Unit 9 Resources
The Human Body
Check out the following features on your Online Learning Center:

**Study Tools**
- Interactive Tables
- Interactive Time Line
- Animated illustrations
- National Geographic Visualizing animations
- Self-Check Quizzes
- Chapter Tests
- Standardized Test Practice
- Vocabulary PuzzleMaker
- Interactive Tutor
- Multilingual Science Glossary
- Study to Go
- Online Student Edition

**Extensions**
- Virtual Labs
- Microscopy Links
- Periodic Table Links
- Career Links
- Web Links
- WebQuest Projects
- Science Fair Ideas
- Internet BioLabs

**For Teachers**
- Teacher Forum
- Teaching Today, and much more!
**Student Lab Safety Form**

Student Name: ____________________________

Date: _________________________________

Lab Title: ________________________________

In order to show your teacher that you understand the safety concerns of this lab, the following questions must be answered after the teacher explains the information to you. You must have your teacher initial this form before you can proceed with the lab.

1. How would you describe what you will be doing during this lab?

2. What are the safety concerns associated with this lab (as explained by your teacher)?
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________
   - __________________________________________

3. What additional safety concerns or questions do you have?

Chapter 32 Integumentary, Skeletal, and Muscular Systems

Diagnostic Test .................................................. 3
Launch Lab ......................................................... 4
MiniLab (1) .......................................................... 5
MiniLab (2) .......................................................... 6
BioLab ............................................................... 7
Real-World Biology ............................................... 9
Enrichment .......................................................... 11
Concept Mapping ................................................ 12
Study Guide (English) .......................................... 13
Study Guide (Spanish) ......................................... 17
Section Quick Check 1 ........................................ 21
Section Quick Check 2 ........................................ 22
Section Quick Check 3 ........................................ 23
Chapter Test A .................................................... 24
Chapter Test B .................................................... 27
Chapter Test C .................................................... 30
Student Recording Sheet ................................. 33
Before reading Chapter 32, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. Rebecca and several friends are at the beach for the day. By the end of the day, the girls’ skin has begun to tan, and questions about tanning leads Rebecca’s friend to ask about the purpose of skin. Rebecca’s father is a dermatologist, and she asks him about the different functions of skin. What is one answer Rebecca’s father gives?
   A. Heat absorbed by the skin warms the body core.
   B. One skin layer makes vitamin D for the body.
   C. Skin stores vital minerals needed by the body.
   D. The layers of the skin prevent feelings of pain.
   Explain.

2. Kalil is assembling a model of a human skeleton for his coach’s lecture about common sports injuries. Which bone placement will Kalil make?
   A. The clavicle connects two major leg bones.
   B. The patella is between the skull and vertebrae.
   C. The radius and ulna are bones in the shoulder.
   D. The upper ribs are connected to the sternum.
   Explain.

3. While watching a track and field meet, Toki notices the physical differences between the athletes participating in different events. She observes the bursts of speed displayed by the sprinters, the endurance of the long-distance runners, and the large muscle mass of the shot-put throwers. Toki believes there is a genetic basis for these differences. Critique Toki’s statement.
Chickens have structures similar to ours. You will examine a chicken wing and begin to explore it.

**Procedure**

1. Read and complete the lab safety form.
2. Obtain a treated chicken wing in a self-sealing sandwich bag. Observe the skin of the wing.
3. Without removing the wing from the bag, manipulate the wing to determine how it moves and where the joints are located.
4. Lay the bag on a flat surface and gently press and massage the wing to determine where bones and muscles are located.
5. Based on your observations, draw the wing as you imagine it might look if the skin was removed. Show the bones and muscles.

**Data and Observations**

**Analysis**

1. **Label** your drawing to show which parts correspond to your upper arm, elbow, wrist, and hand.

2. **Differentiate** How are the parts that make up your arm different from the chicken wing?
How is chicken skin similar to human skin? The skin of chicken has characteristics similar to human skin. Using the chicken wing from the Launch Lab, you will further examine the characteristics of skin.

Procedure

1. Read and complete the lab safety form.
2. Wear disposable lab gloves. Remove the chicken wing from the self-sealing bag and place it in a dissection pan.
3. Use a dissection kit to remove the skin from the wing. Use dissection scissors to carefully snip a hole in the skin that is loosely attached to the wing.
4. Make a cut about 6 cm in length. Pull the skin away from the wing. Use scissors and the scalpel to cut through the transparent membrane that attaches the skin to the muscles.
5. Try to remove the skin without making any more holes. Look for pockets of fat, blood vessels, and muscle fibers attached to the skin. Note the strength of the skin.
6. Dispose of the skin and used gloves as directed by your teacher. Clean your dissection tools and dissection pan with warm, soapy water. Save the skinned wing for use in the next MiniLab.

Analysis

1. Think Critically Human skin contains hair follicles. What type of follicles might you find on chicken skin?

2. Explain Why is it important for skin to be strong and elastic?
How are bones attached to muscles and other bones? Tendons attach muscle to bone, and ligaments attach bone to bone. You will examine these attachments using the skinned chicken wing from MiniLab Examine Skin.

Procedure

1. Read and complete the lab safety form.
2. Wear disposable lab gloves. Put the skinned chicken wing in a dissection pan.
3. Choose one muscle and use a pair of dissection scissors to cut the muscle away from the bone, leaving each end intact. Look for the long, white, tough tendons that connect the muscle to the bone.
4. Move the bones at the joint and notice how the tendon moves as the bones are pulled.
5. Carefully cut away all the muscles from the bones. The bones will still be attached to each other. Look for the white ligaments that hold them together. Examine the ends of each bone.
6. Draw a diagram of the wing without the muscles showing how the bones are attached to each other. Compare this drawing to the one you made in the Launch Lab.

Data and Observations

Analysis

1. Compare and Contrast  How is the drawing you made in the Launch Lab different from the drawing you made of the wing in this lab?

2. Observe and Infer  Did you notice how a muscle is attached at one end to a bone and the ligament at the other end runs across a joint to attach that end of the muscle to the next bone? Explain why this is important. A diagram probably will help your explanation.

3. Think Critically  At movable joints, what is the color of the ends of the bones? What do you think this material is?
Background: Imagine there is a National Museum of Domestic Chickens and it has been robbed. Several bones from the first chicken eaten in America are missing. Three dogs are suspects. Your job is to examine impressions of bones that were found in mud near the doghouse of each dog and to determine if any of the bones came from a chicken. You will be given a clue for each unknown bone.

Question: Can the structure and form of a bone tell you from which animal it came?

Materials
impressions of three unknown bones
set of clues
various animal skeletons
magnifying lens
metric ruler
string

Safety Precautions

Procedure
1. Read and complete the lab safety form.
2. Collect materials you will use to measure and examine the skeletons on display, and determine what type of measurements you will make.
3. Obtain impressions of three bones and a set of clues from your teacher. Do not open the clues until you are told to do so.
4. Design a data table to record your measurements.
5. Examine the skeletons. Compare them to the impressions.
6. Make measurements and record the data.
7. Open the clues you were given and reexamine your data and answers.
8. Cleanup and Disposal Return any reusable materials to their proper storage areas.

Data and Observations
BioLab, Forensics: How can skeletons help you solve a “crime”? continued

Analyze and Conclude

1. **Analyze Data**  Based on your observations and measurements, determine which one of the impressions came from a chicken.

2. **Interpret Data**  How did you use information concerning the size and shape of each impression to help you determine from which animal it came?

3. **Evaluate**  Did your conclusions change after you opened the clue? Explain your reasoning if your conclusions changed.

4. **Compare and Contrast**  What similarities did you notice between each impression and bones in the human skeleton? What differences did you notice?

5. **Relate**  Which skeletons seem to share the most characteristics with a human skeleton?

6. **Draw Conclusions**  Which dog stole the chicken bones?
Real-World Biology: Analysis

CHAPTER 32
Biomechanics

Bethany Hamilton is a courageous teenage girl who is a competitive surfer. When she was 13 years old, Bethany lost her left arm in a shark attack near her home in Hawaii. Three weeks later, she was back in the water and then returned to competitive surfing and other sports with her one good arm. A myoelectric arm was developed for Bethany. Prosthetic devices, such as a myoelectric arm, are possible because, on a mechanical level, the skeleton is a system of bony levers. In the body, the levers of bone are activated by muscles that produce movement. These principles of biomechanics are applied to the design of prosthetic arms and legs.

Levers form one of the most important groups of simple machines. At its simplest, a lever is a rigid bar that can turn freely around a fixed point, known as a fulcrum. Figure 1 illustrates the three different classes of levers. \( L \) is the load that is lifted, and \( E \) is the effort force used to lift the load.

### Analyze and Conclude

Respond to each question and statement.

1. **Identify** Adenosine triphosphate (ATP) provides energy to move bones in the human hand. What is the source of the energy needed to move bones in the myoelectric hand?

2. **Apply** For each bone/muscle system in Figure 2, indicate which class of lever is illustrated and label the fulcrum, effort force, and load.

---

Figure 1

- **First-Class Lever:** Fulcrum is between load and effort.
- **Second-Class Lever:** Load is between fulcrum and effort.
- **Third-Class Lever:** Effort is between load and fulcrum.

Figure 2

Class of lever a. ____________________ b. ____________________ c. ____________________

---

Week 9
3. **Apply** Label the load and the fulcrum in Figure 3a and in Figure 3b.

![Figure 3a](image1.png)

![Figure 3b](image2.png)

4. **Compare** In grasping the load, how does the movement of the human hand compare with that of the myoelectric hand?

   ________________________

   ________________________

   ________________________

   ________________________

**CAREERS IN BIOLOGY**

**Prosthetics Technology** Visit biologygmh.com for information on prosthetics technicians. What are the responsibilities of a prosthetics technician?
Anthropologists and forensic pathologists try to solve mysteries. An anthropologist might work to solve a mystery that occurred a million years ago. A forensic pathologist might work to solve a recent crime. Both types of scientists work with bones to reconstruct skeletons and provide information about that individual.

Anthropologists often have only fragments of teeth and fossil bone to use to reconstruct the morphology and living habits of ancient humans. Skeletal remains might be all that a forensic pathologist has to use to solve a ten-year-old crime. Certain bones can provide critical information about specific characteristics of an individual.

**Select** Working in a small group, select one of the forensic or anthropological problems listed in the table to research. For example, one group might research how bones are used to determine the age of an individual, while another group researches the use of bones in determining an individual’s sex.

**Research** After selecting a problem, use your textbook and other reference materials to find information. Include information about the types of bones that scientists use to determine a particular characteristic of an individual and how scientists analyze those bones to make the determination.

**Present** Finally, present the information that you researched to your class. As other groups give their presentations, fill out the table below. In the space below the table, write questions you have about the information presented. After all the groups have given their presentations, have a class discussion to answer everyone’s questions.

### Table: Forensic/Anthropological Problems and Bones Used to Solve the Problem

<table>
<thead>
<tr>
<th>Forensic/Anthropological Problem</th>
<th>Bones Used to Solve the Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of individual</td>
<td></td>
</tr>
<tr>
<td>Height of individual</td>
<td></td>
</tr>
<tr>
<td>Sex of individual</td>
<td></td>
</tr>
<tr>
<td>Diet of individual</td>
<td></td>
</tr>
<tr>
<td>Ancestry of individual</td>
<td></td>
</tr>
</tbody>
</table>

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Complete the events chain about muscle contraction. These terms may be used more than once: actin, calcium, contracts, myofibrils, myosin, nerve impulse, relaxes, sarcomere.

1. A(n) ________________ travels to the muscle.

2. ________________ is released into the ________________.

3. Calcium causes ________________ and actin to attach to each other.

4. ________________ filaments are pulled to the center of the ________________.

5. The muscle ____________________.

6. The filaments slide back into their original positions, and the muscle ____________________.
In your textbook, read about the structure of skin.

Complete the table by checking the correct column(s) for each description.

<table>
<thead>
<tr>
<th>Description</th>
<th>Epidermis</th>
<th>Dermis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The outermost layer of skin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Contains connective tissue, glands, and muscles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The thicker, inner layer of skin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Partly composed of dead keratin-containing cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Contains pigmented cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Layer from which hair follicles grow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Site of continual mitotic division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Has many blood vessels and nerves</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Label the diagram of the structural parts of skin. Use these choices:

dermis  epidermis  hair follicle  nerve  sebaceous gland  sweat gland  sweat pore

9. _________________
10. _________________
11. _________________
12. _________________
13. _________________
14. _________________
15. _________________
In your textbook, read about the structure of the skeletal system.

*Compare the axial skeleton with the appendicular skeleton by examining the illustration below. Label the diagram. Use these choices:*

- clavicle
- femur
- humerus
- metacarpal bones
- pelvic girdle
- phalanges
- ribs
- skull
- sternum
- tarsal bones
- tibia
- ulna
- vertebral column

**Axial**

1. ______________________
2. ______________________
3. ______________________
4. ______________________

**Appendicular**

5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________
11. ______________________
12. ______________________
13. ______________________
14. ______________________
In your textbook, read about compact and spongy bone.

Examine the illustration, and identify compact bone and spongy bone in the table. Complete the table by filling in the missing information.

<table>
<thead>
<tr>
<th>Type of Bone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>17.</td>
</tr>
<tr>
<td>16.</td>
<td>18.</td>
</tr>
</tbody>
</table>

In your textbook, read about joints.

Label the illustrations of the four different types of joints. Use these choices:

ball-and-socket joint    gliding joint    hinge joint    pivot joint

19. ______________________  21. ______________________
20. ______________________  22. ______________________
In your textbook, read about the three types of muscle.

Complete the table by filling in the missing information. Use these choices:

<table>
<thead>
<tr>
<th>cardiac</th>
<th>gap junctions</th>
<th>heart</th>
<th>skeletal</th>
</tr>
</thead>
<tbody>
<tr>
<td>smooth</td>
<td>striated</td>
<td>tendons</td>
<td>voluntary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Muscle Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4. involuntary; it is not ____________, or striped; each cell has one nucleus</td>
</tr>
<tr>
<td>2.</td>
<td>5. involuntary; only in the ________________; striated cells arranged in a network, or web; cells have one nucleus and are connected by ________________</td>
</tr>
<tr>
<td>3.</td>
<td>6. ________________; attached to bones by ________________; striated</td>
</tr>
</tbody>
</table>

In your textbook, read about skeletal muscle contraction.

Match the definition in Column A with the term in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______</td>
<td>7. part of the muscle that contracts</td>
</tr>
<tr>
<td>_______</td>
<td>8. smaller units that make up muscle fibers</td>
</tr>
<tr>
<td>_______</td>
<td>9. have great endurance and store a lot of oxygen</td>
</tr>
<tr>
<td>_______</td>
<td>10. protein filaments that make up myofibrils</td>
</tr>
<tr>
<td>_______</td>
<td>11. adapted for strength and store little oxygen</td>
</tr>
<tr>
<td>_______</td>
<td>12. energy for muscles provided by cellular respiration</td>
</tr>
</tbody>
</table>

A. myofibrils
B. sarcomere
C. myosin and actin
D. ATP
E. slow-twitch muscles
F. fast-twitch muscles
Guía de estudio

CAPÍTULO 32

Sección 1: El sistema integumentario

En tu libro de texto, lee acerca de la estructura de la piel.

Completa la tabla marcando la(s) columna(s) correcta(s) para cada descripción.

<table>
<thead>
<tr>
<th>Descripción</th>
<th>Epidermis</th>
<th>Dermis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. La capa externa de la piel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Contiene tejido conectivo, glándulas y músculos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. La capa interna y más gruesa de la piel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Parcialmente compuesta de células muertas que contienen queratina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Contiene células pigmentadas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Capa de la cual crecen los folicúlos pilosos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Sitio de división mitótica continua</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Tiene muchos vasos sanguíneos y nervios</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identifica el diagrama de las partes estructurales de la piel. Usa estas opciones:

dermis
epidermis
foliculo piloso
glándula sebácea
glándula sudorípara
nervio
poro sudoríparo

9. 
10. 
11. 
12. 
13. 
14. 
15. 

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Guía de estudio

Sección 2: El sistema esquelético

En tu libro de texto, lee acerca de la estructura del sistema esquelético.

Compara el esqueleto axial con el esqueleto apendicular en la siguiente ilustración. Identifica las partes del diagrama. Usa estas opciones:

<table>
<thead>
<tr>
<th>cinturón pélvico</th>
<th>clavícula</th>
<th>columna vertebral</th>
<th>costillas</th>
<th>cráneo</th>
</tr>
</thead>
<tbody>
<tr>
<td>cúbico</td>
<td>esternón</td>
<td>falanges</td>
<td>fémur</td>
<td>húmero</td>
</tr>
<tr>
<td>huesos metacarpianos</td>
<td>esternón</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>huesos tarsales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tibia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. ______________________

2. ______________________

3. ______________________

4. ______________________

Axial

5. ________________________

6. ________________________

7. ________________________

8. ________________________

9. ________________________

10. ______________________

11. ______________________

12. ______________________

13. ______________________

14. ______________________

Apendicular

Omóplato

Radio

Huesos carpianos

Huesos metatarsianos

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En tu libro de texto, lee acerca del hueso compacto y del hueso esponjoso.

*Estudia la ilustración e identifica el hueso compacto y el hueso esponjoso en la tabla. Completa la tabla con la información faltante.*

<table>
<thead>
<tr>
<th>Tipo de hueso</th>
<th>Descripción</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>17.</td>
</tr>
<tr>
<td>16.</td>
<td>18.</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de las articulaciones.

*Identifica las ilustraciones de los cuatro diferentes tipos de articulaciones. Usa estas opciones:* articulación de rótula articulación deslizante articulación en bisagra articulación en pivote

19. ____________________________ 21. ____________________________

20. ____________________________ 22. ____________________________
En tu libro de texto, lee acerca de los tres tipos de músculo.

Completa la tabla con la información faltante. Usa estas opciones:

cardíaco corazón esquelético estriado
liso tendones voluntario uniónes puente

<table>
<thead>
<tr>
<th>Tipo de músculo</th>
<th>Definición</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4. involuntario; no es __________________________, o rayado; cada célula tiene un núcleo</td>
</tr>
<tr>
<td>2.</td>
<td>5. involuntario; sólo en el __________________________, células estriadas organizadas en una red; las células tienen un núcleo y están conectadas por __________________________</td>
</tr>
<tr>
<td>3.</td>
<td>6. __________________________; unido a los huesos por medio de __________________________; estriado</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la contracción del músculo esquelético.

Relaciona la definición de la columna A con el término de la columna B.

Columna A

_____ 7. parte del músculo que se contrae
_____ 8. unidades más pequeñas que componen las fibras musculares
_____ 9. tienen gran resistencia y almacenan mucho oxígeno
_____ 10. filamentos de proteína que componen las miofibrillas
_____ 11. adaptados para dar fuerza y almacenan poco oxígeno
_____ 12. energía para los músculos proporcionada por la respiración celular

Columna B

A. miofibrillas
B. sarcómero
C. miosina y actina
D. ATP
E. músculos de fibras lentas
F. músculos de fibras rápidas
Section Quick Check

CHAPTER 32
Section 1: The Integumentary System

After reading the section in your textbook, respond to each statement.

1. **List** the four types of tissues of the integumentary system.

2. **Summarize** the functions of skin.

3. **Identify** the type of cells from which both hair and nails develop.

4. **Arrange** the following layers of the integumentary system from the outside to the inside: dermal connective tissue with glands and hair follicles, epidermal cells with keratin, epidermal cells with melanin, subcutaneous layer.

5. **Evaluate** who is more likely to have healthy skin as an older adult—a person who spends a lot of time in the Sun and develops a dark tan or a person who limits exposure to the Sun and uses sunscreen. Explain.
Quick Check

Section 2: The Skeletal System

After reading the section in your textbook, respond to each statement.

1. List the functions of cartilage.

2. Describe the functions of the skeletal system.

3. Categorize the following bones as part of the axial skeleton or part of the appendicular skeleton: pelvic girdle, radius, ribs, skull, sternum, and tarsal bones.

4. Compare compact bone and spongy bone.

5. Theorize how you would determine if a cell is an osteoblast or an osteoclast.
Quick Check

After reading the section in your textbook, respond to each statement.

1. **State** the parts of skeletal muscles. **Describe** their relationship to each other. Use the terms *actin, myofibrils, myosin, and sarcomeres* in your answer.

2. **Explain** why muscles are arranged in antagonistic pairs, using the figures below.

![Figure 1](Contracting biceps)  
![Figure 2](Relaxing triceps)

3. **Indicate** how smooth muscle differs from other muscle types.

4. **Speculate** why many people immediately think of only skeletal muscles when the word *muscle* is used.

5. **Evaluate** the attributes of slow-twitch muscles that allow them to have more endurance than fast-twitch muscles.
Section 32.1
Vocabulary Review

Explain the difference between the vocabulary terms in each pair.

1. 

2. 

3. 

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

4. A B C D

5. A B C D

6. A B C D

7. A B C D

8. A B C D

Constructed Response

9. 

10. 

11. 

Think Critically

12. 

13. 

Section 32.2
Vocabulary Review

Explain the difference between the vocabulary terms in each pair.

14. 

15. 

16. 

17. 

18. 

19. 

20. 

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CHAPTER 32
Assessment
Student Recording Sheet

15. 

16. 

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

17. A B C D
19. A B C D
21. A B C D
23. A B C D
18. A B C D
20. A B C D
22. A B C D

Constructed Response

24. 

25. 

26. 

Think Critically

27. 

28. 

Section 32.3
Vocabulary Review

Choose the vocabulary term that does not belong, and explain why it does not belong.

29. 

30. 

31. 

Name ___________________________ Date ________________________ Class ___________
CHAPTER 32  
Assessment  
Student Recording Sheet

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

32.  \[ \text{A} \quad \text{B} \quad \text{C} \quad \text{D} \]  

33.  \[ \text{A} \quad \text{B} \quad \text{C} \quad \text{D} \]  

34.  \[ \text{A} \quad \text{B} \quad \text{C} \quad \text{D} \]  

Constructed Response

35.  

36.  

Think Critically

37.  

38.  

Additional Assessment

39.  Writing in Biology  Record your answer for question 39 on a separate sheet of paper.

Document-Based Questions

40.  

41.  

Cumulative Review

42.  Record your answer for question 42 on a separate sheet of paper.
CHAPTER 32
Assessment
Student Recording Sheet

Standardized Test Practice
Multiple Choice
Select the best answer from the choices given, and fill in the corresponding circle.

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D

Short Answer
Answer each question with complete sentences.

9. 

10. 

11. Record your answer for question 11 on a separate sheet of paper.

12. 

13. 

14. 

15. 

Extended Response
Answer each question with complete sentences.

16. 

17. 

Essay Question
18. Record your answer for question 18 on a separate sheet of paper.
# Table of Contents

## Reproducible Pages

## Chapter 33  Nervous System

<table>
<thead>
<tr>
<th>Activity</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Test</td>
<td>39</td>
</tr>
<tr>
<td>Launch Lab</td>
<td>40</td>
</tr>
<tr>
<td>MiniLab (1)</td>
<td>41</td>
</tr>
<tr>
<td>MiniLab (2)</td>
<td>42</td>
</tr>
<tr>
<td>BioLab</td>
<td>43</td>
</tr>
<tr>
<td>Real-World Biology</td>
<td>45</td>
</tr>
<tr>
<td>Enrichment</td>
<td>47</td>
</tr>
<tr>
<td>Concept Mapping</td>
<td>48</td>
</tr>
<tr>
<td>Study Guide (English)</td>
<td>49</td>
</tr>
<tr>
<td>Study Guide (Spanish)</td>
<td>53</td>
</tr>
<tr>
<td>Section Quick Check 1</td>
<td>57</td>
</tr>
<tr>
<td>Section Quick Check 2</td>
<td>58</td>
</tr>
<tr>
<td>Section Quick Check 3</td>
<td>59</td>
</tr>
<tr>
<td>Section Quick Check 4</td>
<td>60</td>
</tr>
<tr>
<td>Chapter Test A</td>
<td>61</td>
</tr>
<tr>
<td>Chapter Test B</td>
<td>64</td>
</tr>
<tr>
<td>Chapter Test C</td>
<td>67</td>
</tr>
<tr>
<td>Student Recording Sheet</td>
<td>71</td>
</tr>
</tbody>
</table>
CHAPTER 33  Nervous System

Before reading Chapter 33, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. Kareem is completing a project about drug addiction as part of his requirements to be an Eagle Scout. Part of the project involves learning about the neurons that make up the human nervous system. Which does Kareem learn about neurons?
   A. Neurons are cells that look like most other cells of the body.
   B. Neurons are tissues in the body that carry electrical messages.
   C. Specialized cells, called neurons, receive and transmit impulses.
   D. Specialized nerves, called neurons, relay pleasure and pain sensations.

   Explain.

2. Beth volunteers at the vision center of a local hospital. As part of the orientation process, Beth learns how different structures of the eye function. Which does she learn?
   A. Cones and rods in the retina collect information from incoming light.
   B. Light-sensitive cells, called rods, provide information about colors.
   C. The eye lens captures an image of light and sends it to the brain.
   D. The pupil focuses incoming light and images onto the lens of the eye.

   Explain.

3. Lilla learns about addictions to drugs during health class. To introduce the topic, Lilla’s health teacher defines the term *drug*. What definition does her teacher give?

---

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Launch Lab

CHAPTER 33

How does information travel in the nervous system?

Your body is bombarded by sounds, odors, sights, tastes, and physical contact almost constantly. The nervous system makes sense of these stimuli, and reacts in ways that promote your survival. In this lab, you will model that communication process.

Procedure
1. Form groups of four and assign one student to each of the following roles: a sensor, a relayer, an interpreter, and an actor.
2. Brainstorm situations, such as touching a hot object, in which your senses receive information and you respond.
3. Model one situation. The sensor should describe what he or she senses to the relayer, who passes the information to the interpreter, who decides on a body response. The relayer then passes the response to the actor to act out the response.
4. Repeat step 3 using different situations. Record your observations below.

Data and Observations

Analysis
Explain What factors could cause the situations you modeled to vary in speed?
MiniLab

CHAPTER 33

Investigate the Blink Reflex

What factors affect the blink reflex? Have you ever been in a car when an object hit the windshield? You probably blinked. The blink reflex, in which the eye closes and opens again rapidly, is an involuntary response to stimuli the brain interprets as harmful. Nerve impulses associated with the blink reflex travel short, simple pathways in milliseconds, allowing for rapid reaction time that can prevent eye damage.

Procedure

1. Read and complete the lab safety form.
2. Form a group of three. One person, the subject, should sit behind a 1-m² piece of acrylic. A second person should monitor and record the subject’s responses.
3. The third person should stand 1 m from the barrier and gently toss a table-tennis ball so that it hits the barrier.
4. Repeat step 3 and record the subject’s response after each trial.
5. Brainstorm variables that might affect the subject’s response. Predict the effect of each on the blink reflex.

Data and Observations

Analysis

Interpret Data Did the subject perceive the stimuli in each trial the same way? Explain.
How do light receptors in the retina adapt to low light conditions? The retina contains two types of receptor cells. Cones, adapted for vision in bright light, allow you to perceive color. Rods, adapted for vision in dim light, help you detect shape and movement. The brain combines and interprets nerve impulses received from these cells, making it possible for you to see in various light conditions.

**Procedure**

1. Work with a partner. Using a stopwatch, time how long it takes to separate 30 plastic bottle caps into groups based on color.
2. Record the time, the number of caps in each group, and the percent accuracy of the grouping.
3. Predict changes in the data if the experiment is repeated in dim light.
4. Mix the caps into one group. Dim the lights. Immediately repeat step 1.
5. Restore light conditions, and record the data.
6. Discuss the data with your group. Predict changes in the data if the experiment is repeated after five minutes in dim light. Dim the lights.
7. Wait five minutes, and repeat step 1. Restore the light, and record data.

**Data and Observations**

**Analysis**

1. **Analyze** Graph the time required and the percent accuracy in each trial. How do these variables compare across trials?

2. **Think Critically** Based on the data, compare the action of the blink reflex (MiniLab Investigate the Blink Reflex) to the action of the eyes in adjusting to low light conditions.
Background: Imagine forging a narrow path through a wooded area. As the path is traveled over time, it becomes more defined and easier to follow. In a similar manner, neural pathways are developed in the brain when you learn something new. As you practice what you learned, connections between neurons strengthen, causing nerve impulses to pass more quickly and efficiently along the circuit.

Question: What effect do learning strategies have on the efficiency of a neural circuit?

Materials
- graph paper
- pencil
- paper
- calculator

Procedure
1. Read and complete the lab safety form.
2. Work with one student in your group to write a list of 20 concrete words that describe specific physical objects. Assign a number, 1 to 20, to each word.
3. Read the list aloud to three test subjects. Immediately, and without discussion, have them write as many words as they can remember from the list.
4. Calculate and record the percent recall for each word: divide the number of subjects who recalled each word by the total number of subjects. Multiply by 100.
5. Graph the percent recall for each word. Note patterns in the data.
6. Calculate the average percent recall: add the percent recall for each word, divide by 20, and multiply by 100.
7. Brainstorm techniques to increase the average percent recall. Choose one technique. Predict how it will affect the average percent recall. Design an experiment to test the prediction.
8. Once your teacher approves the plan, implement it with the same test subjects.
9. Make another list of 20 concrete words that describe specific physical objects.
10. Repeat steps 3–5 to evaluate changes in the average percent recall.

Data and Observations
BioLab, How do neural pathways develop and become more efficient? continued

Analyze and Conclude

1. **Identify** patterns in the percent recall data after the list was read the first time. Which words were most likely to be remembered?

2. **Interpret Data** Describe the technique you used to increase the average percent recall. Compare the average percent recall before and after the technique was used.

3. **Analyze** Did the technique strengthen the neural circuits responsible for remembering the list of words as well as you predicted? Explain.

4. **Error Analysis** Identify factors, other than the technique you used, that might have affected the average percent recall.
Real-World Biology: Analysis

CHAPTER 33
Relief from a Patch

Which statements are true?
- Nicotine induces vomiting.
- Nicotine causes high blood pressure.
- Nicotine causes respiratory distress.

Unfortunately for cigarette smokers, all the statements above are true. According to surveys, many of the nation’s 50 million cigarette smokers would like to eliminate cigarettes from their lives. However, attempts to quit smoking often fall short because of the addictive properties of nicotine, a major component of cigarette smoke. One popular source of help for this problem is the nicotine skin patch. Nicotine patches are palm-sized pads that, when applied to the skin, release a specific amount of nicotine that travels out of the patch, through the skin, and into the bloodstream. The structural properties of the patch determine the rate at which nicotine is released into the blood. This method keeps a constant low level of nicotine in the body. Although the resulting level of nicotine is less than one would get from smoking, it might be enough to keep one from craving cigarettes or experiencing other withdrawal symptoms.

Part A: How does the nicotine skin patch work?

Figure 1 illustrates how a nicotine skin patch works.

Analyze and Conclude

Respond to each question.

1. Explain Why does a person using the nicotine patch not become addicted to the nicotine in the patch as he or she did to the nicotine in cigarettes?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Predict Would you predict that the patch method is more effective or less effective for helping people quit smoking than gradually cutting down on the number of cigarettes smoked per day? Explain.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Part B: Are nicotine patches effective?

Figure 2 shows data from a study on the effectiveness of nicotine patches for helping people quit smoking.

![Graph showing percentage of patients not smoking over study weeks for different nicotine patch doses.](Image)

![Graph showing withdrawal symptoms over study weeks for different treatments.](Image)

**Analyze and Conclude**

*Use Figures 2a and 2b to respond to each question.*

1. **Summarize**  
   According to Figure 2a, what percentage of patients receiving the 21-mg nicotine patches remained off cigarettes after 24 weeks? Answer the same question for 14-mg nicotine patches and placebos.

2. **Explain**  
   What was the purpose of the placebo group?

3. **Evaluate**  
   Figure 2b shows a graph of the withdrawal symptoms reported by patients during the first six weeks of using the patch. What do these data indicate about the effectiveness of nicotine patches for reducing withdrawal symptoms?

4. **Evaluate**  
   What do these data suggest about the overall effectiveness of nicotine patches? Explain.

---

**CAREERS IN BIOLOGY**

**Product Development** Visit biologygmh.com for information on product development science technicians. What are the responsibilities of product development science technicians?
The synapse between two neurons is a busy region where dozens of molecules are involved in many essential chemical reactions. The introduction of a foreign molecule, such as a toxin, can easily disrupt the delicate balance that makes normal nerve transmission possible. Foreign molecules can induce significant behavioral and mental changes, such as disorientation, lassitude, agitation, and excitement, as well as critical physical changes, such as muscular spasms, convulsions, paralysis, coma, and death.

Botulin and parathion are two toxins that disrupt normal neuronal activity. Botulin is produced by the bacterium Clostridium botulinum. It is one of the most potent poisons known to humans. Parathion is a member of the organophosphate family, compounds whose molecules contain a phosphate group (PO₄³⁻) attached to a carbon atom. For many years, parathion was used widely as an insecticide, although its use now has been severely limited because of its toxic effects on humans.

**Draw**  In the space below, make a diagram that shows how the axon of one neuron, the dendrite of an adjacent neuron, and the synapse between them are related. Show the process by which a neurotransmitter is synthesized, how it is transmitted to the adjacent neuron, and what happens to it after reaching that neuron.

**Research**  After completing your diagram, use library resources to learn how botulin or parathion affects humans. Make a second diagram corresponding to the first diagram that shows where and how either botulin or parathion interferes with the normal process of nerve transmission.

**Write**  On the lines below, describe the behavioral, mental, and physical changes that occur as a result of the action of either botulin or parathion.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Complete the events chain about what happens during a nerve impulse. These terms may be used more than once: axon, channels, dendrites, negative charge, neuron, positive charge.

In a (1) _________ at rest, there are more sodium ions outside and more potassium ions inside the cell.

The inside of the cell is negatively charged.

The (2) _________ receive a signal.

A threshold stimulus causes (3) _________________ in the plasma membrane to open.

Sodium ions move into the cells, and the cells get a (4) _________________.

More channels open and potassium ions leave the cell, restoring the (5) _________________ inside the cell.

The change in charge moves down the length of the (6) _________________.

A Nerve Impulse

Nervous System  CHAPTER 33

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There are three major parts to a neuron. These parts are the cell body, dendrites, and (1) _________________. There are (2) ________________ basic types of neurons. These types include (3) _________________, (4) _________________, and (5) _________________. A nerve impulse is a(n) (6) _________________ and is called a(n) (7) _________________. Neurons use (8) _________________ and (9) _________________ to send (10) _________________.

Refer to the illustration below. Match the parts of the illustration with the terms or phrases below. Write the letter of the correct part. Letters may be used more than once.

11. nucleus
12. axon
13. dendrite
14. part that receives messages
15. part that sends messages
16. neuron

For each statement below, write true or false.

17. Gaps in the myelin sheath of an axon are called nodes.
18. All neurons have myelin.
19. A synapse is the distance between the dendrites of two neurons.
20. Neurotransmitters help to create new action potential.
In your textbook, read about the central nervous system.

Refer to the illustration of the brain and spinal cord. Write the correct letter to identify the structure being described. Letters may be used more than once.

1. sends and receives messages from all parts of the body
2. protected by the vertebrae
3. protected by the skull
4. carries messages from skin to spinal cord
5. spinal cord
6. body nerves
7. cerebrum is its largest part
8. described as a nerve column
9. 31 pairs of nerves extend from it
10. more than 100 billion neurons are found here

Complete the graphic organizer about the central nervous system. These terms may be used more than once: autonomic nervous system, central nervous system, peripheral nervous system, sympathetic nervous system.
In your textbook, read about the senses.

Match the description in Column A with the term in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. respond to temperature, pressure, and pain</td>
<td>A. taste buds</td>
</tr>
<tr>
<td>2. specialized chemical receptors on the tongue</td>
<td>B. sensory receptors</td>
</tr>
<tr>
<td>3. transmit information about body position</td>
<td>C. rods</td>
</tr>
<tr>
<td>4. light-sensitive cells</td>
<td>D. cochlea</td>
</tr>
<tr>
<td>5. filled with fluid and lined with hair cells</td>
<td>E. semicircular canals</td>
</tr>
</tbody>
</table>

In your textbook, read about sight.

Complete the table by filling in the missing information. Use these choices:

<table>
<thead>
<tr>
<th>cones</th>
<th>cornea</th>
<th>lens</th>
<th>retina</th>
<th>rods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects image onto the retina</td>
<td>6. cornea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contains receptor cells called rods and cones</td>
<td>7. lens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the structure through which light first enters the eye</td>
<td>8. retina</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excited by low levels of light</td>
<td>9. rods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide information about color to the brain</td>
<td>10.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In your textbook read about hearing and balance.

Use each of the terms below only once to complete the passage.

auditory canal balance cochlea hearing middle ear nerve impulses tympanum

Two major functions of the ear are (11) ____________________________________________________________________________ and (12) ____________________________________________________________________________. Sound waves enter the (13) ____________________________________________________________________________ and cause the (14) ____________________________________________________________________________ to vibrate. The vibrations travel through the bones of the (15) ____________________________________________________________________________ and cause fluid in the (16) ____________________________________________________________________________ to vibrate. Hair cells then generate (17) ____________________________________________________________________________ that are transmitted to the brain.
In your textbook, read about classes of commonly abused drugs.

*Complete the table by filling in the missing information.*

<table>
<thead>
<tr>
<th>Drug</th>
<th>Common Examples of Drug and Description of Drug’s Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotine</td>
<td>1.</td>
</tr>
<tr>
<td>Caffeine</td>
<td>2.</td>
</tr>
<tr>
<td>Alcohol</td>
<td>3.</td>
</tr>
<tr>
<td>Inhalants</td>
<td>4.</td>
</tr>
</tbody>
</table>
La neurona tiene tres partes principales. Estas partes son el cuerpo celular, las dendritas y el 
(1) ______________. Existen (2) ______________ tipos básicos de neuronas. Éstos son (3) ______________, (4) ______________ y (e) (5) ______________. Un impulso nervioso es una 
(6) ______________, y se le denomina (7) ______________.

Las neuronas usan (8) ______________ y (9) ______________ para enviar (10) ______________.

En tu libro de texto, lee acerca de las neuronas.

Consulta la siguiente ilustración. Relaciona las partes de la ilustración con los términos o las 
frases siguientes. Escribe la letra de la parte correcta. Las letras se pueden usar más de una vez.

11. núcleo
12. axón
13. dendrita
14. parte que recibe mensajes
15. parte que envía mensajes
16. neuronas

En tu libro de texto, lee acerca de la velocidad de un potencial de acción y la sinapsis.

Para cada afirmación a continuación, escribe «verdadero» o «falso».

17. Las hendiduras en la vaina de mielina de un axón se llaman nódulos.
18. Todas las neuronas tienen mielina.
19. Una sinapsis es la distancia entre las dendritas de dos neuronas.
20. Los neurotransmisores ayudan a crear nuevo potencial de acción.
Guía de estudio

CAPÍTULO 33
Sección 2: Organización del sistema nervioso

En tu libro de texto, lee acerca del sistema nervioso central.

Consulta la ilustración del cerebro y la médula espinal. Escribe la letra correcta para identificar la estructura que se describe. Las letras se pueden usar más de una vez.

1. Envía y recibe mensajes de todas las partes del cuerpo.
2. Está protegido por las vértebras.
3. Está protegido por el cráneo.
4. Lleva el mensaje desde la piel hacia la médula espinal.
5. Es la médula espinal.
6. Son los nervios del cuerpo.
7. El cerebro es su parte más grande.
8. Se describe como una columna de nervios.
9. Treinta y un pares de nervios se extienden desde aquí.
10. Aquí se encuentran más de 100,000 millones de neuronas.

Completa el organizador gráfico sobre el sistema nervioso central. Estos términos se pueden usar más de una vez: sistema nervioso autonómico, sistema nervioso central, sistema nervioso periférico, sistema nervioso simpático.
Guía de estudio

En tu libro de texto, lee acerca de los sentidos.

Relaciona la descripción de la columna A con el término de la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Responden a la temperatura, la presión y el dolor.</td>
<td>A. papilas del gusto</td>
</tr>
<tr>
<td>2. Son receptores químicos especializados en la lengua.</td>
<td>B. receptores sensoriales</td>
</tr>
<tr>
<td>3. Transmiten información acerca de la posición del cuerpo.</td>
<td>C. bastones</td>
</tr>
<tr>
<td>4. Son células sensibles a la luz.</td>
<td>D. cóclea</td>
</tr>
<tr>
<td>5. Es llena de líquido y forrada con células ciliadas.</td>
<td>E. canales semicirculares</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la vista.

Completa la tabla con la información faltante. Usa estas opciones:

<table>
<thead>
<tr>
<th>bastones</th>
<th>conos</th>
<th>córnea</th>
<th>lente</th>
<th>retina</th>
</tr>
</thead>
<tbody>
<tr>
<td>Función</td>
<td>Estructura</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proyecta la imagen en la retina.</td>
<td>6.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contiene células receptoras llamadas bastones y conos.</td>
<td>7.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>La luz entra primero al ojo a través de esta estructura.</td>
<td>8.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Se excitan con niveles bajos de luz.</td>
<td>9.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ofrecen información al cerebro acerca del color.</td>
<td>10.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca del oído y el equilibrio.

Usa cada uno de los siguientes términos sólo una vez para completar el párrafo.

<table>
<thead>
<tr>
<th>canal auditivo</th>
<th>cóclea</th>
<th>equilibrio</th>
<th>impulsos nerviosos</th>
</tr>
</thead>
<tbody>
<tr>
<td>oído medio</td>
<td>oír</td>
<td>tálmano</td>
<td></td>
</tr>
</tbody>
</table>

Las dos funciones más importantes del oído son (11) ________________ y mantener el (12) ________________. Las ondas de sonido entran por el (13) ________________ y causan que el (14) ________________ vibre. Las vibraciones se desplazan a través de los huesos del (15) ________________, y causan que el líquido en la (16) ________________ vibre. Luego, las células ciliadas generan (17) ________________, que son transmitidos al cerebro.
En tu libro de texto, lee acerca de las clases de drogas comúnmente usadas.

Completa la tabla con la información faltante.

<table>
<thead>
<tr>
<th>Droga</th>
<th>Ejemplos comunes de la droga y descripción de sus efectos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotina</td>
<td></td>
</tr>
<tr>
<td>1.</td>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>Cafeína</td>
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<tr>
<td>2.</td>
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<tr>
<td>Alcohol</td>
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<td>3.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Inhalantes</td>
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<td>4.</td>
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</tr>
</tbody>
</table>
Section Quick Check

CHAPTER 33

Section 1: Structure of the Nervous System

After reading the section in your textbook, respond to each statement.

1. **List** the three main regions of a neuron.

2. **Describe** the path of a signal as it starts from a sensory neuron and goes through a reflex arc.

3. **Explain** how the myelin sheath changes the speed of an action potential.

4. **Compare** the ion content of a neuron at rest to a neuron that has just received a threshold stimulus.

5. Anesthetics are used to reduce feelings of pain. **Hypothesize** about some ways anesthetics might work.
Quick Check

Section 2: Organization of the Nervous System

After reading the section in your textbook, respond to each statement.

1. **Name** the two major divisions of the nervous system and briefly describe their components.

2. **Describe** the structure of the cerebrum.

3. **Differentiate** between the somatic nervous system and the autonomic nervous system.

4. **Formulate** a situation in which your sympathetic nervous system would be active.

5. A boy without a helmet falls on a concrete sidewalk while riding a bike. He hits the back of his head near his neck. **Suggest** some of the problems that might occur from this injury and why.
Quick Check

Section 3: The Senses

After reading the section in your textbook, respond to each statement.

1. **Recall** the location and function of taste buds.

2. **Review** the path that light takes through the eye.

3. **Compare** the functions of the hair cells in the cochlea to the hair cells in the semicircular canals.

4. **Imagine** a situation in which you use at least four sensory receptors. **Describe** the situation.

5. **Deduce** what happens to the size of the pupil of your eye when you turn on a light in a dark room.
Quick Check

Section 4: Effects of Drugs

After reading the section in your textbook, respond to each statement.

1. Define drug.

2. Explain how amphetamines and cocaine both cause feelings of pleasure.

3. Describe how tolerance leads to addiction.

4. Analyze the differences between the short-term effects and the long-term effects of use of cocaine and amphetamines.

5. Evaluate the difference between the biological definition of a drug and what society might define as a drug.
CHAPTER 33
Assessment

Student Recording Sheet

Section 33.1
Vocabulary Review

Choose the vocabulary term that does not belong, and explain why it does not belong.

1. ____________________________________________

2. ____________________________________________

3. ____________________________________________

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

4. [A] [B] [C] [D]

5. [A] [B] [C] [D]

Constructed Response

6. ____________________________________________

7. ____________________________________________

Think Critically

8. ____________________________________________

Section 33.2
Vocabulary Review

Choose the vocabulary term that does not belong, and explain why it does not belong.

9. ____________________________________________

10. ____________________________________________

11. ____________________________________________
CHAPTER 33
Assessment
Student Recording Sheet

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

12. A B C D

13. A B C D

14. A B C D

Constructed Response

15. Record your answer for question 15 on a separate sheet of paper.

Think Critically

16. Record your answer for question 16 on a separate sheet of paper.

17. __________________________________________

Section 33.3
Vocabulary Review
Explain the difference between the vocabulary terms in each pair.

18. __________________________________________

19. __________________________________________

20. __________________________________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

21. A B C D

22. A B C D

23. A B C D

24. A B C D

Constructed Response

25. __________________________________________

Think Critically

26. __________________________________________

27. __________________________________________
CHAPTER 33
Assessment
Student Recording Sheet

Section 33.4
Vocabulary Review

Write sentences to compare and contrast each pair of terms.

28. __________________________________________
29. __________________________________________
30. __________________________________________

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

31. A B C D
32. A B C D
33. A B C D

Constructed Response

34. __________________________________________
35. __________________________________________

Think Critically

36. __________________________________________

Additional Assessment

37. Writing in Biology  Record your answer for question 37 on a separate sheet of paper.

Document-Based Questions

38. __________________________________________

39. Record your answer for question 39 on a separate sheet of paper.

Cumulative Review

40.–42. Record your answers for questions 40–42 on a separate sheet of paper.
Assessment

Student Recording Sheet

CHAPTER 33

Standardized Test Practice

Multiple Choice

Select the best answer from the choices given, and fill in the corresponding circle.

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D

Short Answer

Answer each question with complete sentences.

9. 

10. 

11. 

12. 

13. 

Extended Response

Answer each question with complete sentences.

14. 

15. 

16. 

Essay Question

17. Record your answer for question 17 on a separate sheet of paper.
Table of Contents

Chapter 34 Circulatory, Respiratory, and Excretory Systems

Diagnostic Test ........................................... 77
Launch Lab .................................................. 78
MiniLab (1) .................................................. 79
MiniLab (2) .................................................. 80
BioLab ....................................................... 81
Real-World Biology ....................................... 83
Enrichment ................................................... 85
Concept Mapping .......................................... 86
Study Guide (English) .................................... 87
Study Guide (Spanish) .................................... 91
Section Quick Check 1 ................................... 95
Section Quick Check 2 ................................... 96
Section Quick Check 3 ................................... 97
Chapter Test A ............................................. 98
Chapter Test B ............................................. 101
Chapter Test C ............................................. 104
Student Recording Sheet ............................... 107
Before reading Chapter 34, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. Kesia is creating a model of the human circulatory system as part of a science project. She labels all the parts of the heart and the major types of blood vessels. She also includes an explanation of the function of each part of the system. Which would be included in her model?
   A. Blood vessels called arteries carry oxygen-rich blood away from the heart.
   B. Capillaries are thick blood vessels that carry blood and dissolved gases.
   C. The heart is made of one large chamber that pumps blood through the body.
   D. Veins are narrow, netlike blood vessels that deliver oxygen to tissues.

   Explain.

2. Dr. Danilo Ayala is diagnosing a patient who is having difficulties breathing. After a thorough examination, the doctor concludes that a foreign substance has irritated the patient’s respiratory pathways, and the pathways are constricted, making breathing more difficult. Which respiratory disorder would Dr. Danilo Ayala conclude is causing the patient’s symptoms?
   A. asthma
   B. bronchitis
   C. emphysema
   D. pneumonia

   Explain.

3. Tasanee’s aunt has been diagnosed with an excretory system disorder. Tasanee is uncertain of the different parts of the excretory system, and she decides to research the system. About what parts of the excretory system does Tasanee learn?
What changes take place in the body during exercise?

Body systems, including the respiratory and circulatory systems, function together to meet the demands of exercise and to maintain homeostasis. For example, red blood cells circulate throughout the body to deliver oxygen to cells, where it is used to help produce the energy required for exercise. In this lab, you will investigate how body system responses to exercise might be related to each other.

Procedure
1. Read and complete the lab safety form.
2. Do a rhythmic exercise, such as jogging or marching in place, for two minutes. As you exercise, note how your body responds.
3. Make a list of the body system responses you identified as you exercised.

Data and Observations

Analysis
1. Create a flowchart showing how these body responses might be related to each other.

2. Analyze Propose how one of the body system responses on your list helps regulate the body’s internal environment.
**MiniLab**

**CHAPTER 34**

**Investigate Blood Pressure**

How does blood pressure change in response to physical activity? Blood pressure changes from day to day, and throughout the day, and is affected by physical, psychological, behavioral, and inherited factors.

**Procedure**

1. Read and complete the lab safety form.
2. Watch the instructor demonstrate how to safely take a blood pressure. Practice using a **blood-pressure cuff** to measure a partner’s blood pressure. Refer to a **blood-pressure chart** to interpret the reading.
3. Predict how exercise will affect systolic and diastolic blood pressure.
4. Take the resting blood-pressure reading of one member of your group.
5. Have the person whose blood pressure was taken do rhythmic exercise for one minute.
6. Take a second blood-pressure reading, and compare it to the resting blood-pressure reading.

**Data and Observations**

**Analysis**

1. **Identify** What are the experimental constants, the independent and dependent variables, and the control in your experiment?

   __________________________________________________________

   __________________________________________________________

   __________________________________________________________

   __________________________________________________________

   __________________________________________________________

2. **Conclude** Were your predictions supported? Explain.

   __________________________________________________________

   __________________________________________________________

   __________________________________________________________

   __________________________________________________________
Minilab

CHAPTER 34
Recognize Cause and Effect

Does exercise affect metabolism? As you increase your level of exercise, your breathing rate increases. The more you exercise, the harder the circulatory and respiratory systems must work.

Procedure
1. Read and complete the lab safety form.
2. Record the number of heartbeats and number of breaths per minute for ten classmates.
3. Instruct the same students to walk for five minutes. At the end of that time, record each person's heartbeat per minute and number of breaths per minute.
4. After students have rested for five minutes, instruct them to jog or walk briskly for five minutes. Then, record each person's heartbeat per minute and number of breaths per minute.
5. Plot your results on graph paper. Each coordinate point should indicate breaths per minute on the horizontal axis and heartbeats per minute on the vertical axis.

Data and Observations

Analysis
1. Interpret What is the relationship between the two variables of your experiment—heart rate and breathing rate?

2. Conclude Does exercise affect metabolism? Why?

3. Hypothesize Identify why different students have different numbers of heartbeats per minute and breaths per minute even though they all walked or jogged for the same amount of time.
Background: Both heredity and lifestyle choices affect overall health. Achieving optimal health involves making wise choices regarding exercise, nutrition, drugs and alcohol, stress management, and smoking. Because body systems function together to maintain homeostasis, changes in one system can impact overall health. In this lab, you will design a presentation that focuses on how specific health choices influence the functionality of body systems.

Question: How do lifestyle choices affect the function of the circulatory, respiratory, and excretory systems?

Materials
Choose materials that would be appropriate for creating your presentation. Possible materials include:
resource materials from the school library or classroom

Procedure
1. Read and complete the lab safety form.
2. In the space below, develop an outline of information you would like to include in your presentation. Include information about how specific health choices affect the respiratory, circulatory, and excretory systems.
3. Use resources and data you collected in this chapter's labs to determine the effects of specific health choices on your body.
4. Choose a presentation medium. Ideas include a multimedia presentation, video, poster, or pamphlet. The medium you choose should appeal to a specific audience.
5. Share your presentation with your target audience. Post your research and presentation at biologygmh.com so others can benefit from what you have learned.
6. Use the evaluation information provided by your teacher to evaluate the effectiveness of the presentation.
**BioLab, Internet: Make Positive Health Choices** continued

**Analyze and Conclude**

1. **Describe**  What is the intended audience for your presentation? How did you modify the information included to target this audience?

   ___________________________________________________________

   ___________________________________________________________

   ___________________________________________________________

2. **Summarize**  Identify the key points of your presentation.

   ___________________________________________________________

   ___________________________________________________________

   ___________________________________________________________

3. **Explain**  How do the health choices you described affect multiple body systems?

   ___________________________________________________________

   ___________________________________________________________

   ___________________________________________________________

4. **Evaluate**  Do you think your presentation will influence the health choices of your target audience? Explain.

   ___________________________________________________________

   ___________________________________________________________

   ___________________________________________________________

5. **Critique Your Presentation**  How could you increase the effectiveness of your presentation?

   ___________________________________________________________

   ___________________________________________________________

   ___________________________________________________________
The Biology of a Hiccup

When you breathe in and out, air moves into and out of your lungs because of the rhythmic contraction of the diaphragm, the tough sheet of muscle that separates the chest from the abdominal cavity. The epiglottis, the flap of tissue that prevents food from entering the respiratory passage, is in an open position during breathing and allows for a smooth flow of air. When a hiccup happens, as shown in Figure 1, this normal sequence of events is disturbed. Instead of contracting rhythmically, the diaphragm undergoes spasms and begins to twitch uncontrollably. As this occurs, air is gulped, and the epiglottis snaps shut. The typical hiccup sound is produced when air is forced past the vocal cords and then cut off by the epiglottis.

When hiccups occur, one of two mechanisms, possibly both, is involved. Either there is a disturbance in the area of the brain that controls the contraction of the diaphragm, or an imprecise impulse is being sent out along one of the two phrenic nerves. These nerves connect the diaphragm to the central nervous system. Common reasons for getting short-term hiccups are eating or drinking too quickly, eating or drinking too much, eating spicy food, gulping air, or drinking alcohol. Long-term hiccups might be caused by lung diseases or diseases in the other tissues that surround the phrenic nerves.

People use a variety of cures for hiccups. Hiccups are muscle spasms caused by faulty signals from the brain. According to scientists, anything that interrupts these signals or influences the diaphragm to regain its rhythm can halt hiccups.
Analyze and Conclude

1. **Identify** whether the Normal Breathing diagram in Figure 1 on the previous page shows a person inhaling or exhaling. Explain.

2. **Generalize** Can you see any similarities in the reasons why people get hiccups? If so, what are they? What might these similarities suggest about the cause of hiccups?

3. **Hypothesize** Suggest a reason why eating or drinking too much can cause hiccups, based on what you know about the biology of hiccups.

4. **Apply** Explain each of the home remedies below, using your knowledge about the biology of hiccups. How might each remedy interrupt the signal from the brain to the diaphragm or help the diaphragm regain its rhythm?
   
a. Hold your breath.

b. Breathe into a paper bag.

c. Lie on your back and bring your knees to your chest.

d. Drink water rapidly.

5. **Propose** Do you have another remedy you use for hiccups? Write what it is and why you think it works.

---

**CAREERS IN BIOLOGY**

**Respiratory Therapy** Visit biologygmh.com for information on respiratory therapists. What are the responsibilities of a respiratory therapist?
The heart pumps 7000 liters of blood through the body every day. In an average lifetime, the heart contracts about 2.5 billion times. The circulatory system transports blood from the heart and lungs through the body. Oxygen-poor blood is pumped to the lungs, where the blood picks up oxygen. The heart then pumps the oxygen-rich blood through the system of blood vessels to the rest of the body.

**Systemic Circuit**  Blood not only transports oxygen to cells throughout the body but also carries cells that protect the body from infection; assists in clotting; transports nutrients, vitamins, and wastes; and helps maintain homeostasis. Blood circulates throughout the body from the heart to the body’s cells and back again. This pathway is known as the systemic circuit of the circulatory system.

**Pulmonary Circuit**  The human heart is a four-chambered, hollow, cone-shaped, muscular pump. It is connected to the lungs, the brain, the digestive system, the excretory system, and the rest of the body by an intricate system of arteries, veins, and capillaries. The major circulatory pathway that connects the heart to the lungs is known as the pulmonary circuit.

**Directions**

In the space below, draw a diagram of the human heart, lungs, and the major connecting blood vessels. Use information from the textbook, as well as resources from the library, to add labels to the diagram. Be sure to label the following: lungs, major veins and arteries, capillaries, and chambers of the heart. Add arrows to illustrate the path of blood through the heart and lungs.
Complete the cycle map about circulation in humans. These terms may be used more than once: aorta, high oxygen/low carbon dioxide, left atrium, left ventricle, low oxygen/high carbon dioxide, lungs, right atrium, right ventricle, veins.

Blood enters  
1.  
   from  
2.  
   condition of blood is  
3.  
   blood is pumped to  
4.  
   and then into  
   pulmonary artery  
5.  
   which leads to  
6.  
   blood leaves  
   condition of blood is  
7.  
   and then to  
   and then into  
8.  
   which carries blood to  
9.  
   all parts of body  
   and goes into  
   pulmonary veins  
   and is pumped into the  

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In your textbook, read about the functions of the circulatory system.

If the statement is true, write true. If the statement is false, replace the italicized word or phrase to make it true.

1. The circulatory system consists of **three parts: the blood, the heart, and the blood vessels.**

2. The heart pumps blood through a network of tubes inside the body called **blood vessels.**

3. The circulatory system transports **oxygen** and nutrients to cells and removes wastes from body cells.

4. The circulatory system distributes **water** throughout the body to help regulate body temperature.

5. The circulatory system contains cell **clots** and proteins.

In your textbook, read about the structure of the heart.

Label the diagram of the human heart. Use these choices:

- aorta
- pulmonary veins
- left atrium
- right atrium
- left ventricle
- right ventricle
- pulmonary arteries

6. ____________________________

7. ____________________________

8. ____________________________

9. ____________________________

10. ____________________________

11. ____________________________

12. ____________________________
In your textbook, read about how the heart beats.

Write the term or phrase that best completes each statement. Use these choices:

- atrioventricular node
- pulse
- sinoatrial node
- systole

13. A group of cells called the pacemaker, or ________________, in the right atrium sends out signals that tell the heart muscle to contract.

14. The ________________ transmits the signal that causes both ventricles to contract.

15. The alternating expansion and relaxation of the artery wall caused by contraction of the left ventricle is the ________________ .

16. The blood pressure caused by contraction of the heart is called ________________ .

In your textbook, read about blood components.

Complete the table by checking the correct column(s) for each description.

<table>
<thead>
<tr>
<th>Description</th>
<th>Red Blood Cell</th>
<th>White Blood Cell</th>
<th>Platelet</th>
<th>Plasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Contains hemoglobin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Carries glucose and fats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Lacks a nucleus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Releases chemicals that form fibrin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Transports oxygen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Produced in bone marrow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Clear, yellowish fluid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Helps clot blood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Fights infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In your textbook, read about the importance of respiration. 

Use each of the terms below only once to complete the passage.

<table>
<thead>
<tr>
<th>breathing</th>
<th>carbon dioxide</th>
<th>external</th>
<th>internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>lungs</td>
<td>oxygen</td>
<td>respiration</td>
<td></td>
</tr>
</tbody>
</table>

The function of the respiratory system is to sustain cellular (1) _____________________________.

This is done by supplying (2) ____________________________ to cells and removing (3) _____________________________ waste from cells. (4) ____________________________ is the mechanical movement of air into and out of the (5) _____________________________.

(6) ____________________________ respiration is the exchange of gases between the atmosphere and the blood that occurs in the lungs. (7) ____________________________ respiration is the exchange of gases between the blood and the body’s cells.

In your textbook, read about the path of air.

Match the description in Column A with the structure in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. large tubes that enter each lung from the trachea</td>
<td>A. mouth or nose</td>
</tr>
<tr>
<td>9. thin-walled, individual air sacs within the lungs</td>
<td>B. trachea</td>
</tr>
<tr>
<td>10. small branches off larger tubes within each lung</td>
<td>C. bronchi</td>
</tr>
<tr>
<td>11. filters out dust; warms and moistens air</td>
<td>D. bronchioles</td>
</tr>
<tr>
<td>12. branches into two large tubes that go to the lungs</td>
<td>E. alveoli</td>
</tr>
</tbody>
</table>

In your textbook, read about breathing.

Mark the figure to the right as each statement directs.

13. Draw red arrows on the figure to show the movement of air and the diaphragm during inhalation.
14. Draw blue arrows on the figure to show the movement of air and the diaphragm during exhalation.
In your textbook, read about the parts of the excretory system and the kidneys.

Complete the table by checking the correct column(s) for each organ.

<table>
<thead>
<tr>
<th>Primary Material(s) Removed</th>
<th>Organ</th>
<th>Salts</th>
<th>Carbon Dioxide</th>
<th>Water</th>
<th>Wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lungs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Skin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Kidneys</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respond to each statement.

4. **Name** the major excretory organ in the body.

5. **Cite** a way that the excretory system helps maintain homeostasis, besides removing wastes, water, carbon dioxide, and salts.

In your textbook, read about the kidneys.

Label the diagram of a nephron. Use these choices:

- Bowman’s capsule
- Capillaries
- Glomerulus
- Convoluted tubule
- To ureter

6. __________________________
7. __________________________
8. __________________________
9. __________________________
10. __________________________
Guía de estudio

En tu libro de texto, lee acerca de las funciones del sistema circulatorio.

Si la afirmación es verdadera, escribe «verdadero». Si la afirmación es falsa, sustituye el término o la frase en cursiva para volverla verdadera.

1. El sistema circulatorio consta de tres partes: la sangre, el corazón y los vasos sanguíneos.

2. El corazón bombea sangre a través de la red de tubos al interior del cuerpo llamados vasos sanguíneos.

3. El sistema circulatorio transporta oxígeno y nutrientes a las células y retira desechos de las células del cuerpo.

4. El sistema circulatorio distribuye agua a través del cuerpo para ayudar a regular la temperatura del cuerpo.

5. El sistema circulatorio contiene coágulos de células y proteínas.

En tu libro de texto, lee acerca de la estructura del corazón.

Identifica en el diagrama las partes del corazón humano. Usa estas opciones:

aorta
venas pulmonares
arterias pulmonares
ventrículo derecho
atrio derecho
atrio izquierdo

6. ____________________________

7. ____________________________

8. ____________________________

9. ____________________________

10. ____________________________

11. ____________________________

12. ____________________________
En tu libro de texto, lee acerca de cómo late el corazón.

*Escribe el término o la frase que mejor complete cada afirmación. Usa estas opciones:*

<table>
<thead>
<tr>
<th>nódulo atriorecorticular</th>
<th>nódulo sinoatrial</th>
<th>pulso</th>
<th>sístole</th>
</tr>
</thead>
</table>

13. Un grupo de células llamadas marcapasos, o _____________, en el atrio derecho envía señales que le indican al músculo del corazón que se contraiga.

14. El _____________ transmite la señal que causa que ambos ventrículos se contraigan.

15. La expansión y relajación alternante de la pared arterial causadas por la contracción del ventrículo izquierdo es el _____________.

16. La presión sanguínea causada por la contracción del corazón se denomina _____________.

En tu libro de texto, lee acerca de los componentes de la sangre.

*Completa la tabla marcando la(s) columna(s) correcta(s) para cada descripción.*

<table>
<thead>
<tr>
<th>Descripción</th>
<th>Glóbulo rojo</th>
<th>Glóbulo blanco</th>
<th>Plaqueta</th>
<th>Plasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Contiene hemoglobina</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Transporta glucosa y grasas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Carece de núcleo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Libera químicos que forman fibrina</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Transporta oxígeno</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Se produce en la médula ósea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Fluido transparente amarillento</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Ayuda a coagular la sangre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Combate la infección</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Guía de estudio

En tu libro de texto, lee acerca de la importancia de la respiración.

Usa cada uno de los siguientes términos solamente una vez para completar el párrafo.

<table>
<thead>
<tr>
<th>dióxido de carbono</th>
<th>externa</th>
<th>interna</th>
<th>oxígeno</th>
</tr>
</thead>
<tbody>
<tr>
<td>pulmones</td>
<td>respiración</td>
<td>respirar</td>
<td></td>
</tr>
</tbody>
</table>

La función del sistema respiratorio es sostener la (1) __________ celulares.

Esto se hace mediante el suministro de (2) __________ a las células y la eliminación de desechos de (3) __________ de las células.

(4) __________ es el movimiento mecánico del aire que entra y sale de los (5) __________. La respiración (6) __________ es el intercambio de gases entre la atmósfera y la sangre, la cual ocurre en los pulmones.

La respiración (7) __________ es el intercambio de gases entre la sangre y las células del cuerpo.

En tu libro de texto, lee acerca del trayecto del aire.

Relaciona la descripción de la columna A con la estructura de la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>A. boca o nariz</td>
</tr>
<tr>
<td>9.</td>
<td>B. tráquea</td>
</tr>
<tr>
<td>10.</td>
<td>C. bronquios</td>
</tr>
<tr>
<td>11.</td>
<td>D. bronquiolos</td>
</tr>
<tr>
<td>12.</td>
<td>E. alvéolos</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la respiración.

Marca el dibujo a la derecha según se indica en cada afirmación.

13. Traza flechas rojas en el dibujo para mostrar el movimiento del aire y el diafragma durante la inhalación.

14. Traza flechas azules en el dibujo para mostrar el movimiento del aire y el diafragma durante la exhalación.
Guía de estudio

Sección 3: El sistema excretor

En tu libro de texto, lee acerca de las partes del sistema excretor y los riñones.

Completa la tabla marcando la(s) columna(s) correcta(s) para cada órgano.

<table>
<thead>
<tr>
<th>Principal(es) material(es) eliminado(s)</th>
<th>Órgano</th>
<th>Sales</th>
<th>Dióxido de carbono</th>
<th>Agua</th>
<th>Desechos</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Pulmones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Piel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Riñones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Responde a cada afirmación.

4. **Nombra** el órgano excretor más importante del cuerpo.

5. **Cita** una forma en la cual el sistema excretor ayuda a mantener la homeostasis además de eliminar desechos, agua, dióxido de carbono y sales.

En tu libro de texto, lee acerca de los riñones.

Identifica en el diagrama las partes de un nefrón. Usa estas opciones:

- a la uretra
- capilares
- cápsula de Bowman
- glomérulo
- túbulo contorneado

6. 

7. 

8. 

9. 

10. 

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Section
Quick Check

CHAPTER 34
Section 1: The Circulatory System

After reading the section in your textbook, respond to each statement.

1. Name the chambers of the heart. Describe their positions.

2. Explain the functions of the major types of blood vessels. Use the terms arteries, capillaries, and veins in your answer.

3. Summarize the functions of the main blood components. Use the terms plasma, red blood cells, white blood cells, and platelets in your answer.

4. Compare and contrast the four types of blood. Determine why it is important to know your blood type.

5. Determine what assists in the movement of blood through the veins, other than the beating of the heart.
CHAPTER 34
Section 2: The Respiratory System

After reading the section in your textbook, respond to each statement.

1. **Tell** what determines the rate of breathing. **Explain** what causes the rate of breathing to increase.

2. **Define** breathing, inhalation, and exhalation.

3. **Indicate** the path that air takes from where it enters the body to where gases are exchanged before leaving the body.

4. **Discuss** which gases are exchanged at the level of the alveoli.

5. **Predict** what happens when a disease, a disorder, or smoking affects the respiratory system.
Section Quick Check

CHAPTER 34
Section 3: The Excretory System

After reading the section in your textbook, respond to each statement.

1. **State** the function of nephrons.

2. **List** the main functions of the excretory system.

3. **Explain** the process of reabsorption that takes place in the kidneys.

4. **Illustrate** the basic shape and structure of a kidney. Use the terms renal cortex, renal medulla, and renal pelvis as labels in your drawing.

5. **Arrange** these terms in the order of urine leaving the kidney and exiting the body: urinary bladder, urethra, ureters. **Explain** this urine path.
CHAPTER 34 Assessment

Student Recording Sheet

Section 34.1

Vocabulary Review

Write the vocabulary term that best matches each definition.

1.  
2.  
3.  

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

4.  A B C D  
5.  A B C D  
6.  A B C D  
7.  A B C D  
8.  A B C D  

Constructed Response

10.  
11.  

Think Critically

12.  
13.  

Section 34.2

Vocabulary Review

Write the vocabulary term that best answers each question.

14.  
15.  
16.  

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

17.  A B C D  
18.  A B C D  
19.  A B C D  
20.  A B C D  
21.  A B C D  
22.  A B C D  

Constructed Response

23.  

CHAPTER 34
Assessment

24. __________________________________________________________________________

25. __________________________________________________________________________

Section 34.3
Vocabulary Review
Write the vocabulary term that best answers each question.
26. __________________________________________________________________________
27. __________________________________________________________________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.
28. A B C D
29. A B C D
30. A B C D
31. A B C D
32. A B C D
33. A B C D

34. __________________________________________________________________________
35. __________________________________________________________________________
36. __________________________________________________________________________

37. Careers in Biology Record your answer for question 37 on a separate sheet of paper.

Additional Assessment
38. Writing in Biology Record your answer for question 38 on a separate sheet of paper.

Document-Based Questions
39. __________________________________________________________________________
40. __________________________________________________________________________
41. __________________________________________________________________________

Cumulative Review
42. Record your answer for question 42 on a separate sheet of paper.
CHAPTER 34

Assessment

Student Recording Sheet

Standardized Test Practice

Multiple Choice

Select the best answer from the choices given, and fill in the corresponding circle.

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D

Short Answer

Answer each question with complete sentences.

9. 

10. 

11. 

12. Record your answer for question 12 on a separate sheet of paper.

13. 

14. 
15. 

__________________________________________

__________________________________________

__________________________________________

Extended Response

*Answer each question with complete sentences.*

16. 

__________________________________________

__________________________________________

__________________________________________

17. 

__________________________________________

__________________________________________

__________________________________________

18. 

__________________________________________

__________________________________________

__________________________________________

Essay Question

19. Record your answer for question 19 on a separate sheet of paper.
Before reading Chapter 35, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. Mirna is constructing a model of the human digestive system for health class. As part of the project, she must research the basic structures of the digestive system. What structures does she not research as parts of the digestive system?
   A. liver, pancreas, and gallbladder
   B. mouth and esophagus
   C. skeleton and joints
   D. stomach and intestines

Explain.

2. Charlotte is learning about nutrition from her parents in an effort to eat a healthier diet. Her father shows her how to read a nutrition label on a can of soup, and he points out the unit used to measure the energy content in food. Which unit does he show her?
   A. Calorie
   B. gram
   C. milliliter
   D. serving

Explain.

3. Zahara researches the new food pyramid designed by the United States Department of Agriculture so that she can alter her diet to gain more energy for playing basketball. Which example is part of the new food pyramid?
   A. A healthy diet includes equal parts protein and carbohydrates.
   B. Junk foods should be no more than 10 percent of a person’s diet.
   C. Vegetables and grains should be the primary source of nutrients.
   D. Whole grain breads and pasta are no better than enriched grains.

Explain.
The acidic digestive juices in the stomach contain the enzyme pepsin. In this lab, you will investigate the role of pepsin in digestion.

**Procedure**
1. Read and complete the lab safety form.
2. Label and prepare three test tubes.
   - A: 15 mL water
   - B: 10 mL water, 5 mL HCl solution
   - C: 5 mL each water, HCl solution, and pepsin solution
3. Cut hard-boiled egg white portions into pea-sized chunks with a knife.
4. Add equal amounts of egg white to each tube. Predict the relative amount of digestion in each test tube.
5. Place test tubes in an incubator overnight at 37°C. Record observations the next day.

**Data and Observations**

**Analysis**

**Evaluate** Rank the test tubes based on the amount of digestion that occurred. Based on your results, describe the roles of stomach-pH pepsin in digestion.
How do bile salts and pancreatic solution affect digestion? Lipids, or fats, are not water soluble. The body compensates by producing bile, a chemical that breaks apart fat and helps the molecules mix with the watery solution in the small intestine. In this lab, you will investigate the breakdown of lipids.

Procedure
1. Read and complete the lab safety form.
2. Study the lab procedure and construct a data chart.
3. Label three test tubes. Add 5 mL vegetable oil and 8–10 drops phenolphthalein to each. Shake well. If the color is not pink, add NaOH solution one drop at a time until the solution turns pink.
4. Add 125 mL water to a 250-mL beaker. Warm to about 40°C.
5. Prepare the test tubes as follows, then seal each with a stopper.
   - Test Tube A: 5 mL distilled water, pinch of bile salt
   - Test Tube B: 5 mL pancreatic solution, pinch of bile salt
   - Test Tube C: 5 mL pancreatic solution
6. Shake each tube to mix the contents and gently place in the beaker. Record your observations.
7. Dispose of test tube contents in the designated container.

Data and Observations

Analysis

1. Analyze What did a color change inside a test tube indicate? What caused the change?

2. Draw Conclusions Based on your results, describe the roles of bile and pancreatic solution in digestion.
MiniLab

CHAPTER 35
Model the Endocrine System

How do hormones help the body maintain homeostasis? Activities like taking a test or running a race place demands on your body. Your body’s responses to these demands cause changes in your body. Your endocrine and nervous systems work together to ensure a stable internal environment.

Procedure

1. Read and complete the lab safety form.
2. Identify a sport or activity. Brainstorm what body actions occur as you prepare for, take part in, and recover from the activity.
3. Imagine you are writing a computer program that your body will follow to complete the activity. Sequence the steps you brainstormed in step 2.
4. Review your program. Insert steps where the endocrine system might secrete hormones to maintain homeostasis. Use your knowledge and available resources to identify the specific hormones involved. Include body responses to these hormones as separate steps.
5. Compare your program with those developed by other students.

Data and Observations

Analysis

1. Think Critically  Did some of the same hormones appear in most of the other programs you studied in step 5? Why or why not?

2. Draw Conclusions  List the major body systems represented in your program. What does this show about the range of body functions controlled by the endocrine system?
Background: Starch digestion begins in the mouth. The enzyme amylase, present in saliva, catalyzes the breakdown of starch into sugar molecules. The smallest of these sugar molecules is glucose, an important energy source. Foods, including crackers, vary in the amount of starch they contain. In this lab, you will compare how quickly starch is digested in several types of crackers to determine the relative amount in each.

Question: How does the amount of time required for starch digestion by amylase compare among various types of crackers?

Materials
Choose materials that would be appropriate for this lab. Possible materials include:
variety of crackers
mortar and pestle
test tubes and test tube rack
filter paper
funnels

Safety Precautions

WARNING: Iodine can irritate and will stain skin.

Plan and Perform the Experiment
1. Read and complete the lab safety form.
2. Examine three types of crackers. Design an experiment to compare the amount of time required to digest the starch in each. You will use the enzyme amylase to stimulate the digestion of starch. Iodine, a chemical indicator that turns blue-black when starch is present, will indicate when starch digestion is complete.
3. Construct a data chart to record your observations.
4. Consider these points with your group and modify the plan as necessary:
   - What factors will be held constant?
   - Have you established a control sample?
5. Make sure your teacher approves your plan before you proceed.
6. Carry out your experiment.
7. Cleanup and Disposal Dispose of test tube contents as directed. Clean and return glassware and equipment. Wash hands thoroughly after handling chemicals and glassware.
Design Your Own BioLab, How does the rate of starch digestion compare among crackers? continued

Data and Observations

Analyze and Conclude
1. Analyze  How did the amylase affect the starch in the crackers?

2. Observe and Infer  In which cracker was starch digested most quickly? What does this indicate about the amount of starch in this cracker compared to the others?

3. Think Critically  What variables among human mouths might affect the action of amylase on starch? Explain.

4. Error Analysis  Did any steps in your procedure introduce uncontrolled variables into the experiment? Explain how the procedure could be redesigned to make these factors constant.
Real-World Biology: 
Analysis

CHAPTER 35
Choking and the Abdominal Thrust

Would you know what to do if someone around you started choking on a piece of food? With choking consistently ranked as one of the leading causes of accidental death in the United States, knowing what to do in such a respiratory emergency is an important skill. When food or some other object gets stuck in the throat, permanent brain damage or death from asphyxiation can occur after 4 min without air. One important first-aid technique for choking is the abdominal thrust, developed in 1973 by Dr. Henry Heimlich. In this activity, you will take an inside look at the abdominal thrust to see how and why it works.

Part A: The Abdominal Thrust

Swift, decisive action is needed when someone begins to choke on an object blocking the air passage. The abdominal thrust is an emergency technique designed to quickly and effectively dislodge food or another object from the respiratory passage. Read the steps of the abdominal thrust and then answer the questions below.

1. If the choking victim cannot breathe and is standing, quickly stand behind him or her and place your fist with the thumb side against the victim’s abdomen. The correct placement of the fist is slightly above the navel but below the rib cage, as shown in Figure 1.

2. Grab your fist with the other hand and give four quick and forceful upper thrusts. Do not squeeze on the ribs with your arms. Just use your fist on the abdomen. It might be necessary to repeat this procedure several times until the airway is clear.

3. When the obstructing object is dislodged and moves into the victim's mouth, remove it quickly.

4. The victim should be seen by a doctor or sent to a hospital as soon as possible for observation.

Analyze and Conclude

Respond to each statement.

1. **Describe** Using what you have learned about the digestive and respiratory systems, describe the normal pathways of food and air as they enter the body.

   __________________________________________________________________________

   __________________________________________________________________________

   __________________________________________________________________________

2. **Describe** the pathways of food and air during a choking incident.

   __________________________________________________________________________

   __________________________________________________________________________

   __________________________________________________________________________
Part B: Analyzing the Abdominal Thrust
A detailed look at the anatomy involved in the abdominal thrust can give a better appreciation of this important technique.

Figure 2

Analyze and Conclude

Use Figure 2 to respond to each question and statement.

1. Explain Use your knowledge of the respiratory system to explain how a force applied in the abdominal area can dislodge an object caught in the throat.

2. Apply When performing the abdominal thrust on a choking victim, the correct placement of your arms and hands is very important. What problems can result if the abdominal thrust is not performed properly?

3. Judge Choking is the cause of nearly 3000 deaths in the United States each year. If a person is choking, should someone at the scene administer the abdominal thrust, or should nothing be done until an emergency medical team arrives? Explain.

CAREERS IN BIOLOGY

Emergency Medicine Visit biologygmh.com for information on emergency medical technicians. What are the responsibilities of an emergency medical technician?
The food we eat is of no value to our bodies until it has been broken down into simpler components. This process occurs in every part of the digestive system, from the mouth to the intestines. The chemical changes that take place in food during digestion are made possible by enzymes and other compounds that perform many specialized functions.

**Research**  The chart below lists some important enzymes and other compounds that are needed for digestion. Choose one of the compounds to research in detail. Provide the information needed to complete the chart for the compound you have chosen. “Region of Action” means the part of the digestive system where the compound acts. “Source” refers to the organ, tissue, or other body part that supplies the compound.

**Compose**  Work in groups to make a life-size drawing of the human digestive system on a large sheet of paper. Have each person summarize the results of his or her research on an index card. Attach each card to the appropriate region of action on your drawing. Your final labeled drawing should provide a complete summary of the changes that take place in food as it passes through the digestive system and the digestive compounds involved in those changes.

<table>
<thead>
<tr>
<th>Digestive Compound</th>
<th>Region of Action</th>
<th>Source</th>
<th>Function</th>
<th>Products of Digestive Compound’s Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ptyalin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amylopsin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maltase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sucrase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bile salts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pancreatic lipase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pepsinogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trypsinogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chymotrypsinogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Complete the flowchart about the digestion of food. These terms may be used more than once: esophagus, feces, large intestine, liver, mechanical digestion, mouth, pancreas, pepsin, stomach.

Food enters the body through the (1) ________ , where (2) ________ takes place by chewing and digestive enzymes begin chemical digestion.

Food then moves through the (3) ________ by peristalsis. It passes through the sphincter and into the (4) ________ .

The muscles in the stomach wall contract to break down the food and mix it with stomach secretions at about pH 2. These secretions contain (5) ________ for digesting proteins.

In the small intestine, the (6) ________ adjusts the pH to a little above pH 7 and provides digestive enzymes. The (7) ________ produces bile, which is stored in the gall-bladder until it is needed. Most of the nutrients are absorbed through the villi.

In the (8) ________ , water is absorbed, and the waste product becomes solid (9) ________ , which are eliminated from the body.
In your textbook, read about the functions of the digestive system.

Use each of the terms below only once to complete the passage.

chemical  chyme  colon  enzymes  hormones
mechanical  small intestine  three  water

The digestive system has (1) ___________________________ major functions. Digestion can be categorized as either (2) ___________________________ or (3) ___________________________.

Most nutrients are absorbed in the (4) ___________________________. Accessory organs provide bile, (5) ___________________________, and (6) ___________________________ to aid digestion.

(7) ___________________________ is absorbed from (8) ___________________________ in the (9) ___________________________.

Label the diagram of the digestive system. Use these choices:

esophagus  gallbladder  large intestine  liver  mouth
pancreas  salivary glands  small intestine  stomach

10. ___________________________
11. ___________________________
12. ___________________________
13. ___________________________
14. ___________________________
15. ___________________________
16. ___________________________
17. ___________________________
18. ___________________________
In your textbook, read about the small and large intestines.

If the statement is true, write true. If the statement is false, replace the italicized term or phrase to make it true.

19. The *pancreas* produces bile, which helps the body break down fats.

20. The largest internal organ of the body is the *liver*.

21. The *gallbladder* produces enzymes, hormones, and an alkaline fluid.

22. Fingerlike structures called *villi* absorb nutrients from food.

23. The *colon* is a small organ with no known function that sometimes gets infected.

Complete the table by checking the correct column(s) for each function.

<table>
<thead>
<tr>
<th>Function</th>
<th>Small Intestine</th>
<th>Large Intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. Water is absorbed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Mechanical digestion is completed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Nutrients are absorbed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Peristalsis happens.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Undigestible material is collected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. Bile and pancreatic juices are added.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Chemical digestion is completed.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respond to each statement.

31. **State** the function of the gallbladder.

32. **Name** the part of the digestive system where food spends the most time.
In your textbook, read about calories and carbohydrates.

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

1. Which of these activities burns more Calories?
   A. jogging
   B. playing baseball
   C. sleeping
   D. walking

2. Complex carbohydrates, or starches, are found in _____
   A. fruit.
   B. potatoes.
   C. soda pop.
   D. sugar.

In your textbook, read about fats and proteins.

For each answer below, write an appropriate question.

3. Answer: Fats supply concentrated energy, serve as building blocks, protect internal organs, and help maintain homeostasis.
   Question: ________________________________

4. Answer: because no single plant source contains all eight essential amino acids
   Question: ________________________________

In your textbook, read about vitamins and minerals.

Complete the table by checking the correct column(s) for each description.

<table>
<thead>
<tr>
<th>Description</th>
<th>Vitamins</th>
<th>Minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Organic compounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Involved with metabolic activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Help build bones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Can be produced by bacteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Essential part of a healthy diet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Inorganic compounds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In your textbook, read about the action of hormones.

For each statement below, write true or false.

1.  Endocrine glands produce hormones.  
   _____________

2.  A hormone is an inorganic compound used as building material in the body.  
   _____________

3.  Estrogen, testosterone, and insulin are examples of steroid hormones.  
   _____________

In your textbook, read about the endocrine glands and their hormones.

Complete the table by filling in the missing information.

<table>
<thead>
<tr>
<th>Gland</th>
<th>Example of a Hormone or Substance That the Gland Secretes</th>
<th>Function of Hormone or Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreas</td>
<td>4.</td>
<td>accelerates the conversion of glucose to glycogen</td>
</tr>
<tr>
<td>Adrenal glands</td>
<td>5.</td>
<td>6.</td>
</tr>
<tr>
<td>Thyroid</td>
<td>thyroxine</td>
<td>7.</td>
</tr>
<tr>
<td>Pituitary gland</td>
<td>8.</td>
<td>9.</td>
</tr>
</tbody>
</table>

In your textbook, read about the link to the nervous system.

Number the steps in the order in which they occur, showing the responses of the endocrine and nervous systems to dehydration.

10.  ADH travels in the blood to the kidneys.

11.  ADH bonds to receptors on kidney cells.

12.  The water in urine decreases; the water in the blood increases.

13.  The kidneys reabsorb more water.

14.  The hypothalamus releases ADH.

15.  The water level in the body is low.
En tu libro de texto, lee acerca de las funciones del sistema digestivo.

Usa cada uno de los siguientes términos sólo una vez para completar el párrafo.

agua colon enzimas hormonas intestino delgado mecánica química quimo tres

El sistema digestivo tiene (1) __________________________ funciones principales. La digestión se puede clasificar como (2) __________________________ o (3) __________________________.

La mayoría de los nutrientes se absorben en el (4) __________________________. Los órganos accesorios suministran bilis, (5) __________________________ y (6) __________________________ para ayudar en la digestión. El (7) __________________________ se absorbe del (8) __________________________ en el (9) __________________________.

Identifica el diagrama del sistema digestivo. Usa estas opciones:

- boca
- esófago
- estómago
- glándulas salivales
- hígado
- intestino delgado
- intestino grueso
- páncreas
- vesícula biliar

10. __________________________
11. __________________________
12. __________________________
13. __________________________
14. __________________________
15. __________________________
16. __________________________
17. __________________________
18. __________________________
En tu libro de texto, lee acerca del intestino delgado y del intestino grueso.

Si la afirmación es verdadera, escribe «verdadero». Si la afirmación es falsa, sustituye el término o la frase en cursiva para volverla verdadera.

19. El páncreas produce bilis, la cual ayuda al cuerpo a descomponer las grasas.

20. El órgano interno más grande del cuerpo es el hígado.

21. La vesícula produce enzimas, hormonas y un fluido alcalínico.

22. Las estructuras en forma de dedos llamadas vellos absorben los nutrientes de los alimentos.

23. El colon es un órgano pequeño sin ninguna función conocida que algunas veces se infecta.

Completa la tabla marcando la(s) columna(s) correcta(s) para cada función.

<table>
<thead>
<tr>
<th>Función</th>
<th>Intestino delgado</th>
<th>Intestino grueso</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. Se absorbe el agua.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. La digestión mecánica se completa.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Se absorben los nutrientes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Ocurre la peristalsis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Se recolecta el material indigestible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. Se agregan la bilis y los jugos pancreáticos.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Se completa la digestión química.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Responde a cada afirmación.

31. Indica la función de la vesícula biliar.

32. Nombra la parte del sistema digestivo donde la comida permanece la mayor parte del tiempo.
Guía de estudio

CAPÍTULO 35

Sección 2: La nutrición

En tu libro de texto, lee acerca de las calorías y los carbohidratos.

En el espacio a la izquierda, escribe la letra del término o de la frase que mejor completa cada afirmación o responde a cada pregunta.

1. ¿Cuál de estas actividades quema más calorías?
   A. caminar
   B. dormir
   C. jugar béisbol
   D. trotar

2. Los carbohidratos complejos, o almidones, se encuentran en ______
   A. el azúcar.
   B. las bebidas gaseosas.
   C. las frutas.
   D. las papas.

En tu libro de texto, lee acerca de las grasas y las proteínas.

Para cada respuesta a continuación, escribe una pregunta adecuada.

3. Respuesta: Las grasas brindan energía concentrada, sirven como bloques edificantes, protegen los órganos internos y ayudan a mantener la homeostasis.

   Pregunta: ____________________________________________

4. Respuesta: porque ninguna planta individual contiene los ocho aminoácidos esenciales

   Pregunta: ____________________________________________

En tu libro de texto, lee acerca de las vitaminas y minerales.

Completa la tabla marcando la(s) columna(s) correcta(s) para cada descripción.

<table>
<thead>
<tr>
<th>Descripción</th>
<th>Vitaminas</th>
<th>Minerales</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Son compuestos orgánicos.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Participan en las actividades metabólicas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Ayudan a edificar los huesos.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Pueden ser producto de las bacterias.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Son parte esencial de una dieta saludable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Son compuestos inorgánicos.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
En tu libro de texto, lee acerca de la acción de las hormonas.

Para cada afirmación a continuación, escribe «verdadero» o «falso».

1. Las glándulas endocrinas producen hormonas.
2. Una hormona es un compuesto inorgánico que se usa como material edificante en el cuerpo.
3. El estrógeno, la testosterona y la insulina son ejemplos de hormonas esteroides.

En tu libro de texto, lee acerca de las glándulas endocrinas y sus hormonas.

Completa la tabla con la información faltante.

<table>
<thead>
<tr>
<th>Glándula</th>
<th>Ejemplo de una hormona o sustancia secretada por la glándula</th>
<th>Función de la hormona o sustancia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Páncreas</td>
<td>4.</td>
<td>Acelera la conversión de la glucosa en glicógeno.</td>
</tr>
<tr>
<td>Glándulas adrenales</td>
<td>5.</td>
<td>6.</td>
</tr>
<tr>
<td>Tiroides</td>
<td>tiroxina</td>
<td>7.</td>
</tr>
<tr>
<td>Glándula pituitaria</td>
<td>8.</td>
<td>9.</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la relación con el sistema nervioso.

Enumera los pasos en el orden en el cual ocurren, de manera que indiquen las respuestas del los sistemas endocrino y nervioso a la deshidratación.

10. La hormona antidiurética (HAD) se desplaza por la sangre hacia los riñones.
11. La hormona antidiurética (HAD) se une a los receptores en las células del riñón.
12. El agua en la orina disminuye; el agua en la sangre aumenta.
13. Los riñones vuelven a absorber más agua.
15. El nivel de agua en el cuerpo es bajo.
Quick Check

CHAPTER 35
Section 1: The Digestive System

After reading the section in your textbook, respond to each statement.

1. **Arrange** the following organs in the order in which food passes through them in the digestive system: esophagus, large intestine, mouth, small intestine, stomach.

2. **Identify** the three areas of the digestive system in which mechanical digestion takes place.

3. **Summarize** what happens to food as it moves through the digestive system.

4. Diarrhea is a condition in which the feces contain too much water. **Deduce** which part of the digestive system is malfunctioning for this to occur.

5. A person’s gallbladder might need to be surgically removed when he or she has problems with gallstones. **Speculate** about what effect removal of the gallbladder will have. Explain.
Quick Check

Section 2: Nutrition

After reading the section in your textbook, respond to each question and statement.

1. Tell What is an essential amino acid, and how are essential amino acids different from other amino acids used by humans in protein synthesis?

2. Describe what MyPyramid is.

3. Explain why the daily input of energy from food should equal the amount of energy a person uses daily.

4. Calculate You and your friend sit down to watch a movie. You have a bag of tortilla chips. After the movie is over, you realize that you have eaten the entire bag of chips. According to the nutrition label on the chips, each 28-g serving contains 147 Calories, and there are 20 servings per bag. Assuming that you and your friend ate equal amounts, how many Calories did each of you consume? Show your work.

5. Suggest a good weight-loss strategy. Consider both diet and exercise.
Quick Check

Section 3: The Endocrine System

After reading the section in your textbook, respond to each statement.

1. **List** the glands of the endocrine system.

   [List the glands]

   [List the glands]

   [List the glands]

2. **Describe** what happens during an “adrenaline rush.”

   [Description of adrenaline rush]

   [Description of adrenaline rush]

   [Description of adrenaline rush]

3. **Contrast** the way steroid and nonsteroid, or amino acid, hormones interact with the plasma membrane of their target cell.

   [Comparison of interaction]

   [Comparison of interaction]

   [Comparison of interaction]

4. **Organize** Pair the following with the hormones they secrete.

   **Glands:** adrenal glands, hypothalamus, pituitary gland, thyroid

   **Hormones:** antidiuretic hormone, calcitonin, cortisol, human growth hormone

   [Pairing of glands and hormones]

   [Pairing of glands and hormones]

   [Pairing of glands and hormones]

5. **Conclude** some of the ways a thyroid malfunction that affects thyroxine can affect an adult. Explain.

   [Explanation of effects]

   [Explanation of effects]

   [Explanation of effects]
Section 35.1
Vocabulary Review

Choose the vocabulary term that does not belong, and explain why it does not belong.

1. ______________________________________

2. ______________________________________

3. ______________________________________

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.


Constructed Response

8. ______________________________________

9. Record your answer for question 9 on a separate sheet of paper.

10. _____________________________________

11. _____________________________________

12. _____________________________________

Think Critically

13. _____________________________________

Section 35.2
Vocabulary Review

Explain the difference between the vocabulary terms in each pair.

13. _____________________________________
CHAPTER 35 Assessment

Student Recording Sheet

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

16. [ ] A [ ] B [ ] C [ ] D

17. [ ] A [ ] B [ ] C [ ] D

18. [ ] A [ ] B [ ] C [ ] D

19. [ ] A [ ] B [ ] C [ ] D

Constructed Response

20. Careers in Biology

Think Critically

22.

23.

Section 35.3 Vocabulary Review

Write sentences to compare and contrast each pair of terms.

24.

25.

26.
CHAPTER 35
Assessment

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

27. [ ] A [ ] B [ ] C [ ] D
28. [ ] A [ ] B [ ] C [ ] D
29. [ ] A [ ] B [ ] C [ ] D
30. [ ] A [ ] B [ ] C [ ] D

Constructed Response
31. ____________________________________________
32. ____________________________________________

Think Critically
33. ____________________________________________
34. ____________________________________________

Additional Assessment
35. Writing in Biology  Record your answer for question 35 on a separate sheet of paper.

Document-Based Questions
36. ____________________________________________
37. ____________________________________________
38. ____________________________________________

Cumulative Review
39. ____________________________________________
40. ____________________________________________
41. Record your answer for question 41 on a separate sheet of paper.
CHAPTER 35
Assessment

Student Recording Sheet

Standardized Test Practice

Multiple Choice

Select the best answer from the choices given, and fill in the corresponding circle.

1. A B C D

2. A B C D

3. A B C D

4. A B C D

5. A B C D

6. A B C D

Short Answer

Answer each question with complete sentences.

7. 

8. 

9. 

10. 

11. 

12. 

13. 

Extended Response

Answer each question with complete sentences.

14. 

15. 

16. Record your answer for question 16 on a separate sheet of paper.

Essay Question

17. Record your answer for question 17 on a separate sheet of paper.
Chapter 36  Human Reproduction and Development

Diagnostic Test ............................................. 149
Launch Lab .................................................. 150
MiniLab (1) .................................................. 151
MiniLab (2) .................................................. 152
BioLab ....................................................... 153
Real-World Biology ......................................... 155
Enrichment .................................................. 157
Concept Mapping .......................................... 158
Study Guide (English) ...................................... 159
Study Guide (Spanish) ...................................... 163
Section Quick Check 1 .................................... 167
Section Quick Check 2 .................................... 168
Section Quick Check 3 .................................... 169
Chapter Test A ............................................. 170
Chapter Test B ............................................. 173
Chapter Test C ............................................. 176
Student Recording Sheet ................................. 179
Before reading Chapter 36, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. Mika has learned that his aunt is pregnant with her first child. His aunt is taking a course about pregnancy and reading books on the topic to become knowledgeable about the development of the baby. About once a week, Mika’s aunt comes over for dinner, and his family discusses how the fetus is developing inside the uterus. During her pregnancy term, which would Mika’s aunt include in her dinner conversations?
   A. Her doctor told her that she could drink alcohol during the first trimester.
   B. She feels the first kicks of the baby at week 21, during the second trimester.
   C. The baby’s heartbeat can be heard without a stethoscope after 24 weeks.
   D. The fetus’ lungs and heart begin to develop during the third trimester.
   Explain.

2. Alesha has turned 18 years old and is entering adulthood. Which will probably occur during Alesha’s adult life before the age of 50?
   A. decreased bone length
   B. increased height
   C. increased metabolism
   D. loss of muscle mass
   Explain.

3. Robert and Julia are fifth-graders who are taking gender-segregated sex education classes at their school. In class, they learn about the changes a person can expect during adolescence. Discuss possible changes they will learn.
How are sex cells specialized for the formation of a zygote? Reproduction is a process which follows a predictable pattern. The production of sex cells is a crucial step in reproduction. Sperm and egg cells have specific characteristics that support their roles in reproduction. In this lab, you will investigate how the design of sex cells supports their function.

**Procedure**

1. Read and complete the lab safety form.
2. Observe the slide of the egg cell under the microscope and identify its characteristics. Make a sketch.
3. Observe the slide of the sperm cell under the microscope and identify its characteristics. Make a sketch.

**Data and Observations**

**Analysis**

1. **Compare** and **contrast** the sperm and egg cells you studied. How do they differ?

2. **Identify** What structures and characteristics did you observe that might affect each cell’s role in reproduction?
Why does meiosis produce four sperm but only one egg? The difference in the division of cytoplasm is the major reason meiosis is different in human males and females. Use clay to model how the sex cells are produced during meiosis.

Procedure

1. Read and complete the lab safety form.
2. Choose two lumps of clay, each of a different color. Choose one to represent a primary spermatocyte and the other a primary oocyte.
3. Use the primary spermatocyte to simulate the meiotic divisions as they occur in males.
4. Simulate maturation of the sperm by removing about half of the clay from each sperm and using a small part of it to add a flagellum to each cell.
5. Next simulate the first meiotic division in females.
6. Use one of the sperm and mold it to one side of the large cell. Now simulate the second meiotic division.

Analysis

1. Use Models Make drawings of each step of the simulation above and label the following: primary spermatocyte and oocyte, egg, sperm, first polar body, second polar body, fertilized egg, and zygote.

2. Explain What is the benefit of meiosis concentrating most of the cytoplasm into one egg?
What developmental changes occur during the first eight weeks of life? Fertilization begins when a sperm penetrates the egg. The zygote undergoes predictable developmental changes. Cell division produces increasing numbers of cells. Cells move and arrange themselves to form specific organs, making it possible for cells to perform specific functions.

Procedure
1. Visit biologygmh.com to see images of embryos.
2. Study the images and information provided for Stage 1 through Stage 23, the first ten weeks after fertilization. Choose one factor to track through this developmental period.
3. Chart the development of this factor along a time line through the ten-week period.

Factors might include embryonic size, cell differentiation, overall structural changes, specific organ or organ system development, or others.

Analysis
1. Analyze the time line you created. Identify developmental milestones related to this factor during the ten-week period.

2. Summarize the level of development of the factor you examined by the end of Stage 23.
CHAPTER 36

Internet: How are ultrasound images used to track fetal development?

Background: Ultrasound is a medical imaging technique that uses high frequency sound waves and their echoes to produce an image of something inside the body. While two-dimensional images are the current standard, technology capable of producing three-dimensional fetal images and four-dimensional, or moving, images is now available.

Question: How are ultrasound images used to assess fetal characteristics and development?

Materials
- computer with internet access
- labeled ultrasound images showing embryos and fetuses at various developmental stages
- ultrasound images showing embryos and fetuses at unknown stages of development

Procedure
1. Read and complete the lab safety form.
2. Visit biologygmh.com to examine fetal development from the second trimester through week 40. Use this information to complete the time line you started in MiniLab Sequence Early Human Development.
3. Study the ultrasound images of fetuses during identified stages of development provided by your teacher. Compare these to your time line, and identify as many features as possible. As you study the images, choose a body structure that you would like to examine further.
4. Study the ultrasound images provided by your teacher of fetuses at an unknown stage of development. Use your time line and what you have learned to determine the approximate stage of fetal development. Look for clues based on development of the system you choose.

Data and Observations
BioLab, Internet: How are ultrasound images used to track fetal development? continued

Analyze and Conclude

1. **Interpret Data** During which time period does the developing embryo or fetus change the most? Justify your answer.

2. **Analyze** What physical characteristics were most helpful in identifying the level of fetal development? Explain.

3. **Compare** two- and three-dimensional ultrasound images. Which are easiest to interpret?

4. **Think Critically** What advantages are provided by four-dimensional imaging?

5. **Error Analysis** How accurate were your estimates of fetal development? Explain how your estimates could have been improved.
About 10 percent of babies born in the United States are born prematurely, or before they are fully developed. The cause of a premature birth is unknown in about half the cases. Some factors that are known to contribute to premature labor and birth are the early rupture of the amniotic sac, certain infections, abnormalities in the uterus, and fetal defects. Chronic diseases in the mother, such as high blood pressure and diabetes, can also be factors. Smoking, using alcohol and other drugs, and not eating a balanced diet are easily preventable factors that contribute to premature births.

The fetus in Figure 1 has all its major organs, but it still needs to develop and grow in its mother’s uterus, receiving oxygen and nutrients through the placenta. If the fetus were born now, it would not survive. In about eight more weeks, it might have a chance of survival with medical intervention. In this activity, you will investigate the problems premature babies face and their chances of survival.

**Chances of Survival**

Many factors affect a premature baby’s chances of survival. One of the most important factors is gestational age, the fetus’s age at the time of birth. Table 1 shows survival rates at different gestational ages. These rates are based on babies who are born alive and who receive medical care. Other factors that affect the survival of premature babies are the baby’s weight, breathing problems, abnormal development, and diseases such as respiratory and lung infections.

Premature babies that survive have an increased risk for blindness, lung diseases, learning disabilities, and developmental disabilities. Sometimes disabilities do not appear until the child goes to school. However, any premature baby might defy the odds and survive without long-term health problems.

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gestational Age</strong></td>
</tr>
<tr>
<td>21 weeks or less</td>
</tr>
<tr>
<td>22 weeks</td>
</tr>
<tr>
<td>23 weeks</td>
</tr>
<tr>
<td>24 weeks</td>
</tr>
<tr>
<td>25 weeks</td>
</tr>
<tr>
<td>26 weeks</td>
</tr>
<tr>
<td>27 weeks</td>
</tr>
<tr>
<td>30 weeks</td>
</tr>
<tr>
<td>34 weeks</td>
</tr>
</tbody>
</table>

Figure 1 14-week fetus
Analyze and Conclude

Respond to each question and statement.

1. **Identify** What are the risks that premature babies face?

2. **Calculate** the approximate number of premature babies born out of every ten babies born in the United States.

3. **Predict** what medical treatment premature babies might need, based on a baby’s growth and development in the uterus.

4. **Suggest** what a woman can do to try to prevent a premature birth, based on what you know about factors that contribute to premature births.

5. **Interpret** During which weeks do a baby’s chances of survival increase at the greatest rate?

---

**Neonatal Nursing** Visit biologygmh.com for information on neonatal nurses. What are the responsibilities of a neonatal nurse?
Hormones secreted by the pituitary gland and the male and female reproductive organs control and regulate human reproduction and development. Imbalances of some hormones can cause major physiological changes, especially in women after their childbearing years. Hormone therapy is the administering of hormones or drugs to rectify hormonal imbalances. Hormone therapy for women has focused on relieving the symptoms of menopause. For men, hormone therapy is used mainly for treatment of prostate cancer.

Select Work in a small group and select one of the hormone therapies listed in the table to research in depth. Groups might concentrate on either the beneficial effects or negative side effects of male or female hormone treatments.

Research Once you have selected a hormone therapy for detailed study, use your textbook and other reference materials to find information on the topic. Your research should include information about current research regarding the therapy, individuals who should and should not consider undergoing the therapy, and any uncertainties involved in the therapy. Also, include background information on where the hormone is secreted in the body and its normal function.

Present Finally, present the information that you learned about the hormone therapy to your class. As other groups give their presentations, make a list of questions you have on the information presented. After all the groups have given their presentations, discuss everyone’s questions.

<table>
<thead>
<tr>
<th>Hormones/Drugs</th>
<th>Beneficial Effects of Therapy</th>
<th>Side Effects of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estrogen</td>
<td>• relieves symptoms of menopause (including hot flashes and sleeping difficulty)</td>
<td>• fluid retention</td>
</tr>
<tr>
<td>Progesterone</td>
<td>• reduces osteoporosis</td>
<td>• headaches, including migraines</td>
</tr>
<tr>
<td>Estrogen plus progesterone</td>
<td>• possible decrease in coronary heart disease*</td>
<td>• breast tenderness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• irritability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• monthly bleeding</td>
</tr>
<tr>
<td>Various drugs to decrease</td>
<td>• treatment for prostate cancer</td>
<td>• potential increase in breast cancer and uterine cancer*</td>
</tr>
<tr>
<td>testosterone levels</td>
<td></td>
<td>• increased risk of gallbladder disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• decrease in bone density</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• hot flashes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• anemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• erectile dysfunction</td>
</tr>
</tbody>
</table>

*Ongoing research has not yet established a clear and undisputed link.
Complete the flowchart about pregnancy. These terms may be used more than once:
blastocyst, embryo, fat, fertilization, first trimester, growth, heartbeat, morula, third
trimester, vulnerable, zygote.

1. Pregnancy starts with
2. which produces a(n)
3. which is divided into
4. that through cellular division becomes a(n)
5. with the development of
tissues, organs, and organ systems
6. which makes the embryo
7. which makes
8. which is a period of
9. and accumulation of
10. whose inner mass becomes a(n)
11. can be heard
In your textbook, read about the human male reproductive system.

If the statement is true, write true. If the statement is false, replace the italicized word or phrase to make it true.

1. The male hormone responsible for male secondary characteristics is estrogen.

2. In the testes, sperm cells are produced in the seminiferous tubules.

3. The temperature of the testes is higher than the internal temperature of the male body.

4. Follicle-stimulating hormone stimulates the production and secretion of testosterone.

5. The secondary sex characteristics appear at puberty.

Use each of the terms below only once to complete the passage.

epididymis  semen  urethra  vas deferens

Newly formed sperm cells pass through the seminiferous tubules to the (6) _________________. There the sperm mature and are stored. When the mature sperm are released, they travel through the (7) _________________, which is a duct leading away from the testis. Sperm travel along this duct and into the (8) _________________. This tube carries both (9) _________________ and urine out of the body through the penis.

Complete the table by writing in the name of the steroid for each description. Use these choices:

Follicle-stimulating hormone (FSH)  Gonadotropin-releasing hormone (GnRH)
Luteinizing hormone (LH)  Testosterone

<table>
<thead>
<tr>
<th>Steroid</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>increases the production of follicle-stimulating hormone and luteinizing hormone</td>
</tr>
<tr>
<td>11.</td>
<td>promotes the production of sperm cells in the testes</td>
</tr>
<tr>
<td>12.</td>
<td>influences the development of male secondary sex characteristics</td>
</tr>
<tr>
<td>13.</td>
<td>stimulates the production and secretion of testosterone in the testes</td>
</tr>
</tbody>
</table>
In your textbook, read about the human female reproductive system and the menstrual cycle.

Match the definition in Column A with the term in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. tube that connects the ovary to the uterus</td>
<td>A. oocyte</td>
</tr>
<tr>
<td>15. first phase of the menstrual cycle</td>
<td>B. luteal phase</td>
</tr>
<tr>
<td>16. the smaller of the two structures resulting from the first meiotic division in the female</td>
<td>C. oviduct</td>
</tr>
<tr>
<td>17. female sex cell</td>
<td>D. flow phase</td>
</tr>
<tr>
<td>18. third phase of the menstrual cycle</td>
<td>E. polar body</td>
</tr>
<tr>
<td>19. occurs when the follicle ruptures and an oocyte is released into an oviduct</td>
<td>F. ovulation</td>
</tr>
<tr>
<td>20. second phase of the menstrual cycle</td>
<td>G. follicular phase</td>
</tr>
</tbody>
</table>

Complete the table by checking the correct column(s) for each event.

<table>
<thead>
<tr>
<th>Event</th>
<th>Phase of Menstrual Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. The corpus luteum develops from a ruptured follicle.</td>
<td>Flow</td>
</tr>
<tr>
<td>22. Estrogen levels are at their peak.</td>
<td>Follicular</td>
</tr>
<tr>
<td>23. Progesterone levels are at their peak.</td>
<td>Luteal</td>
</tr>
<tr>
<td>24. The uterine lining is shed.</td>
<td></td>
</tr>
<tr>
<td>25. The LH level rises abruptly.</td>
<td></td>
</tr>
<tr>
<td>26. Ovulation occurs.</td>
<td></td>
</tr>
<tr>
<td>27. The uterine lining becomes engorged with blood, fat, and tissue fluid.</td>
<td></td>
</tr>
<tr>
<td>28. The FSH level begins to rise.</td>
<td></td>
</tr>
</tbody>
</table>
In your textbook, read about fertilization.

Label the diagram. Use these choices:

- fertilization
- implantation
- ovulation
- uterus
- ovary
- vagina
- oviduct
- zygote

1. __________________________
2. __________________________
3. __________________________
4. __________________________
5. __________________________
6. __________________________
7. __________________________
8. __________________________

In your textbook, read about the placenta.

Read each of the following terms. If it describes a substance that can cross the placenta, write yes. If not, write no.

- 9. oxygen
- 10. antibodies
- 11. alcohol
- 12. nutrients
- 13. drugs
- 14. waste
- 15. blood cells
- 16. carbon dioxide

In your textbook, read about the three trimesters of development.

Complete the table by checking the correct column(s) for each event.

<table>
<thead>
<tr>
<th>Event</th>
<th>Trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
</tr>
<tr>
<td>17. Fetus can survive outside the uterus with medical assistance at the end of this trimester.</td>
<td></td>
</tr>
<tr>
<td>18. Fetus undergoes rapid brain development.</td>
<td></td>
</tr>
<tr>
<td>19. Embryo is most vulnerable to outside influences.</td>
<td></td>
</tr>
<tr>
<td>20. Embryo becomes a fetus.</td>
<td></td>
</tr>
<tr>
<td>21. Fetus can move its arms, fingers, and toes and make facial expressions.</td>
<td></td>
</tr>
<tr>
<td>22. Fetus can respond to sounds in the environment.</td>
<td></td>
</tr>
<tr>
<td>23. Fetus can suck its thumb and hiccup.</td>
<td></td>
</tr>
</tbody>
</table>
In your textbook, read about birth.

Complete the table by writing in the stage of birth for each description. Use these choices:

<table>
<thead>
<tr>
<th>Description</th>
<th>Stage of Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The placenta detaches from the uterus.</td>
<td>dilation</td>
</tr>
<tr>
<td>2. The umbilical cord is clamped and cut.</td>
<td>expulsion</td>
</tr>
<tr>
<td>3. Contractions of the uterus become stronger and the amniotic sac tears.</td>
<td>placental</td>
</tr>
<tr>
<td>4. The placenta and extraembryonic membranes leave the mother’s body.</td>
<td></td>
</tr>
<tr>
<td>5. The cervix opens to allow the baby to leave the uterus.</td>
<td></td>
</tr>
<tr>
<td>6. The mother contracts her abdominal muscles to help push the baby through the vagina.</td>
<td></td>
</tr>
</tbody>
</table>

In your textbook, read about growth and aging.

For each answer below, write an appropriate question.

7. **Answer:** It is the stage of life that begins when physical growth is complete.
   **Question:**

8. **Answer:** It is the stage of life when a person typically learns to walk.
   **Question:**

9. **Answer:** It is the stage of life between childhood and adulthood.
   **Question:**

10. **Answer:** It is the stage of life between infancy and adolescence.
    **Question:**

Use each of the terms below only once to complete the passage:

8 and 13  10 and 15  adolescence  adulthood  childhood
child’s infancy menopause two

The first (11) _______________ years of life are known as (12) _______________.

A(n) (13) _______________ ability to reason and solve problems develops progressively during (14) _______________. In girls, puberty usually begins between ages (15) _______________ during (16) _______________. In boys, puberty usually begins between ages (17) _______________. In women, the ability to have children ends at (18) _______________ during late (19) _______________. 
En tu libro de texto, lee acerca del sistema masculino de reproducción humana.

Si la afirmación es verdadera, escribe «verdadero». Si la afirmación es falsa, sustituye la palabra o frase en cursiva para volverla verdadera.

1. La hormona masculina responsable de las características masculinas secundarias es el estrógeno.  
   Verdadero

2. En los testículos, las células de esperma se producen en los túbulos seminíferos.  
   Verdadero

3. La temperatura de los testículos es mayor que la temperatura interna del cuerpo masculino.  
   Verdadero

4. La hormona estimulante de folículos estimula la producción y secreción de testosterona.  
   Verdadero

5. Las características sexuales secundarias aparecen en la pubertad.  
   Verdadero

Usa cada uno de los siguientes términos sólo una vez para completar el párrafo.

- conducto deferente
- epidídimo
- semen
- uretra

El esperma pasa a través de los túbulos seminíferos hacia el (6) epidídimo, donde el esperma madura y se almacena. Cuando el esperma se libera, se desplaza a través del (7) conducto deferente, el cual es un conducto que se aleja de los testículos. El esperma se desplaza por este conducto a la (8) uretra. Este tubo transporta tanto el semen como la orina hacia fuera del cuerpo a través del pene.

Completa la tabla con el nombre del esteroide para cada descripción. Usa estas opciones:

- Hormona estimulante de folículos (FSH)
- Hormona luteinizante (LH)
- Hormona liberadora de gonadotropina (GnRH)
- Testosterona

<table>
<thead>
<tr>
<th>Esteroides</th>
<th>Descripción</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Hormona estimulante de folículos (FSH)</td>
<td>Aumenta la producción de la FSH y la LH.</td>
</tr>
<tr>
<td>11. Hormona luteinizante (LH)</td>
<td>Promueve la producción de células de esperma en los testículos.</td>
</tr>
<tr>
<td>12. Hormona liberadora de gonadotropina (GnRH)</td>
<td>Influencia el desarrollo de las características sexuales secundarias.</td>
</tr>
<tr>
<td>13. Testosterona</td>
<td>Estimula la producción de la testosterona.</td>
</tr>
</tbody>
</table>
En tu libro de texto, lee acerca del sistema femenino de reproducción humana y del ciclo menstrual.

Relaciona la definición de la columna A con el término de la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. tubo que conecta el ovario con el útero</td>
<td>A. oocito</td>
</tr>
<tr>
<td>15. primera fase del ciclo menstrual</td>
<td>B. fase lútea</td>
</tr>
<tr>
<td>16. la más pequeña de las dos estructuras que resultan de la primera división meiótica en la mujer</td>
<td>C. oviducto</td>
</tr>
<tr>
<td>17. célula sexual femenina</td>
<td>D. fase del flujo</td>
</tr>
<tr>
<td>18. tercera fase del ciclo menstrual</td>
<td>E. cuerpo polar</td>
</tr>
<tr>
<td>19. ocurre cuando el foliculo se rompe y se libera un oocito dentro de un oviducto</td>
<td>F. ovulación</td>
</tr>
<tr>
<td>20. segunda fase del ciclo menstrual</td>
<td>G. fase folicular</td>
</tr>
</tbody>
</table>

Completa la tabla marcando la(s) columna(s) correcta(s) para cada evento.

<table>
<thead>
<tr>
<th>Evento</th>
<th>Fase del ciclo menstrual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flujo</td>
</tr>
<tr>
<td>21. El cuerpo lúteo se desarrolla a partir de un foliculo roto.</td>
<td></td>
</tr>
<tr>
<td>22. Los niveles de estrógeno están en su nivel máximo.</td>
<td></td>
</tr>
<tr>
<td>23. Los niveles de progesterona están en su nivel máximo.</td>
<td></td>
</tr>
<tr>
<td>24. Se arroja el revestimiento uterino.</td>
<td></td>
</tr>
<tr>
<td>25. El nivel de la hormona luteinizante (LH) aumenta abruptamente.</td>
<td></td>
</tr>
<tr>
<td>27. El revestimiento uterino se llena de sangre, grasa y fluido del tejido.</td>
<td></td>
</tr>
<tr>
<td>28. El nivel de la hormona estimulante de foliculos (FSH) empieza a subir.</td>
<td></td>
</tr>
</tbody>
</table>
En tu libro de texto, lee acerca de la fertilización.
Identifica el diagrama. Usa estas opciones:

<table>
<thead>
<tr>
<th>cigoto</th>
<th>fertilización</th>
<th>implantación</th>
<th>ovario</th>
</tr>
</thead>
<tbody>
<tr>
<td>oviducto</td>
<td>ovulación</td>
<td>útero</td>
<td>vagina</td>
</tr>
</tbody>
</table>

1. __________________
2. __________________
3. __________________
4. __________________
5. __________________
6. __________________
7. __________________
8. __________________

En tu libro de texto, lee acerca de la placenta.
Lee cada uno de los siguientes términos. Si describe una sustancia que puede atravesar la placenta, escribe «sí». De lo contrario, escribe «no».


En tu libro de texto, lee acerca de los tres trimestres de desarrollo.
Completa la tabla marcando la(s) columna(s) correcta(s) para cada evento.

<table>
<thead>
<tr>
<th>Evento</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. El feto puede sobrevivir por fuera del útero con asistencia médica al final de este trimestre.</td>
</tr>
<tr>
<td>18. El feto pasa por un rápido desarrollo del cerebro.</td>
</tr>
<tr>
<td>19. El embrión es más vulnerable a influencias externas.</td>
</tr>
<tr>
<td>20. El embrión se convierte en feto.</td>
</tr>
<tr>
<td>22. El feto puede responder a los sonidos en el ambiente.</td>
</tr>
<tr>
<td>23. El feto puede chuparse el dedo y tener hipo.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evento</th>
<th>Trimestre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primero</td>
</tr>
<tr>
<td>17.</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td></td>
</tr>
</tbody>
</table>
Guía de estudio

Sección 3: Nacimiento, crecimiento y envejecimiento

En tu libro de texto, lee acerca del nacimiento.

Completa la tabla con la etapa del nacimiento para cada descripción. Usa estas opciones:

<table>
<thead>
<tr>
<th>descripción</th>
<th>dilatación</th>
<th>expulsión</th>
<th>placentaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. La placenta se desprende del útero.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. El cordón umbilical se atá y se corta.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Las contracciones se vuelven más fuertes y el saco amniótico se rompe.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. La placenta y las membranas extraembrionicas salen del cuerpo de la madre.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. La cerviz se abre para permitir que el bebé salga del útero.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. La madre contrae los abdominales para empujar al bebé a través de la vagina.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca del crecimiento y el envejecimiento.

Para cada respuesta a continuación, escribe una pregunta adecuada.

7. **Respuesta:** Es la etapa de la vida que empieza cuando el crecimiento físico está completo.
   **Pregunta:**

8. **Respuesta:** Es la etapa de la vida cuando una persona por lo general aprende a caminar.
   **Pregunta:**

9. **Respuesta:** Es la etapa de la vida entre la niñez y la adultez.
   **Pregunta:**

10. **Respuesta:** Es la etapa de la vida entre la infancia y la adolescencia.
    **Pregunta:**

Usa cada uno de los siguientes términos sólo una vez para completar el párrafo.

8 y 13
infancia

10 y 15
menopausia

adolescencia

adultez

dos

niño

Los primeros (11) ______________ años de vida se llaman la (12) ______________. La capacidad de un (13) ______________ para razonar se desarrolla durante la (14) ______________. En las niñas, la pubertad empieza entre las edades de (15) ______________ durante la (16) ______________. En los niños, la pubertad empieza entre las edades de (17) ______________. Las mujeres terminan de poder tener hijos en la (18) ______________ durante la (19) ______________ tardía.
Section Quick Check

CHAPTER 36
Section 1: Reproductive Systems

After reading the section in your textbook, respond to each statement.

1. Explain why the scrotal pouch is located outside the body.

2. Define testosterone. Identify where it is produced.

3. Describe how hormone levels change during the follicular phase of the menstrual cycle. Use the terms estrogen, follicles, FSH, LH, negative feedback, and progesterone in your answer.

4. Compare the frequency of production of sperm in human males to the frequency of production of eggs in human females.

5. Theorize whether there will be a flow phase of the menstrual cycle if pregnancy occurs. Explain. Use the terms embryo and endometrium in your answer.
After reading the section in your textbook, respond to each statement.

1. **State** the purpose of amniotic fluid.

2. **Summarize** how the levels of hormones change and affect the levels of other hormones during pregnancy.

3. **Indicate** why a fetus is more vulnerable to effects of alcohol, tobacco, drugs, and other environmental influences during the first trimester than other trimesters.

4. **Theorize** why ultrasound would be used first to diagnose fetal conditions before amniocentesis or chorionic villi sampling.

5. **Infer** why it takes several hundred sperm for only one sperm to fertilize a human egg.
Quick Check

After reading the section in your textbook, respond to each statement.

1. **Cite** seven signs of aging.

2. **Explain** the physical and chemical processes that occur in the mother as the birthing process begins.

3. **Describe** the kinds of changes and developments that occur during adolescence.

4. **Compare** how the reproductive capability of women and men changes as they age in adulthood.

5. **Assess** why contractions are stronger during the expulsion stage of birth than during the dilation stage.
CHAPTER 36
Assessment
Student Recording Sheet

Section 36.1
Vocabulary Review
Write sentences to compare and contrast each pair of terms.
1. 

2. 

3. 

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.
4. A B C D
5. A B C D
6. A B C D

Constructed Response
7. 

8. 

9. 

Think Critically
10. 

11. 

Section 36.2
Vocabulary Review
Write a sentence defining each vocabulary term.
12. 

Name ___________________________ Date ___________________________ Class ___________________________
CHAPTER 36
Assessment

13. 

14. 

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

15. A B C D

16. A B C D

17. A B C D

18. A B C D

19. A B C D

Constructed Response

20. 

21. Careers in Biology 

22. 

Think Critically

23. 

24. 

Section 36.3

Vocabulary Review

Write sentences to compare and contrast each pair of terms.

25. 

26. 
CHAPTER 36
Assessment
Student Recording Sheet

27. 

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

28. A B C D
29. A B C D
30. A B C D
31. A B C D
32. A B C D

Constructed Response

33. 

34. 

35. Careers in Biology Record your answers for question 35 on a separate sheet of paper.

Think Critically

36. 

Additional Assessment

37. Writing in Biology Record your answer for question 37 on a separate sheet of paper.

Document-Based Questions

38. Record your answer for question 38 on a separate sheet of paper.
39. 

Cumulative Review

40. 

41. 

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Assessment

Student Recording Sheet

CHAPTER 36

Standardized Test Practice

Multiple Choice

Select the best answer from the choices given, and fill in the corresponding circle.

1.  A B C D
2.  A B C D
3.  A B C D
4.  A B C D
5.  A B C D
6.  A B C D
7.  A B C D
8.  A B C D
9.  A B C D

Short Answer

Answer each question with complete sentences.

10. 

11. 

12. Record your answer for question 12 on a separate sheet of paper.

13. 

14. Record your answer for question 14 on a separate sheet of paper.

15. 

16. 

Extended Response

Answer each question with complete sentences.

17. Record your answer for question 17 on a separate sheet of paper.

18. 

19. 

Essay Question

20. Record your answer for question 20 on a separate sheet of paper.
# Chapter 37 Immune System

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Test</td>
<td>185</td>
</tr>
<tr>
<td>Launch Lab</td>
<td>186</td>
</tr>
<tr>
<td>MiniLab (1)</td>
<td>187</td>
</tr>
<tr>
<td>MiniLab (2)</td>
<td>188</td>
</tr>
<tr>
<td>BioLab</td>
<td>189</td>
</tr>
<tr>
<td>Real-World Biology</td>
<td>191</td>
</tr>
<tr>
<td>Enrichment</td>
<td>193</td>
</tr>
<tr>
<td>Concept Mapping</td>
<td>194</td>
</tr>
<tr>
<td>Study Guide (English)</td>
<td>195</td>
</tr>
<tr>
<td>Study Guide (Spanish)</td>
<td>199</td>
</tr>
<tr>
<td>Section Quick Check 1</td>
<td>203</td>
</tr>
<tr>
<td>Section Quick Check 2</td>
<td>204</td>
</tr>
<tr>
<td>Section Quick Check 3</td>
<td>205</td>
</tr>
<tr>
<td>Chapter Test A</td>
<td>206</td>
</tr>
<tr>
<td>Chapter Test B</td>
<td>209</td>
</tr>
<tr>
<td>Chapter Test C</td>
<td>212</td>
</tr>
<tr>
<td>Student Recording Sheet</td>
<td>215</td>
</tr>
</tbody>
</table>
CHAPTER 37

The Immune System

Before reading Chapter 37, predict answers to questions about the chapter content based on what you already know. Circle the letter of the correct answer, and then explain your reasoning.

1. Isabel is feeling ill and visits a doctor for a diagnosis of her illness. The doctor evaluates her condition before talking with Isabel about her condition and possible treatment options. Which would be a statement made by the doctor?
   A. You are infected by bacteria causing the degenerative Lyme disease.
   B. You contracted asthma, a genetic disease you inherited from a parent.
   C. You have a common cold virus, an infectious disease that I cannot treat with drugs.
   D. You have the flu virus, a noninfectious disease I will treat with antibiotics.
   Explain.

2. Michael is concerned about contracting colds, the flu, and other diseases during the winter months. He decides to research the basic defenses of his body’s immune system so he can decide how best to help his immune system fight off disease-causing microorganisms. Which fact will he find during his research?
   A. Bone marrow can produce special red blood cells to fight off infections.
   B. Tears contain dilute hydrochloric acid to kill bacteria and viruses in the eyes.
   C. The body’s skin is the first barrier against the invasion of microorganisms.
   D. The lymphatic system uses chemicals to kill microorganisms in the blood.
   Explain.

3. A new and deadly virus has emerged in the country of Austria. The virus displays flu-like symptoms at first, but it quickly invades the body’s immune system and causes a failure of the system. What should medical researchers do to combat this new disease?

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Launch Lab

CHAPTER 37

How do you track a cold?

Colds and many other illnesses are caused by pathogens that can pass from person to person. In this lab, you will trace the path of a cold.

Procedure

1. Read and complete the lab safety form.
2. Create a series of questions you can ask your classmates about the last time they had a cold: their symptoms, other family members and friends who had the same symptoms, and the hygiene precautions they used to avoid illnesses.
3. Interview your classmates using your list.
4. In the space below, design a concept map that organizes the data you have collected to trace the paths the colds in your classmates took as they passed from person to person.

Data and Observations

Analysis

1. **Describe** how your concept map distinguishes between different cold symptoms present in your classmates.

2. **Infer** what paths the different colds might have taken as they passed from person to person among your classmates and their friends and family.
MiniLab

CHAPTER 37

Evaluate the Spread of Pathogens

How can you evaluate the spread of disease? Investigate what possible diseases might be transmitted by common items.

Procedure

1. Read and complete the lab safety form.
2. Observe all the items given to you by your teacher.
3. Infer the types of diseases each item could pass on to a human (if any).

Analysis

1. Identify the types of pathogens that might be transmitted by the items you were given and the methods of transmission of each pathogen.

2. Infer the items most likely to be disease reservoirs.

3. Describe possible disease patterns of each pathogen.

4. Evaluate the likelihood of each item transmitting a disease to a human, and devise a scale for assessing each item’s probability for transmitting an infectious disease. Use a separate sheet of paper.

4. Infer how you could prevent getting diseases from these possible pathogens.
How do cancerous cells and healthy cells differ in appearance? Observe and compare liver cells afflicted with this common noninfectious disease to healthy liver cells.

Procedure
1. Read and complete the lab safety form.
2. Place a prepared slide of healthy human liver cells on a microscope.
WARNING: *Never touch broken microscope slides or other broken glass materials.*
3. Observe the healthy liver cells under several different magnifications.
4. In the space below, sketch a diagram of several healthy liver cells.
5. Repeat steps 2–4 with a prepared slide of cancerous human liver cells.

Data and Observations

Analysis
1. **Compare** and **contrast** the features of healthy liver cells with those of cancerous liver cells.

2. **Infer** why it would not be dangerous to handle an object that was handled by a patient with liver cancer.

3. **Describe** how cancer disrupts the body’s homeostasis.
Background: Imagine that a new disease—“cellphonitis”—has invaded your school. One of the symptoms of this disease is the urge to use a cell phone during class. “Cellphonitis” is easily transferred from person to person by direct contact and there is no natural immunity to the disease. A student in your class has the disease, and is Patient Zero. The disease is spreading in your class and you need to track the disease to prevent the spread of an epidemic.

Question: Is it possible to track a disease and determine the identity of Patient Zero?

Materials
Pasteur pipets (1 per group)
numbered test tubes of water, one infected with simulated “cellphonitis” (1 per group)
test tube racks (1 per group)

Safety Precautions

Procedure
1. Read and complete the lab safety form.
2. Prepare a table to keep track of the contacts you make. Select a test tube and record the number of the test tube.
3. Use a Pasteur pipet and move a small amount of the fluid from the test tube to a paper cup.
4. Your teacher will divide your class into groups. When your group is called, you will simulate the sharing of saliva during drinking the water by using your pipets to exchange the fluid in your tubes with another member of your group.
5. Record who you exchanged with in your tables.
6. Roll the tube gently between your hands to mix and repeat step 4 every time your group is told to exchange. Be sure to pick someone different to exchange with each time.
7. When the exchanges are complete, your teacher will act as the epidemiologist and use the testing indicator to see who has the disease.
8. Share the information and work together as groups to see if you can determine the identity of Patient Zero.
9. Once each group has made their hypothesis, test the original fluid in each cup to see who really was Patient Zero.
10. Return the test tubes. Dispose of the other materials you used as instructed by your teacher.
BioLab, Forensics: Finding Patient Zero  continued

Analyze and Conclude

1. Analyze Use your data and draw a diagram in the space below for each possible Patient Zero. Use arrows to show who should be infected with each possible Patient Zero.

2. Compare and Contrast How was the spread of “cellphonitis” in this simulation similar to the spread of disease in real life? How was it different?

3. Think Critically If this simulation were run in a large class, why might the disease not be passed in later exchanges?

4. Error Analysis What problems did you run into as you tried to determine Patient Zero?

---

190 The Immune System  CHAPTER 37
Histamine Gone Wild

Two sudden deaths on a summer afternoon in the Sunny Acres section of Middletown had the neighborhood in an uproar. Amad Davis, a young man who had been eating lunch, was found dead in the kitchen of his home. Ofelia Ruiz, a healthy middle-aged woman who had been gardening in the side yard of her house, was found dead by the mail carrier.

What happened? Was there a serial killer on the loose? There was no evidence of an invader at either of the homes, so what could have killed two healthy people suddenly? Fears of a serial killer died down when the medical examiner reported that the throat of each victim was swollen shut. Such throat swelling is a symptom of a severe allergic reaction called anaphylactic shock, which also includes loss of consciousness due to dangerously low blood pressure. Anaphylactic shock occurs when cells release a massive amount of the chemical histamine in response to an allergen.

**Part A: Histamine Release**

Histamine release is the result of a localized inflammatory response to an allergen. Figure 1 shows the difference between the primary and secondary response to exposure to an allergen. When a person is exposed to an allergen, his or her B cells become activated, as shown in Figure 1. The activated B cells produce antibodies that cause histamine to be released.

**Analyze and Conclude**

*Use Figure 1 to respond to each statement.*

1. **Explain** why some allergens might not cause an allergic reaction at the time of first exposure to the allergens.

2. **Predict** after which exposure the massive release of histamine would probably occur. **Explain.**

**Part B: Anaphylactic Shock**

During anaphylactic shock, the immune system identifies a substance to which a person is hypersensitive and then launches a fierce attack on it with histamine. Death can then occur within three to four minutes of exposure to the allergen.

Substances that can trigger anaphylactic shock include prescription medication, venom of stinging insects, foods, blood or blood products that are transfused, and latex.

Neighbors were not aware of any allergies suffered by Amad or Ofelia, so investigators began to look for evidence at the locations of the deaths.
Real-World Biology: Analysis, Histamine Gone Wild  continued

Analyze and Conclude

Respond to each statement.

1. Explain “triggers” investigators might look for at Amad’s and Ofelia’s homes.
   a. Amad’s home ____________________________________________________________
   b. Ofelia’s home __________________________________________________________

Table 1

<table>
<thead>
<tr>
<th>Allergen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust mites</td>
<td>Mites are found in mattresses, pillows, and carpets. Mite feces and the mites themselves are allergens.</td>
</tr>
<tr>
<td>Plant pollen</td>
<td>People can react to one or more pollens. Different parts of the country have different pollen seasons. A person’s pollen allergy season can be from early spring to late fall.</td>
</tr>
<tr>
<td>Animal dander</td>
<td>Dander is skin flakes. Cat and dog allergies are most common, but people are also allergic to other pets such as birds, hamsters, rabbits, mice, and gerbils.</td>
</tr>
<tr>
<td>Peanuts</td>
<td>Certain proteins in peanuts are allergens. Peanut allergy is responsible for more fatalities than any other type of allergy.</td>
</tr>
<tr>
<td>Latex</td>
<td>Latex comes from the milky sap of the rubber tree found in Africa and Southeast Asia. The exact cause of latex allergy is unknown.</td>
</tr>
<tr>
<td>Bee venom</td>
<td>Bees release venom from glands attached to their stingers. The venom causes pain and swelling.</td>
</tr>
</tbody>
</table>

2. Hypothesize which of the common allergens described in Table 1 were responsible for inducing anaphylactic shock in Amad and Ofelia. Explain.
   a. Amad _________________________________________________________________
   b. Ofelia _____________________________________________________________

3. Infer When the investigators looked inside Ofelia’s house, they found an epinephrine kit, which is used to prevent anaphylactic shock. The kit contains a premeasured dose of epinephrine, ready to inject after exposure to an allergen. Circle the reaction you think epinephrine causes when injected into the body.
   A. kills pain   C. relaxes muscles in the airways
   B. lowers blood pressure and pulse rate   D. tranquilizes the person

4. Indicate what precautions Amad and Ofelia could have taken to prevent anaphylactic shock.
   a. Amad _______________________________________________________________
   b. Ofelia _____________________________________________________________

CAREERS IN BIOLOGY

Allergist Visit biologygmh.com for information on allergists. What are the responsibilities of an allergist?
Enrichment

CHAPTER 37

Analyze a Problem: The Rise of Drug-Resistant Diseases

Natural selection is responsible for a growing problem—the rise of drug-resistant diseases. Bacteria, viruses, and other disease-causing microbes are rapidly evolving resistance to many drugs and antibiotics. Some organisms evolve so rapidly that they soon will become resistant to all of the currently available drugs. Consequently, new drugs and antibiotics must constantly be developed.

When antibiotics are not taken properly, not taken for the prescribed time, or taken unnecessarily, drug resistance increases. Another practice that has contributed to drug resistance is the addition of antibiotics or antimicrobials to animal feed. These drugs are passed on in low levels to humans through meat and milk.

Select The table lists some organisms that have varying degrees of drug resistance. Select one of the organisms to research.

Research Once you have selected an organism, research the disease(s) caused by the organism and the problem of the organism’s drug resistance. Questions to consider include: What is the extent of the organism’s drug resistance? What practices contributed to drug resistance? Why is the problem of drug resistance more serious in hospitals?

Discuss Use your textbook and other reference materials to find information. Discuss your topic and possible answers to your questions with your teacher and classmates.

Write Based on your research and class discussion, write an article about the drug-resistant organism you selected. Provide answers for any questions you researched and discussed. Be sure to cite accurately the sources you used to write your article.

Drug-Resistant Organisms

<table>
<thead>
<tr>
<th>Organism</th>
<th>Disease(s)</th>
<th>Drug(s) Used to Treat the Disease(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumococci</td>
<td>pneumonia</td>
<td>penicillin, erythromycin, cephalosporin</td>
</tr>
<tr>
<td>Gonococci</td>
<td>gonorrhea</td>
<td>penicillin, fluoroquinolone</td>
</tr>
<tr>
<td>Enterococci</td>
<td>infections of wounds, blood, heart, intestines, urinary tract</td>
<td>vancomycin</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>infections of wounds, skin, heart</td>
<td>penicillin, vancomycin</td>
</tr>
<tr>
<td>Campylobacter</td>
<td>food-borne, gastrointestinal infections</td>
<td>fluoroquinolone</td>
</tr>
</tbody>
</table>
Complete the flowchart about disease. These terms may be used more than once: antibodies, carriers, cytokines, cytotoxic T cells, disease, genes, genetic disorders, helper T cells, pathogens.

1. can be caused by

2. which can be spread by

3. caused by the inheritance of defective

4. which bind to

5. macrophages

6. which stimulate

7. which destroy pathogens and release

8. to produce

9. 
In your textbook, read about Koch’s postulates.

Match the description of Koch’s postulates in Column A with the step number in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The suspected pathogen that has been grown in a pure culture must</td>
<td>A. step 1</td>
</tr>
<tr>
<td>cause a disease in a healthy host.</td>
<td></td>
</tr>
<tr>
<td>2. The suspected pathogen must be grown in a pure culture with no</td>
<td>B. step 2</td>
</tr>
<tr>
<td>other microorganisms present.</td>
<td></td>
</tr>
<tr>
<td>3. The suspected pathogen must be identified from the diseased host.</td>
<td>C. step 3</td>
</tr>
<tr>
<td>4. The suspected pathogen must be isolated from the new host, grown</td>
<td>D. step 4</td>
</tr>
<tr>
<td>again in pure culture, and have the same characteristics as the</td>
<td></td>
</tr>
<tr>
<td>original suspected pathogen.</td>
<td></td>
</tr>
</tbody>
</table>

In your textbook, read about the symptoms of disease.

Complete the graphic organizer about the steps of viral infection.

The pathogen invades some of the cells of your body.

5. 

6. 

7. 

Toxins are carried throughout your body.

8. 
In your textbook, read about specific immunity.

Complete the table by filling in the missing information.

<table>
<thead>
<tr>
<th>Organ</th>
<th>Location</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymph nodes</td>
<td>along the course of the lymphatic vessels</td>
<td>1.</td>
</tr>
<tr>
<td>Tonsils</td>
<td>2.</td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>5.</td>
<td>stores blood, destroys damaged cells, responds to foreign substances in the blood</td>
</tr>
<tr>
<td>Thymus</td>
<td>6.</td>
<td>7.</td>
</tr>
</tbody>
</table>

In your textbook, read about passive and active immunity.

Complete the table by checking the correct column(s) for each description.

<table>
<thead>
<tr>
<th>Description</th>
<th>Passive Immunity</th>
<th>Active Immunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Occurs when one organism receives antibodies from another organism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Occurs as a result of having a disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Occurs after the body has been exposed to a pathogen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Occurs when antibodies are injected into the body</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Occurs when a mother passes antibodies to a fetus through the placenta</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In your textbook, read about B cell response, T cell response, and passive and active immunity.

Complete the table by filling in the missing information.

<table>
<thead>
<tr>
<th>Type of Blood Cell or Structure</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>B cells</td>
<td>13.</td>
</tr>
<tr>
<td>Memory B cell</td>
<td></td>
</tr>
<tr>
<td>T cells</td>
<td>14.</td>
</tr>
<tr>
<td>Helper T cell</td>
<td></td>
</tr>
<tr>
<td>Cytotoxic T cell</td>
<td></td>
</tr>
<tr>
<td>Memory T cell</td>
<td></td>
</tr>
<tr>
<td>Antibodies</td>
<td>15.</td>
</tr>
</tbody>
</table>

In your textbook, read about immune system failure.

Use each of the terms below only once to complete the passage.

blood products decreases RNA secondary infection sexual intercourse

HIV is a(n) (16) ____________________________ virus that infects helper T cells. Eventually, the number of helper T cells (17) ____________________________ , and the person becomes susceptible to disease. The virus can be passed to another person through (18) ____________________________ and (19) ____________________________. The infected person usually dies from a(n) (20) ____________________________.
In your textbook, read about cancer.

Imagine you are a fund-raiser campaigning to raise awareness of and funds for cancer research. In the space below, design a poster raising awareness about the need for cancer research. On your poster, include a brief definition of cancer, why cancer is so destructive to the body, where in the human body cancer can develop, and factors that contribute to cancer.

---

In your textbook, read about autoimmunity.

Complete the table by filling in the missing information.

<table>
<thead>
<tr>
<th>Autoimmune Disease</th>
<th>Symptoms</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>knobs or swelling of the joints</td>
<td>2.</td>
</tr>
<tr>
<td>Rheumatic fever</td>
<td>3.</td>
<td>4.</td>
</tr>
<tr>
<td>Lupus</td>
<td>5.</td>
<td>6.</td>
</tr>
</tbody>
</table>
Guía de estudio

Sección 1: Enfermedades infecciosas

En tu texto, lee acerca de los postulados de Koch.
Relaciona la descripción de los postulados de Koch en la columna A con el número de paso en la columna B.

<table>
<thead>
<tr>
<th>Columna A</th>
<th>Columna B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. El patógeno sospechoso que se ha cultivado en un cultivo puro debe causar enfermedad en un huésped sano.</td>
<td>A. paso 1</td>
</tr>
<tr>
<td>2. El patógeno sospechoso debe crecer en un cultivo puro sin otros microorganismos presentes.</td>
<td>B. paso 2</td>
</tr>
<tr>
<td>3. El patógeno sospechoso se debe identificar del huésped enfermo.</td>
<td>C. paso 3</td>
</tr>
<tr>
<td>4. El patógeno sospechoso se debe aislar del huésped nuevo, cultivarse de nuevo en un cultivo puro, y tener las mismas características que el patógeno sospechoso original.</td>
<td>D. paso 4</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de los síntomas de enfermedades.
Completa el organizador gráfico sobre los pasos de la infección viral.

El patógeno invade algunas de las células de tu cuerpo.

5. 

6. 

7. Las toxinas se transportan por todo tu cuerpo.

8. 

Unidad 9

CAPÍTULO 37 El sistema inmunológico
En tu libro de texto, lee acerca de la inmunidad específica. 
Completa la tabla con la información faltante.

<table>
<thead>
<tr>
<th>Órgano</th>
<th>Ubicación</th>
<th>Función</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nudos linfáticos</td>
<td>a lo largo del trayecto de los vasos linfáticos</td>
<td>1.</td>
</tr>
<tr>
<td>Amígdalas</td>
<td></td>
<td>2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>5.</td>
<td>Almacena sangre, destruye las células dañadas y responde a sustancias extrañas en la sangre.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la inmunidad pasiva y activa. 
Completa la tabla marcando la(s) columna(s) correcta(s) para cada descripción.

<table>
<thead>
<tr>
<th>Descripción</th>
<th>Inmunidad pasiva</th>
<th>Inmunidad activa</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Ocurre cuando un organismo recibe anticuerpos de otro organismo.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Ocurre como resultado de tener una enfermedad.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Ocurre después de que el cuerpo se ha expuesto a un patógeno.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Ocurre cuando se inyectan anticuerpos en el cuerpo.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Ocurre cuando una madre transmite anticuerpos al feto a través de la placenta.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
En tu libro de texto, lee acerca de la respuesta celular B, la respuesta celular T y la inmunidad pasiva y activa.

Completa la tabla con la información faltante.

<table>
<thead>
<tr>
<th>Tipo de célula o estructura sanguínea</th>
<th>Función</th>
</tr>
</thead>
<tbody>
<tr>
<td>Células B</td>
<td>13.</td>
</tr>
<tr>
<td>Célula de memoria B</td>
<td></td>
</tr>
<tr>
<td>Células T</td>
<td>14.</td>
</tr>
<tr>
<td>Células ayudantes T</td>
<td></td>
</tr>
<tr>
<td>Células citotóxicas T</td>
<td></td>
</tr>
<tr>
<td>Células de memoria T</td>
<td></td>
</tr>
<tr>
<td>Anticuerpos</td>
<td>15.</td>
</tr>
</tbody>
</table>

En tu libro de texto, lee acerca de la deficiencia del sistema inmunológico.

Usa cada uno de los términos a continuación una vez únicamente para completar el párrafo.

ácido ribonucleico (ARN) acto sexual disminuciones infección secundaria productos sanguíneos

El VIH es un virus del (16) ____________________________ que infecta las células ayudantes T. Finalmente, el número de células ayudantes T (17) ____________________________, y la persona se vuelve susceptible a las enfermedades. El virus se puede transmitir a otra persona a través de(l) (18) ____________________________ y (19) de(l) ____________________________. La persona infectada por lo general muere a causa de una (20) ____________________________.
Guía de estudio

CAPÍTULO 37
Sección 3: Trastornos no infecciosos

En tu libro de texto, lee acerca del cáncer.

Imagina que estás adelantando una campaña para recoger fondos y crear conciencia para la investigación del cáncer. En el siguiente espacio, diseña un afiche para crear conciencia acerca de la necesidad de investigar acerca del cáncer. En tu afiche, incluye una definición breve del cáncer, porqué es tan destructor para el cuerpo, dónde se puede desarrollar en el cuerpo y los factores que pueden contribuir al cáncer.

En tu libro de texto, lee acerca de la autoinmunidad.

Completa la tabla con la información faltante.

<table>
<thead>
<tr>
<th>Enfermedad autoinmunológica</th>
<th>Síntomas</th>
<th>Causa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>protuberancias o inflamación de las coyunturas</td>
<td>2.</td>
</tr>
<tr>
<td>Fiebre reumática</td>
<td>3.</td>
<td>4.</td>
</tr>
<tr>
<td>Lupus</td>
<td>5.</td>
<td>6.</td>
</tr>
</tbody>
</table>
Quick Check

CHAPTER 37
Section 1: Infectious Diseases

After reading the section in your textbook, respond to each statement.

1. Name the three patterns that can occur when outbreaks of diseases spread.
   Define each pattern.

2. Identify three ways in which a disease causes symptoms.

3. Differentiate the ways pathogens can be transmitted to humans. Use the terms
   direct contact, indirect contact, and vector in your answer.

4. Classify these diseases as bacterial or viral: staphylococcal disease, herpes,
   gonorrhea, influenza, and HIV.

5. Infer why children get more colds than adults.
After reading the section in your textbook, respond to each statement.

1. Define antibodies.

2. Explain the function of nonspecific immunity.

3. Summarize the role of memory cells in the immune response.

4. Compare the functions of the different T cells in the specific immune response.

5. Theorize why a person sometimes has a fever when pathogens damage tissue. Use the term inflammatory response in your answer.

6. Determine which lasts longer—passive or active immunity. Explain.
Quick Check

Section 3: Noninfectious Disorders

After reading the section in your textbook, respond to each statement.

1. Define degenerative diseases.

2. Explain why the immune systems of most people do not injure their own cells.

3. Distinguish between an inflammatory response and an inflammatory disease.

4. Contrast the causes of rheumatoid arthritis and degenerative arthritis.

5. Compare an allergic response to anaphylactic shock.

6. Determine why people who live in warm areas have longer periods of allergic reactions to pollen than people who live in colder areas.
CHAPTER 37
Assessment
Student Recording Sheet

Section 37.1
Vocabulary Review
Write the vocabulary term that best completes each sentence.

1. ____________________ 2. ____________________ 3. ____________________

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

5. A B C D 7. A B C D

Constructed Response

9. __________________________________________
   __________________________________________
   __________________________________________

10. __________________________________________
    __________________________________________
    __________________________________________

11. **Careers in Biology** Record your answer for question 11 on a separate sheet of paper.

Think Critically

12. __________________________________________
    __________________________________________
    __________________________________________

13. __________________________________________
    __________________________________________
    __________________________________________
CHAPTER 37
Assessment

Student Recording Sheet

Section 37.2
Vocabulary Review

Write the vocabulary term that best matches each definition.

14. ______________ 15. ______________ 16. ______________

Understand Key Concepts

Select the best answer from the choices given, and fill in the corresponding circle.

17. A B C D
18. A B C D
19. A B C D
20. A B C D
21. A B C D

Constructed Response

22. ______________________________________________________

23. ______________________________________________________

24. ______________________________________________________

Think Critically

25. ______________________________________________________

26. ______________________________________________________

Section 37.3
Vocabulary Review

Write the vocabulary term that best answers each question.

27. ______________________ 28. ______________________ 29. ______________________
CHAPTER 37
Assessment

Understand Key Concepts
Select the best answer from the choices given, and fill in the corresponding circle.

30. A B C D
31. A B C D
32. A B C D
33. A B C D
34. A B C D

Constructed Response

35. 

36. 

37. 

Think Critically

38. Record your answer for question 38 on a separate sheet of paper.
39. 

40. Writing in Biology 

Additional Assessment

Document-Based Questions

41. 

42. 

43. Record your answer for question 43 on a separate sheet of paper.

Cumulative Review

44.–45. Record your answers for questions 44 and 45 on a separate sheet of paper.
Assessment

CHAPTER 37

Student Recording Sheet

CHAPTER 37

Assessment

Standardized Test Practice

Multiple Choice

Select the best answer from the choices given, and fill in the corresponding circle.

1.  A B C D
2.  A B C D
3.  A B C D
4.  A B C D
5.  A B C D
6.  A B C D
7.  A B C D
8.  A B C D

Short Answer

Answer each question with complete sentences.

9.  
10.  
11.  
12.  
13.  
14.  
15.  

Extended Response

Answer each question with complete sentences.

16.  
17.  

Essay Question

18.  Record your answer for question 18 on a separate sheet of paper.