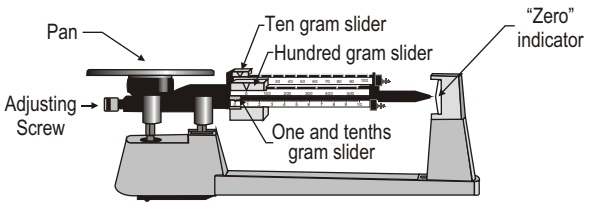


Fig. 2-12
Parts of a Triple Beam Balance

Step 1

To use a triple beam balance like the one in Figure 2-12, you must first be sure that it is on a level surface. Before you put anything on the pan, move the three sliders as far left as they will go. The indicator on the right should be in line with the zero mark. If not, calibrate the balance by turning the screw under the pan until it is in line.

Step 2

Place the object you are measuring on the pan and move the 100 gram slider on the beam until the indicator drops below the mark. Be sure it "clicks" into place. The number *to the left* of this point will show the number of hundreds of grams in the object. Move the slider back one notch to the left so that the indicator is once again above or equal to the zero mark. The slider should now point to the number of hundreds of grams in the object.

Step 3

Next, move the 10 gram slider along its beam until the indicator drops below zero. Be sure the slider clicks into place. Once again the number to the left of this point will tell you how many tens of grams are in the object. Move the slider back one notch to the left so that the indicator is above or equal to the zero mark. This slider will now point to the number of tens of grams in the object.

Step 4

The one gram slider is not notched, so you can move it anywhere on the beam. The numbers marked on this beam are grams, and the marks between are tenths of a gram. Move this last slider until the indicator exactly lines up with the zero mark. The object's mass now "balances" the mass on the beams. By adding the numbers together, you can find the mass of the object. Notice that the mass shown in figure 2-13 is 278.4 grams.

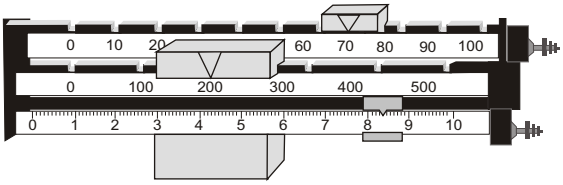


Fig. 2-13
278.4 grams

Equipment for Measuring Weight or Force

Weight is a measurement of the force of gravity on an object, and it is measured in **newtons**. (The newton is the SI unit for force.) Weight and force are measured using a **spring scale**. Your bathroom scale is a spring scale although it does not look like the one in figure 2-14. Some scales have a dial readout, and others have a linear scale as shown in figure 2-14.

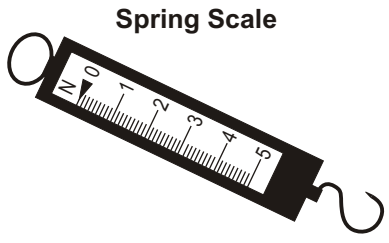


Fig. 2-14

To find the weight of an object using this spring scale, you would hold the scale up and attach the object to be weighed to the hook at the bottom. The spring will stretch, and the pointer will move along the scale and point to the number that shows the object's weight.

Measuring Length

As you saw in Section 1.2, the SI unit for length is the meter. In the laboratory, length is commonly measured with a **ruler** or **meter stick**. Review the ruler shown in figure 2-15, which is drawn to scale.

Do you remember what the small marks are called? How about the longer, numbered marks? The small marks represent millimeters, and the numbered marks represent centimeters.

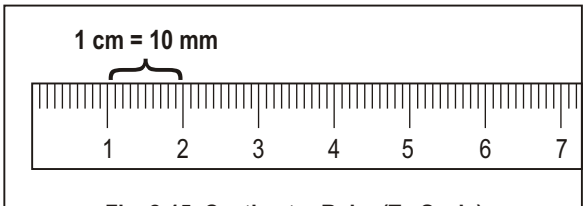
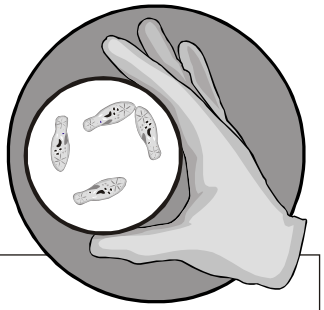


Fig. 2-15 Centimeter Ruler (To Scale)

Cell Structure and Function

Section 5.1
Cell Theory



Pre-View 5.1

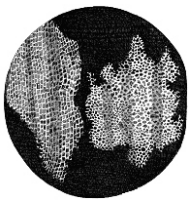
- **Cell** – the smallest unit of life
- **Robert Hooke** – first to observe cells; gave cells their name
- **Anton van Leeuwenhoek** – first to observe living cells
- **Matthias Schleiden** and **Theodor Schwann** – first to introduce the idea that all living things are made up of cells
- **Rudolf Virchow** – first to introduce the idea that cells are created from other preexisting cells
- **Cell theory** – theory that all living organisms are composed of units called cells, that cells are the basic unit of structure and function of living organisms, and that all cells come from other living cells

In Section 4, you saw that all things are made up of chemical **elements,** such as hydrogen, oxygen, carbon, nitrogen, iron, etc. The smallest particle of any element is called an **atom**. You also saw that atoms of one or more elements combine to form chemical compounds. Examples of simple chemical compounds are water, carbon dioxide, and iron oxide (rust). More complex compounds include carbohydrates, DNA, and proteins.

So if atoms of different elements make up all things, what makes the difference between living things and non-living things? The answer to that question is the organization of elements into cells. A **cell** is the smallest unit of life. Some living things, such as bacteria, are composed of only one cell. Other living things, such as a human being or an oak tree, are made up of many cells. In biology, there is a lot to know about cells, so let's start with a little history.

Historic Discoveries

Look around you. Unless you were told, how would you know that you are made up of trillions of cells? It wasn't until the invention of microscopes that people were able to discover these "building blocks" of living things.



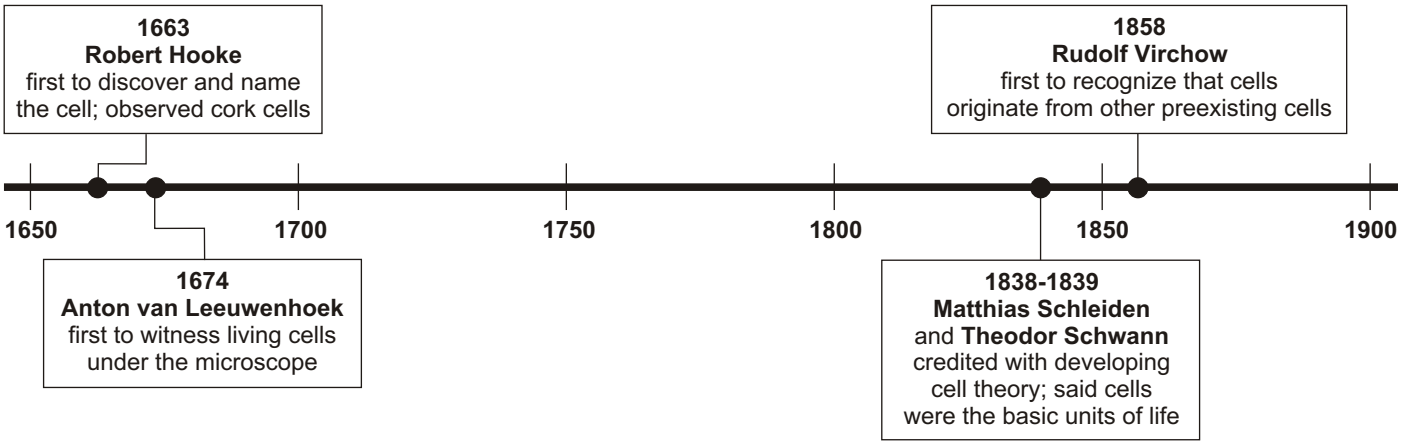
Robert Hooke
In 1665, **Robert Hooke** built a crude compound microscope and examined thin slices of cork. By using the microscope, he observed that the cork was made up of "many little boxes." He named these "little boxes" *cells*. So Robert Hooke is credited with first discovering and naming cells. What he observed was simply the cell walls of dead plant cells.

Anton van Leeuwenhoek
Anton van Leeuwenhoek was a microscope maker. In 1674, he was the first person to observe *live* cells under a microscope. He observed algae, protozoa, bacteria, red blood cells, and many other types of microscopic organisms.

Matthias Schleiden and **Theodor Schwann**
Matthias Schleiden was a botanist who studied plant cells. **Theodor Schwann** was a zoologist who studied animal cells. In 1838, Schleiden concluded that all plants were made up of cells. In 1839, Schwann came to the same conclusion about animal cells. Together, these two men helped to formulate part of our modern cell theory, which states that all living things are made up of one or more cells.

> **Hint:** To help you remember who studied animal cells and who studied plant cells, Schwann's name contains the letter *a* for *animal*. Or remember that *Schwann* is similar to *swan*, an animal (bird).

Rudolf Virchow
Rudolf Virchow was a physician who studied how diseases affected cells. He strongly supported Schleiden and Schwann's cell theory that all living things are made up of cells. However, in 1858 Virchow was the first to recognize that cells originate from other cells. (Before this time, it was believed that cells formed on their own.) This idea that cells are formed from other cells makes up the remainder of our modern cell theory.



Modern Cell Theory

Hooke and Leeuwenhoek were the first to view cells. About 150 years later, Schleiden, Schwann, and Virchow were able to organize this earlier work into a theory about all cells. Each of these scientists was important to the development of our modern theory of cells, which is called the **cell theory**. It has the following three parts.

Cell Theory

- All living things are made up of one or more cells.
- The cell is the basic unit of structure and function in a living organism.
- All cells come from the reproduction of preexisting cells.

Homeostasis
Section 7.3
Passive Transport: Osmosis

Pre-View 7.3

- **Osmosis** – the movement of water across a membrane
- **Solute** – dissolved particles
- **Hypertonic** – having a higher solute concentration outside the cell and causing the cell to shrink
- **Hypotonic** – having a higher solute concentration inside the cell and causing the cell to swell
- **Isotonic** – having equal solute concentrations inside and outside the cell

Osmosis is also a type of passive transport since it does not use the cell's energy. Like diffusion, it moves molecules from a higher concentration to a lower concentration. So, you may be wondering what makes osmosis different from diffusion. There are two important things to remember about osmosis.

1. It is always the movement of *water* molecules.
2. It moves water molecules across a selectively permeable membrane through which the **solute** (dissolved particles) cannot cross.

Osmosis occurs when the concentration of a solute (particles other than water) is greater on one side of a membrane than on the other side of the membrane, BUT the solute particles CANNOT diffuse through the membrane. If the solute particles could move through the membrane, they would do so by diffusion. If the solute particles cannot diffuse, water will move through the membrane in order to equalize the concentration on each side of the membrane. The end result is that water molecules move through the membrane from an area of *higher water concentration* to an area of *lower water concentration* (figure 7-3).

Osmosis: The Movement of Water Through a Selectively Permeable Membrane

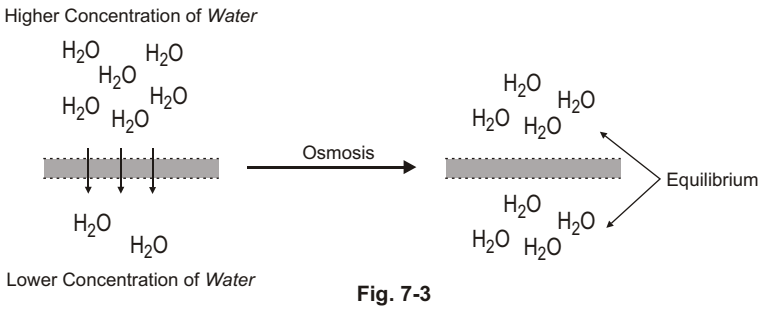


Fig. 7-3

When we are talking about osmosis, we use three words to describe the solutions: *hypertonic, hypotonic,* and *isotonic.* Here are what those terms mean.

Hypertonic Solution

Have you ever poured salt on a snail or slug in your yard, and then watched as it seemed to melt before your eyes? Adding the salt caused the cells of the slug to be surrounded by a hypertonic solution. **Hypertonic** means that the solution outside the cell membrane contains less water and more solute than the solution inside the cell membrane. Water rushes out of the cell through the cell membrane, and the cell shrivels up. This movement of water out of the cells makes it looks as if the slug is melting.

Hint: In a hypotonic solution, will a cell shrink or swell? It will swell. A simple word association may help you to remember this answer. Associate "hypo" with an "o" with "hippo." Hippos are large animals. Remember that cells in a hypotonic solution will swell up to the size of a hippo.

Effects of Osmosis on Animal Cells

Since an animal cell has only its cell membrane around it, the cell is very vulnerable to the effects of osmosis.

Hypertonic solutions will cause animal cells to shrink. If the concentrations are very different inside and outside the cell, an animal cell in a hypertonic solution will shrivel and die. For example, **salt water** is hypertonic to the cells of most vertebrates that live in the ocean. To avoid dehydration that could be fatal to them, these animals constantly drink sea water and then desalt it by pumping the salt out of their gills using *active transport*. (We'll get to that next.) You may have seen pictures of marine turtles that blow salt out of special glands on their noses for the same reason. If a freshwater animal, however, is put in saltwater for an extended period of time, its cells will lose too much water in the hypertonic solution, and the animal will die of dehydration.

In a hypotonic solution, animal cells swell. If the cell membrane is not strong enough, the cells will burst. For example, a red blood cell that contains almost 1% solutes will burst if it is put in pure water (0% solute). A saltwater fish that is put in freshwater will eventually die because its cells will gain too much water.

Effects of Osmosis on Plant Cells

Plant cells have a rigid cell wall in addition to the cell membrane, so the effects of osmosis on plant cells are a little different.

In a hypertonic solution, the plant cell loses water. The contents of the cell will shrink some, but the cell wall will still give the cell some shape and structure. Because of the cell wall, a plant cell in a hypertonic solution may not appear smaller. In this condition, however, the plant may wilt. In a highly hypertonic solution, for example if you put a plant in salt water, the contents of the cell will completely shrink away from the rigid cell wall in a process called **plasmolysis.** In extreme conditions, the cell wall may collapse and the cell will die.

In an isotonic solution, a plant cell may not have enough water in it to fully fill the cell wall cavity. Plants in an isotonic solution may appear wilted or **flaccid** (limp).

In a hypotonic solution, plant cells take in water, but their rigid cell walls keep them from bursting. The cell walls allow pressure to build up within the cells. When the pressure equals the osmotic pressure, osmosis ceases. This pressure is called **turgor pressure**. Turgor pressure gives plants **turgor**, rigidity so that they can "stand up" and not wilt. Have you ever put wilted vegetables in fresh water? If so, you put them in a hypotonic solution. What happens to the vegetables? The water goes into the cells and makes them puff up so they are no longer wilted.

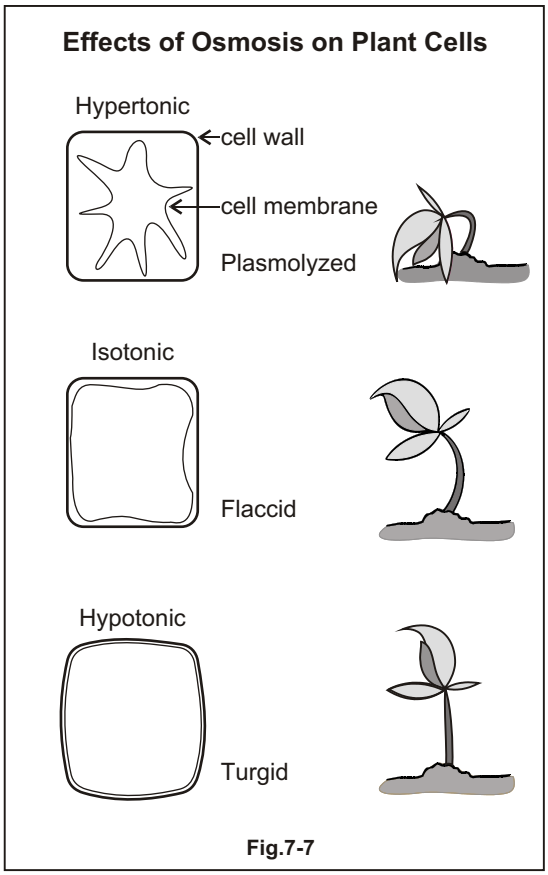
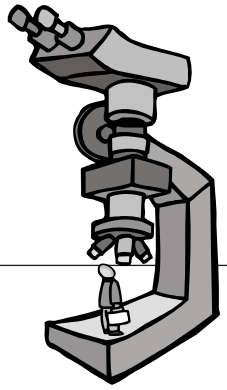


Fig.7-7

Classification of Organisms

Section 13.3
The Six Kingdoms



Pre-View 13.3

- **Five Kingdom System** – classification system that includes Animalia, Plantae, Fungi, Protista, and Monera
- **Six Kingdom System** – classification system that includes Animalia, Plantae, Fungi, Protista, Eubacteria, and Archaebacteria
- **Archaebacteria** – newest kingdom that includes organisms that look like bacteria but have different characteristics than "normal" bacteria
- **Eubacteria** – typical bacteria that were classified as Monera in the five kingdom system
- **Prokaryotic** – describes the cell of single-celled organisms where the cell does not have a true nucleus
- **Eukaryotic** – describes the cells of organisms where each cell generally has a nucleus and other membrane-bound organelles (Mature red blood cells in mammals are eukaryotic, but they do not contain a nucleus.)
- **Autotrophic** – describes organisms that make their own food
- **Heterotrophic** – describes organisms that cannot make their own food

When Aristotle first began to classify organisms, he divided them into two main kingdoms, plants and animals. You are probably most familiar with these two kingdoms. As scientists began using microscopes, they discovered microscopic organisms. They also discovered differences in cell structure between different organisms. They discovered that some organisms have characteristics that make it difficult to classify them as either plant or animal. Two kingdoms no longer worked, and eventually they decided on a **five kingdom system**: Animalia, Plantae, Fungi, Protista, and Monera.

These five kingdoms stuck around for a while, and many people still think in terms of these five kingdoms. However, more recently, something else interesting happened. With the new technology that became available, scientists discovered that some bacteria have different gene sequences than any other organism living on earth. This discovery led to the formation of a new kingdom called the **archaebacteria**, or "ancient bacteria." In addition to having different gene sequences, these bacteria also have chemical specializations in their cell walls, and they live in the most extreme conditions. All other bacteria were placed in the kingdom Eubacteria. So, now most scientists commonly use a **six kingdom system** for classification: Animalia, Plantae, Fungi, Protista, Eubacteria, and Archaebacteria. (Not to confuse the point, but some scientists classify the six kingdoms into three main "domains," with a domain being a taxon above kingdom. As we continue to learn more and more, these classification systems may very well change again!)

The Six Kingdoms

- **Archaebacteria** (newest kingdom) – organisms that resemble bacteria but that live in extreme conditions
- **Eubacteria** (known as the **Monera** kingdom in the five kingdom system) – typical bacteria
- **Protista** – examples are algae, protozoa, slime molds
- **Fungi** – examples are molds, mushrooms, yeasts
- **Plantae** – examples are mosses, ferns, grasses, vegetable plants, trees
- **Animalia** – examples are sponges, jellyfish, worms, snails, insects, fish, frogs, lizards, birds, kangaroos

Remember that a kingdom is the largest classification group. Organisms in each kingdom share many cellular characteristics. For example, are the organisms unicellular or multicellular? Are the organisms' cells prokaryotic (no membrane bound organelles) or eukaryotic (have membrane bound organelles)? Do the cells have a cell wall? If so, what is it made of? Does the organism make its own food (**autotrophic**) or must it obtain food (**heterotrophic**)? Note that organisms that make their own food usually have chloroplasts in their cells, which enable them to carry out photosynthesis. Only a few types of organisms can make their own food without chloroplasts, and those are the ones that undergo chemosynthesis instead of photosynthesis. The chart below shows these main cellular characteristics for organisms in the six kingdoms.

Kingdom	Type of cells	Nucleus?	Cell Wall?	Makes Its Own Food?
Archaebacteria (or Archae)	Unicellular	No	Yes, but not made of peptidogylcan	Some do, mostly by chemosynthesis
Eubacteria (Monera)	Unicellular	No	Most do, usually made of peptidoglycan	Some do, mostly by photosynthesis
Protista	Unicellular or Multicellular	Yes	Some do, mostly made of cellulose	Some do by photosynthesis
Fungi	Unicellular or Multicellular	Yes	Yes, made of chitin and cellulose	No
Plantae	Multicellular	Yes	Yes, made of cellulose	Yes, by photosynthesis
Animalia	Multicellular	Yes	No	No

Practice 1

For each organism described, choose the MOST likely kingdom that the organism belongs to. Each kingdom will only be used once.

_____ 1. a prokaryotic, unicellular organism that contains chloroplasts

_____ 2. a eukaryotic, unicellular organism that contains chloroplasts

_____ 3. a multicellular organism whose cells do not have a cell wall

_____ 4. a multicellular organism that has a cell wall but does not make its own food

_____ 5. a multicellular organism the makes its own food using photosynthesis

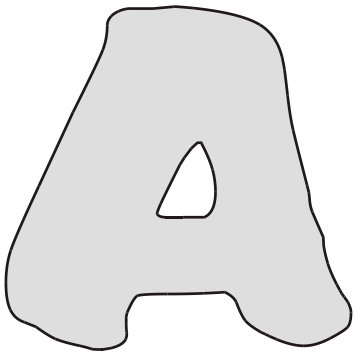
_____ 6. a unicellular organism that lives in complete darkness deep on the ocean floor near a volcanic vent

A. Archaebacteria
B. Eubacteria
C. Protista
D. Fungi
E. Plantae
F. Animalia

Alabama High School Graduation Exam Student Review Guide:

Biology

Practice Test



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Practice Test A for the Alabama High School Graduation Exam Student Review Guide: Biology

by
Kelly Davis Berg and Cecilia Lowery Boles

DO NOT DUPLICATE

These materials are a part of the Student Review Guide Workbook. They have been separated for convenience only and are not to be used without the workbook.

080107/080107AK

Read each of the following questions carefully. Darken the circle corresponding to your answer choice.

1. An independent research company conducts an experiment on the effects of a melatonin supplement on sleep patterns in people ages 40 to 60. The company recruits 300 participants from across the country who suffer from insomnia (inability to fall asleep). The participants are divided into three groups of 100. The first group is given a placebo tablet. The second group is given a 40 mg tablet of melatonin at 8 PM, and a third group is given an 80 mg tablet of melatonin also at 8 PM. The researchers monitor the minutes of uninterrupted sleep each person receives during the night.

Which group or groups represent the control group in this experiment?

A the group receiving the placebo
B the groups receiving the melatonin
C the group receiving 40 mg of melatonin
D the group receiving no tablets

Ⓐ Ⓑ Ⓒ Ⓓ

2. Which of these is NOT a use of lipids?

A store energy long-term
B store energy short-term
C help to form cell membranes
D used to make hormones

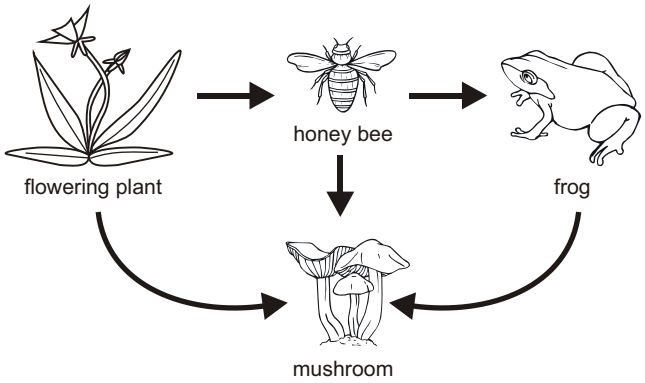
Ⓐ Ⓑ Ⓒ Ⓓ

3. In a controlled scientific experiment, when should the data be recorded?

A while forming a hypothesis
B while developing an experimental plan
C while conducting the experiment
D after conducting the experiment while summarizing the results of the experiment

Ⓐ Ⓑ Ⓒ Ⓓ

4. Study the food web below.



Which organism in this food web represents a decomposer?

A flowering plant
B honey bee
C frog
D mushroom

Ⓐ Ⓑ Ⓒ Ⓓ

5. Which of the following processes requires chlorophyll?

A evaporation
B cellular respiration
C transpiration
D photosynthesis

Ⓐ Ⓑ Ⓒ Ⓓ

6. Which unit of measurement would you use to measure the amount of mass of a bumblebee?

A milliliters
B centimeters
C grams
D micrometers

Ⓐ Ⓑ Ⓒ Ⓓ

Practice Test A

Evaluation Chart

If you missed question #:	Go to section(s):	If you missed question #:	Go to section(s):	If you missed question #:	Go to section(s):
1	3.2	35	17.1, 17.2	69	20.1
2	6.3	36	16.2	70	7.3
3	3.3	37	16.4	71	20.4
4	14.3, 22.3	38	18.4	72	22.5
5	8.3	39	18.3	73	9.2
6	1.3, 2.2	40	18.4	74	23.4
7	3.2	41	18.3	75	22.2
8	2.1	42	9.2	76	9.1
9	2.4	43	15.6	77	22.5
10	22.3, 22.4	44	9.4	78	12.4
11	8.2	45	23.3	79	22.4
12	21.4	46	18.4	80	22.2
13	9.1	47	10.1, 10.2	81	13.3, 14.1
14	2.3	48	13.4	82	13.4
15	15.1, 15.5	49	5.4, 5.5, 8.3	83	22.2
16	9.4	50	22.5	84	7.6
17	5.4	51	12.5	85	13.1
18	8.3, 8.5	52	12.1	86	7.3, 7.6
19	4.5, 6.6	53	23.3	87	1.4
20	23.1	54	5.6	88	12.4
21	15.1, 15.4	55	6.5, 12.1	89	12.4
22	13.1	56	6.5, 12.1	90	7.5
23	9.1	57	7.1, 7.2, 7.3, 7.4	91	5.1
24	16.4	58	5.3, 14.1	92	5.6
25	9.1, 9.2	59	10.1	93	22.2
26	5.4	60	10.1	94	14.1
27	13.2, 16.2	61	10.1, 10.2, 10.3	95	14.2
28	13.2, 16.2	62	7.1, 7.4	96	6.6
29	13.1	63	7.3	97	11.2
30	20.2	64	14.2	98	20.3, 20.4
31	15.6	65	5.4	99	22.1, 22.5
32	5.2	66	23.1	100	10.1, 10.2
33	11.2	67	22.6		
34	15.2, 15.3	68	5.3		