Lesson 1.1: Learning the Key Terms

Directions: Use the terms listed below to fill in the sentence blanks.

abdominal cavity  cavity  nasal cavity  posterior (dorsal) body
abdominopelvic cavity  cranial cavity  oral cavity  sagittal plane
anatomical position  frontal plane  orbital cavities  spinal cavity
anatomy  metric system  pelvic cavity  thoracic cavity
anterior (ventral) body  middle ear cavities  physiology  transverse plane

1. The stomach, liver, and other parts of the digestive tract are contained in the _________________.
2. The French originated a system of measurements called the _____________________ in the 1790s.
3. The _____________________ is situated inside the nose.
4. The study of how living things function or work is called _____________________.
5. The _____________________ surrounds and houses the spinal cord.
6. A continuous internal opening that includes the thoracic and abdominopelvic cavities is called the _____________________.
7. _____________________ is the study of the form or structure of all living things, including plants and animals.
8. An invisible vertical line that divides the body into left and right halves is the _____________________.
9. The opening inside the skull that holds the brain is the _____________________.
10. _________________ are found in the skull and act as chambers for transmitting and amplifying sound.
11. When someone is standing erect with arms at the sides and palms facing forward, they are in _____________________.
12. The _____________________ divides the body into front and back halves.
13. The abdominal and pelvic cavities are both found in the _________________.
14. The _____________________ divides the body into top and bottom halves.
15. The internal opening that holds the reproductive and excretory organs is the _________________.
16. The _____________________ contains the heart and lungs, among other organs.
17. Openings that hold the eyes are called _____________________.
18. A(n) _____________________ is an open chamber that holds the internal organs of the body.
19. Located near the back of the body, the _____________________ is a continuous internal opening that includes the cranial and spinal cavities.
20. The _____________________ is the opening within the mouth.
Lesson 1.1: Study Questions

Directions: Answer the questions below on a separate sheet of paper. Studying the answers will help you prepare for the chapter test.

1. What do we call the study of the body structures we can see with our eyes?
2. What is the difference between anatomy and physiology?
3. Identify and describe the three invisible planes that divide the human body and how they divide the body. What is the direction of the movements or motions that each plane makes?
4. What are movements that do not occur in a direction of one of the three planes called?
5. Does any structure separate the abdominal cavity and pelvic cavity?
6. What is the difference between gross anatomy and microscopic anatomy?
7. What separates the thoracic cavity and abdominopelvic cavity?
8. What are the four base units of the metric system?
9. In the metric system, all units (except those for time) relate by factors of 10. Why does this make conversion between units easy?
10. Common directional terms for anatomy are typically paired. Identify three pairs of directional terms.
11. What is the difference between medial and anterior?
12. What is the difference between lateral and deep?
13. What other directional terms can be used in place of anterior and posterior?
14. What is the name of the measurement system used for nonscientific purposes in the United States?
15. What is the name of the cavity located inside the mouth?
16. Which directional term means above or over?
17. To which part of the body do the directional terms proximal and distal refer?
Lesson 1.1: Identifying Body Cavities

Directions: Label the figure with the appropriate callouts from the list provided.

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
5. ____________________________
6. ____________________________
7. ____________________________
8. ____________________________
9. ____________________________
10. ____________________________

abdominal  middle ear  orbital  spinal
cranial    nasal    pelvic  thoracic
diaphragm oral
Lesson 1.2: Learning the Key Terms

Directions: Use the terms listed below to fill in the sentence blanks.

1. A(n) __________________________ includes two or more organs that work together.
2. Collections of similar cells with a common function form __________________________.
3. The smallest building blocks of all living beings are __________________________.
4. Atoms combine together in different ways to form larger particles known as __________________________.
5. A(n) __________________________ is a body part organized to perform a specific function and is composed of at least two different types of tissue.
6. __________________________ is the state of regulated physiological balance.
7. Organ systems cooperate to maintain homeostasis through processes called __________________________.
8. __________________________ is the mechanism that reverses a condition that has exceeded the normal homeostatic range and restores homeostasis.
9. __________________________ further increases a condition that has exceeded the normal homeostatic range.
10. __________________________ is a condition in which there is a decreased ability for the organ systems to maintain the body’s internal environment within normal ranges.
11. The __________________________ relates to all chemical reactions that occur within an organism to maintain life.
12. A(n) __________________________ is a transmitter that senses environmental changes.
13. The unit that receives a command stimulus from the control center and causes an action to help maintain homeostasis is called a(n) __________________________.
14. __________________________ are tiny particles of matter.
15. The speed at which the body consumes energy is the __________________________.
16. The __________________________ receives and analyzes information from sensory receptors, then sends a command stimulus to an effector to maintain homeostasis.
Lesson 1.2: Study Questions

Directions: Answer the questions below on a separate sheet of paper. Studying the answers will help you prepare for the chapter test.

1. Which two body systems initiate the majority of the body’s homeostatic responses?
2. What three elements do all homeostatic control mechanisms have in common?
3. Does positive feedback increase or decrease disruptive influences?
4. Diabetes can cause homeostatic imbalances, leading to serious side effects. Give at least two examples of the side effects related to homeostatic imbalances in diabetics.
5. What are the four basic types of tissues?
6. What is the primary function of the respiratory system?
7. Which body system pumps the heart and moves the body?
8. What is the name of the tube through which food enters the stomach?
9. Which is part of the cardiovascular system, the brain or the heart?
10. List the structures of the digestive system in the order by which they receive food.
11. What do endocrine glands secrete?
12. Identify the main organs and structures of both the male and female reproductive systems.
13. Which disease associated with aging can occur with homeostatic imbalances?
14. What are the two general activities associated with metabolism?
15. How can drinking too much water during activity be dangerous?
16. Name two conditions that can result from inadequate water intake.
Lesson 1.2: The Human Organ Systems

Directions: Match the organ system with its organs and function by writing the appropriate letters next to each organ system.

<table>
<thead>
<tr>
<th>Organs Function</th>
<th>Organs</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>______ ______</td>
<td>1. Urinary system</td>
<td>a. breaks down foods for absorption of nutrients by the body</td>
</tr>
<tr>
<td>______ ______</td>
<td>2. Cardiovascular system</td>
<td>b. protects, eliminates waste, helps regulate body temperature</td>
</tr>
<tr>
<td>______ ______</td>
<td>3. Muscular system</td>
<td>c. returns body fluids to the bloodstream</td>
</tr>
<tr>
<td>______ ______</td>
<td>4. Digestive system</td>
<td>d. secretes hormones</td>
</tr>
<tr>
<td>______ ______</td>
<td>5. Endocrine system</td>
<td>e. supports body, protects organs, produces blood cells</td>
</tr>
<tr>
<td>______ ______</td>
<td>6. Integumentary system</td>
<td>f. enables production of offspring</td>
</tr>
<tr>
<td>______ ______</td>
<td>7. Sensory system</td>
<td>g. enables vision, hearing, smell, and taste</td>
</tr>
<tr>
<td>______ ______</td>
<td>8. Reproductive systems</td>
<td>h. receives and interprets sensory input, directs body movements, includes memory, emotions, cognition</td>
</tr>
<tr>
<td>______ ______</td>
<td>9. Lympathic system</td>
<td>i. removes nitrogen-containing wastes from blood</td>
</tr>
<tr>
<td>______ ______</td>
<td>10. Skeletal system</td>
<td>j. transports oxygen and nutrients to the body’s cells and removes waste products</td>
</tr>
<tr>
<td>______ ______</td>
<td>11. Respiratory system</td>
<td>k. pumps the heart, helps move materials through the digestive tract, moves the body</td>
</tr>
<tr>
<td>______ ______</td>
<td>12. Nervous system</td>
<td>l. delivers oxygen and removes carbon dioxide from blood</td>
</tr>
</tbody>
</table>
Lesson 1.3: Learning the Key Terms

Directions: Place the letter of the best definition next to each key term.

______ 1. bending
______ 2. combined loading
______ 3. compression
______ 4. elastic
______ 5. force
______ 6. kinetics
______ 7. mass
______ 8. net force
______ 9. pressure
______ 10. shear
______ 11. stress
______ 12. tension
______ 13. torque
______ 14. torsion
______ 15. weight

A. a force that acts along a surface and perpendicular to the length of a structure
B. the simultaneous action of two or more kinds of forces
C. force equal to the gravitational acceleration exerted on the mass of an object
D. push or pull exerting influence on a structure
E. the analysis of the actions of forces
F. the rotary effect of a force
G. the amount of matter that an object contains
H. a response occurring when force is removed and the structure resumes its original shape and size
I. the single force that results from the total of all forces acting on a structure at a given time
J. force distributed over a certain area
K. the distribution of force inside a structure
L. a pulling force creating stress in the structure to which it is applied
M. a loading pattern that can make a structure twist around its length
N. a combination of off-center forces that creates a pattern of loading
O. a squeezing force that causes compression in the object absorbing the force
Lesson 1.3: Study Questions

Directions: Answer the questions below on a separate sheet of paper. Studying the answers will help you prepare for the chapter test.

1. What are three types of directional force distributions that act on the body?
2. The amount of deformation caused by a given force depends upon what factor?
3. Describe how compression and tension differ.
4. What is a chronic, or stress injury?
5. How does the amount of stress created vary between a force acting on a small surface and a force acting over a larger surface?
6. Acceleration and deformation are the two potential effects when a force acts on an object. Describe them.
7. Will a heavier object have greater acceleration than a smaller object? Why or why not?
8. What factors influence whether an injury occurs when an external force is applied to the human body?
9. What does it mean when the body’s response to a force is plastic?
10. What kind of injury is an acute injury?
11. How are pressure and stress quantified?
12. How is knowledge of kinetic concepts useful?
13. Which three factors can be used to describe force?
14. Give two examples of forces the human body commonly encounters.
15. What is net force?
16. What is the rotary effect of the force called when a force causes a structure to rotate?
Lesson 1.4: Learning the Key Terms

Directions: Place the letter of the best definition next to each key term.

______ 1. scientific method
______ 2. statistical inference
______ 3. scientific theory
______ 4. research question
______ 5. data
______ 6. science
______ 7. statistical significance
______ 8. scientific research hypothesis

A. systematically collected and recorded observations
B. a question to be answered or a problem to be solved in a research study
C. a systematic process that creates new knowledge and organizes it into a form of testable explanations and predictions about an aspect of our universe
D. a systematic process that can be used to answer questions or find solutions to problems
E. an educated guess about what the outcome of a study will be
F. an explanation of some aspect of the natural world that is based on rigorously tested, repeatedly confirmed research
G. the practice of generalizing the findings of a research study to a large population
H. an interpretation of statistical data indicating that the results of a study can legitimately be generalized to the population represented in the study sample
Lesson 1.4: Study Questions

**Directions:** Answer the questions below on a separate sheet of paper. Studying the answers will help you prepare for the chapter test.

1. What is used to answer questions or find solutions to problems in many scientific fields?
2. Identify the seven steps of the scientific method.
3. What is another term for an *educated guess*?
4. Measuring height and weight are examples of which type of research?
5. How does experimental research differ from descriptive and comparative research?
6. What are some safety concerns you should consider when conducting research in the lab?
7. What is the difference between a *scientific research hypothesis* and a *scientific theory*?
8. What are the two types of data?
9. What distinguishes an *educated guess* versus a *hunch* or a *feeling*?
10. What are the five criteria for planning the organization of a study?
11. How can research be evaluated for objectivity?
12. How can a researcher feel confident that statistical inference is accurate for his or her research?
13. In order to derive conclusions from the results of a study, researchers must relate the conclusion back to which part of the study?
14. Roman physician Galen learned a great deal about the human body from dissecting animals. Which of his notions about the human body proved true?
15. What correct observations did Vesalius make about the heart, liver, and blood vessels?
16. Which scientific tool was refined by both Robert Hooke and Antonie van Leeuwenhoek?
17. Scientific discoveries made by NASA have contributed to the development of many products related to anatomy and physiology, as well as the environment. Name four of these products.
Lesson 1.4: Using the Scientific Method

**Directions:** The scientific method can be used to answer questions relating to nearly any question or problem in your daily life. For this activity, identify a research question from your daily life or from things or people around you. Using the steps of the scientific method, identify the research question, then formulate and test your hypothesis. Report the steps of your exploration in the spaces below.

Step 1: Identifying a Research Question

______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________

Step 2: Formulating One or More Hypotheses

______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________

Step 3: Planning the Organization of the Study

______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________

Step 4: Collecting the Data

______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________

Step 5: Analyzing and Evaluating the Data with Statistical Tools

______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________

Step 6: Interpreting and Discussing the Results

______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________

Step 7: Deriving Conclusions from the Results

______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
### Chapter 1: Analyzing Body Movements

**Directions:** Using the Internet, find and print five action shots from five different sports. Analyze each image to determine the athlete’s motion, and what plane of the body is involved in the movement. Then, fill in the details of each image in the table below. An example is provided for your reference.

<table>
<thead>
<tr>
<th>Sport</th>
<th>Action</th>
<th>What’s Moving?</th>
<th>Plane(s) Involved in Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>tennis</td>
<td>Serena Williams uses a backhand stroke to return the ball to her opponent.</td>
<td>upper body rotates; arms move as part of her backhand stroke; feet are planted</td>
<td>transverse plane</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Compare and contrast the planes and most common movements between two of the sports you chose. Did any sports require similar movements?

______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
______________________________________________________________________________________________________________
Chapter 1 Lab Investigation: The Language of Anatomy

Purpose
In this investigation you will practice identifying body planes and directional terms.

Materials
your textbook, your body

Procedure
Follow the directions below and refer to your textbook as needed to answer the questions.

Body Planes
1. Stand in anatomical position.
   A. Your feet point in which direction? ________________________________
   B. Your thumbs point in which direction? ________________________________
   C. Your fingers point in which direction? ________________________________
   D. Your palms face which direction? ________________________________

2. With your palm open and your thumb pointing up, use your right index finger to follow a sagittal plane on your body. As you do this, which direction (right or left) does your palm face? ________________________________

3. With your palm open and your thumb pointing up, use your right index finger to follow a frontal plane on your body. As you do this, which direction (front or back) does your palm face? ________________________________

4. With your palm open and your thumb pointing away from your body, use your right little finger to follow a transverse plane on your body. As you do this, which direction (up or down) does your palm face? ________________________________

Directional Terms
1. Place your left index finger on the tip of your nose.
   A. List a body part that is superior to your nose. ________________________________
   B. List a body part that is inferior to your nose. ________________________________
   C. List a body part that is lateral to your nose. ________________________________
   D. List a body part that is posterior to the tip of your nose. ________________________________
   E. Is there a body part medial to the tip of your nose? ________________________________
   F. Is there any body part that is anterior to the tip of your nose? ________________________________
2. Standing in anatomical position, place your left index finger on the anterior surface of your right elbow.
   A. List a body part that is distal to your right elbow. ________________________________
   B. List a body part that is proximal to your right elbow. ______________________________
   C. List a body part that is lateral to your right elbow. _______________________________
   D. List a body part that is medial to your right elbow. _______________________________

3. Place your right index finger on your left collarbone.
   A. List a body part that is medial to your left collarbone. ____________________________
   B. List a body part that is lateral to your left collarbone. ____________________________
   C. List a body part that is deep to your left collarbone. _____________________________

4. Place your left index finger on your left cheek.
   A. List a body part that is anterior to your left cheek. ______________________________
   B. List a body part that is posterior to your left cheek. _____________________________
   C. List a body part that is medial to your left cheek. _______________________________

5. Place your left index finger on your belly button.
   A. List a body part that is lateral to your belly button. ______________________________
   B. List a body part that is deep to your belly button. _______________________________  
   C. List a body part that is superior to your belly button. ___________________________
   D. List a body part that is inferior to your belly button. ____________________________

6. Place your right index finger on your left knee.
   A. List a body part that is superior to your left knee. ________________________________
   B. List a body part that is distal to your left knee. _________________________________
   C. List a body part that is proximal to your left knee. ______________________________

Conclusions
1. Which body plane divides the body into left and right halves? _______________________
2. Which body plane divides the body into top and bottom halves? ____________________
3. Which body plane divides the body into front and back halves? ____________________
4. Circle the body parts listed below that are divided into two pieces by a mid sagittal plane: nose, mouth, left eye, right leg, belly button, heart, right lung, left kidney
5. Circle the body parts listed below that are divided into two pieces by a frontal plane through the middle of the body: belly button, right lung, left kidney, nose, heart, left eye, brain, left leg
6. Circle the body parts listed below that are divided into two pieces by a transverse plane through the abdomen: brain, stomach, kidney, right leg, left arm, left eye, nose

Select the correct word from the two choices and write it in the blank to the right.
7. Your head is (superior, inferior) to your neck. _________________________________
8. Your thumb is (medial, lateral) to your fingers. _________________________________
9. Your belly button is (superficial, deep) to your intestines. _______________________
10. Your forearm is (distal, proximal) to your hand. _______________________________
11. Your sternum is (anterior, posterior) to your spinal cord. _______________________

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Chapter 1 Practice Test

Completion: Carefully read the following statements. Write the term that completes the statement in the spaces provided.

1. _____________________________ is the state of regulated physiological balance.
2. The study of how living things function or work is called _____________________________.
3. _____________________________ is the single force that results from the total of all forces acting on a structure at a given time.
4. Generalizing the findings of a research study to a large population is called _____________________________.
5. The speed at which the body consumes energy is the _____________________________.

True/False: Indicate whether each statement below is true or false by circling either T or F.

T  F  6. The chin is inferior to the trunk.
T  F  7. Combined loading is the simultaneous action of two or more kinds of forces.
T  F  8. The rotary effect of a force is called torque.
T  F  9. Data is a systematic process that can be used to answer questions or solve problems.
T  F  10. Collections of similar cells with a common function are called effectors.

Multiple Choice: Circle the correct answer.

11. Which of the following is not true of the metric system?
   A. It can be used in many countries.
   B. It is easy to convert.
   C. Its measurements depend on gravity.
   D. It is organized around four base units.

12. The smallest building blocks of all living beings are _____.
   A. data
   B. organs
   C. tissues
   D. cells

13. Sagittal plane movements _____.
   A. mean there is no movement
   B. go forward and backward
   C. go sideways
   D. move rotationally

14. The trachea is an organ of the _____ system.
   A. digestive
   B. cardiovascular
   C. skeletal
   D. respiratory

15. Stress is quantified in the same way as _____.
   A. pressure
   B. acceleration
   C. torsion
   D. deformation
Matching: Match each key term to its definition by writing the letter of the definition in the spaces provided.

16. metabolic rate  
17. kinetics  
18. anatomy  
19. anterior (ventral) cavity  
20. scientific theory  
21. force  
22. homeostatic imbalance  
23. research question  
24. organ system  
25. bending

A. a condition in which there is a decreased ability for the organ systems to maintain the body’s internal environment within normal ranges
B. a question to be answered or a problem to be solved in a research study
C. push or pull exerting influence on a structure
D. the study of the form or structure of all living things, including plants and animals
E. two or more organs that work together
F. a combination of off-center forces that creates a pattern of loading
G. the analysis of the actions of forces
H. the speed at which the body consumes energy
I. an explanation of some aspect of the natural world that is based on rigorously tested, repeatedly confirmed research
J. a continuous internal opening that includes the thoracic and abdominopelvic cavities

Art Labeling: Locate each of the following items on the drawing by placing the corresponding letter on the blanks provided.

26. thoracic cavity  
27. abdominopelvic cavity  
28. cranial cavity  
29. orbital cavity  
30. spinal cavity  
31. nasal cavity  
32. anterior (ventral) cavity  
33. pelvic cavity  
34. diaphragm  
35. posterior (dorsal) cavity

Short Answer: Answer the following questions using what you have learned in this chapter.

36. Explain how homeostasis works.
37. Explain the factors that influence whether or not the application of an external force causes injury to the human body.