

Anatomy & Physiology

THIRD EDITION

Seeley
Stephens
Tate

Philip Tate
James Kennedy
Rod Seeley

STUDY GUIDE

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PREFACE

To the Student

This study guide is designed to accompany *Anatomy and Physiology* by Seeley, Stephens, and Tate. Each chapter in the study guide, and the order of topics within the chapter, corresponds to a chapter in the text. This makes it possible for you to study systematically and also makes it easier for you to find or to review information. Read the corresponding material in the text before you use this study guide. It is designed to help you understand and master the subject of anatomy and physiology.

FEATURES

Focus

Each chapter begins with a focus statement, briefly reviewing some of the main points of the text chapter. This is not a chapter summary; you will find that in the text. The chapter summary is useful. Reading it should become a routine part of your study habits. In the study guide, the focus statement sets the stage by reminding you of the major concepts you should have learned by reading the textbook.

Content Learning Activity

This section of the study guide contains a variety of exercises including matching, completion, ordering, and labeling activities, arranged by order of topics in the text. Each part begins with a quotation from the text or a statement that identifies the subject to be covered. Occasionally, you will find a "bulletin" statement describing important information. Just because that information is not a question does not mean it is unimportant. Quite the contrary. The "bulletin" statements are added to the study guide because they will help you to understand the material, so pay attention to them.

The content learning activity is not a test; it is a strategy to help you learn. Don't guess! If you learn something incorrectly it

is difficult to relearn it correctly. Use the textbook or your lecture notes for help whenever you are not sure of an answer. The emphasis here is on learning the content, hence the name of this section. The content questions cover the material in the same sequence as it is presented in the text. Learning the material in this order makes it easier to relate pieces of information to each other, and makes it easier to remember the information.

After completing the exercises check your answers against the answer key. If you missed the correct answer to a question, check the text to make sure you now understand the correct answer. Before going on to the next section of the study guide, review this section to be sure you understand and remember the content. Cover the answers you have written with a piece of paper and mentally answer each exercise once more as you review.

Quick Recall

The quick recall section asks you to list, name, or briefly describe some aspect of the chapter's content. Although this section can be completed rapidly, do not confine yourself to quickly writing down the answers. As you complete each quick recall question, use it to trigger more information in your mind. For example, if the quick recall question asks you to name the two major regions of the body, do that, then think of their definition, what their various sub-parts are, visualize them, and so on. This section should be enjoyable and satisfying because it will demonstrate that you have learned the basic information about the material. Verify your answers against the answer key.

Mastery Learning Activity

The mastery learning activity lets you see what you have learned and if you can use that information. It consists of multiple choice questions that are similar to the questions on the exams you will take for a grade, so it is really a "practice" test and

should be taken as a test. However, don't guess. This "practice" test is also a learning tool. If you don't know the answer for sure, admit it and then find out what the correct answer is. Some of the questions require recall of information. Others may state the information somewhat differently than the way it appeared in either the text or study guide. This is entirely fair, because in real life you must be able to recognize the information no matter how it is reworded, and you should even be able to express the information in your own words. Another goal of this section is to make you think about the relationship between different bits of information or concepts, so some of the questions are more complex than those requiring only recall. Finally, some questions in this section ask you to use what you have learned to solve new problems.

After you have answered these questions, check the answer key. In addition to the answers, there is a detailed explanation of why a particular answer was correct. Sometimes an explanation of why a choice is incorrect is also given. These explanations are provided because this section is more difficult than the preceding sections. Make sure you understand why each answer is correct. Check the textbook, ask another student, talk with your instructor, but make sure you know. The mastery learning activity will show you the areas that you need to concentrate on further. Use it to improve your understanding of anatomy and physiology.

The format of this section allows you to write the answers to the questions beside each question. If you cover the answers, you can retake the test. Don't be satisfied until you get at least 90% of the questions correct.

Final Challenges

This section of the study guide corresponds to the concept questions at the end of each chapter in the text. These questions challenge you to apply information to new situations, analyze data and come to conclusions, synthesize solutions, and evaluate problems. Some of the problem solving questions in the mastery learning section have given you practice for the questions in this section. In addition, explanations are provided to help you see

how to go about solving questions of this type. Even though explanations are given, write down your answers to the questions on a separate piece of paper. Writing is a good way to organize your thoughts and most of us can benefit from practice in writing. A good way to determine if you have communicated your thoughts effectively is to have another student read your answers and see if they make sense.

The questions contain useful information, but they are not designed primarily to help you learn specific information. Rather, they emphasize the thought processes necessary to solve problems. If all you do is read the question and quickly look up the answer, you have defeated the purpose of this section. Think about the questions and develop your reasoning skills. Long after you have forgotten a particular bit of information, these skills will be useful, not only for anatomy and physiology related problems, but for many other aspects of your life as well. We hope that you not only see the benefit of possessing problem solving skills, but will come to appreciate that solving problems is fun!

A Final Thought

Good luck with all aspects of the anatomy and physiology course you are about to begin. We hope that the study guide makes things a little easier and a little clearer for you. When you have completed the course we are confident that you will be proud of what you have accomplished. Just remember to enjoy the learning process as you go along.

*Philip Tate
James Kennedy
Rodney Seeley*

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Anita Herl-Peterson
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1

The Human Organism

FOCUS: The human organism is often examined at seven structural levels: molecule, organelle, cell, tissue, organ, organ system, and the organism. Anatomy examines the structure of the human organism, and physiology investigates its processes. Structure and process interact to maintain homeostasis through

negative-feedback mechanisms. Human anatomy can be examined by sectioning the body into three planes: sagittal, transverse, and frontal. The trunk contains three cavities: thoracic, abdominal, and pelvic. These cavities and the organs they contain are lined with serous membranes.

CONTENT LEARNING ACTIVITY

Anatomy and Physiology

“Anatomy is the scientific discipline that investigates the body's structure.”

Match these terms with the correct statement or definition:

Anatomic imaging
Cytology
Histology

Regional anatomy
Surface anatomy
Systemic anatomy

- _____ 1. Study of the structural features of cells.
- _____ 2. Study of tissues.
- _____ 3. Study of the body by systems (a group of structures that have one or more common functions).
- _____ 4. Study of the body's organization by areas.
- _____ 5. Use of external landmarks such as bony projections to locate deeper structures.
- _____ 6. Involves the use of x-rays, ultrasound, nuclear magnetic resonance, and other technologies to create pictures of internal structures.



Physiology is the scientific discipline that deals with the vital processes or functions of living things.

Structural and Functional Organization

“The body can be considered conceptually at seven structural levels.”

A. Match these terms with the correct statement or definition:

Cell
Molecule
Organ
Organelle

Organism
Organ system
Tissue

- _____ 1. Structure within a cell that performs one or more specific functions.
- _____ 2. Two or more tissue types that perform one or more common functions.
- _____ 3. Basic living unit of all plants and animals.
- _____ 4. Group of organs classified as a unit because of a common set of functions.
- _____ 5. Group of cells with similar structure and function, together with the extracellular substances located between the cells.

B. Match these terms with the correct statement or definition:

Cardiovascular
Digestive
Endocrine
Integumentary
Lymphatic
Muscular

Nervous
Reproductive
Respiratory
Skeletal
Urinary

- _____ 1. Organ system that consists of skin, hair, and nails; protects and prevents water loss.
- _____ 2. Organ system that consists of the brain, spinal cord, and nerves; detects sensation and controls movements.
- _____ 3. Organ system that consists of the lungs; exchanges gases between blood and the air.
- _____ 4. Organ system that consists of the kidneys and urinary bladder; removes waste products from the circulatory system.
- _____ 5. Organ system that consists of the mouth, pharynx, esophagus, stomach, and intestines; breaks down and absorbs nutrients.
- _____ 6. Organ system that consists of bones and cartilage; protects and supports the body, and produces blood cells.
- _____ 7. Organ system that consists of the heart, blood vessels, and blood; transports nutrients, wastes, and gases.

-
-
8. Organ system that consists of glands such as the pituitary and the thyroid gland; a major regulatory system.
 9. Organ system that consists of muscles attached to the skeleton; allows body movement, maintains posture, and produces body heat.

The Human Organism

“Much of our knowledge about humans has come from studying other organisms.”

Match these terms with the correct statement or definition:

Development
Differentiation
Growth
Metabolism

Morphogenesis
Organization
Reproduction
Responsiveness

-
-
-
-
-
1. Ability to use energy to perform vital functions.
 2. Ability to sense changes in the environment and make adjustments that help to maintain life.
 3. Ability of cells to increase in size or number.
 4. The changes an organism undergoes through time.
 5. Changes in the shape of tissues, organs, and the entire organism.

Homeostasis

“Homeostasis is the existence and maintenance of a relatively constant environment within the body.”

A. Match these terms with the correct statement or definition:

Negative feedback
Positive feedback

-
-
-
-
-
-
-
1. Maintains homeostasis by reducing or resisting any deviation from an ideal normal value.
 2. Medical therapy is often designed to help this type of feedback.
 3. When a deviation from a normal value occurs, the response is to increase the deviation.
 4. Causes heart rate to increase in response to a decrease in blood pressure.
 5. Maintains an elevated blood pressure during exercise.
 6. Causes a decrease in blood pressure as a result of losing blood.
 7. Increases the strength of uterine contractions during delivery.

B. Match these terms with the correct statement or definition:

Control center
Effector
Receptor
Response

Set point
Stimulus
Variable

- | | |
|-------|---|
| _____ | 1. A condition, such as temperature, that can change. |
| _____ | 2. Ideal, normal value maintained by a homeostasis. |
| _____ | 3. Functions to monitor the value of a variable. |
| _____ | 4. Establishes the set point. |
| _____ | 5. Functions to change the value of a variable. |
| _____ | 6. A deviation from a set point. |
| _____ | 7. Returns a variable back toward the set point; produced by an effector. |

Directional Terms

“Directional terms always refer to the body in the anatomical position.”

Match these terms with the correct statement or definition:

Anterior
Caudal
Cephalic
Deep
Distal
Dorsal
Inferior

Lateral
Medial
Posterior
Proximal
Superficial
Superior
Ventral

- | | |
|-------|--|
| _____ | 1. Lower than or toward the tail (two terms). |
| _____ | |
| _____ | 2. Higher than or toward the head (two terms). |
| _____ | |
| _____ | 3. Toward the front or toward the belly (two terms). |
| _____ | |
| _____ | 4. Toward the back (of the body) (two terms). |
| _____ | |
| _____ | 5. Farther than another structure from the point of attachment to the trunk. |
| _____ | |
| _____ | 6. Away from the midline. |
| _____ | |
| _____ | 7. Away from the surface. |

Planes

“A plane is an imaginary flat surface passing through the body or an organ.”

A. Match these terms with the correct statement or definition:

Cross (transverse) section
Frontal (coronal) plane
Longitudinal section

Oblique section
Sagittal plane
Transverse plane

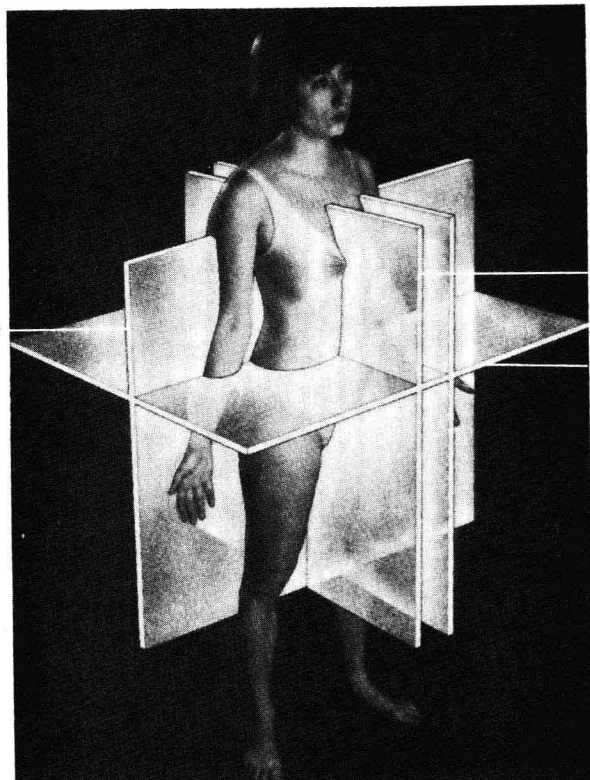
- _____ 1. Runs vertically through the body and divides the body into right and left portions.
- _____ 2. Runs vertically through the body and divides the body into anterior and posterior portions.
- _____ 3. Divides the body into superior and inferior portions and runs parallel to the surface of the ground.
- _____ 4. A cut through the long axis of an organ.
- _____ 5. A right angle cut across the long axis of an organ.



A midsagittal section divides the body into equal right and left halves. A parasagittal section divides the body into right and left parts to one side of the midline.

B. Match these terms with the correct planes labeled in Figure 1-1:

Frontal (coronal) plane
Midsagittal plane
Transverse plane



1. _____
2. _____
3. _____

Figure 1-1

C. Match these terms with the correct section in Figure 1-2:

Longitudinal section
Oblique section
Cross (transverse) section

1. _____
2. _____
3. _____

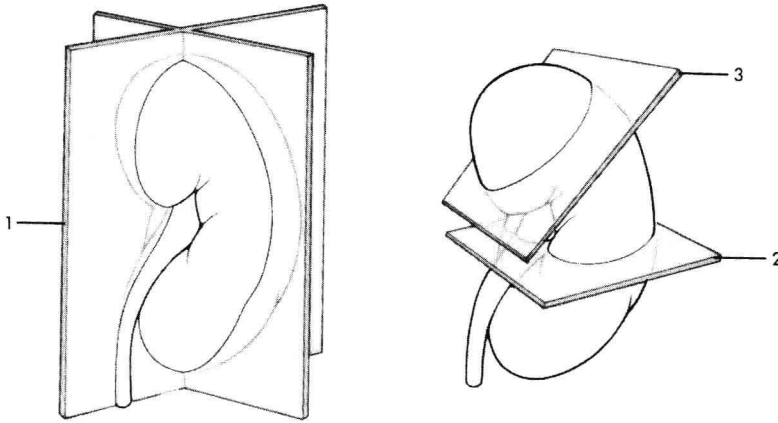


Figure 1-2

Body Regions

“The body commonly is divided into several regions.”

Using the terms provided, complete these statements:

Abdomen
Arm
Forearm
Leg
Lower limb

Pelvis
Thigh
Thorax
Upper limb

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

The (1) consists of the arm, forearm, wrist, and hand.
The (2) extends from the shoulder to the elbow, and the (3) extends from the elbow to the wrist. The (4) consists of the thigh, leg, ankle, and wrist. The (5) extends from the hip to the knee, and the leg (6) extends from the knee to the ankle. The trunk consists of the (7), (8), and (9).



The abdominal region can be subdivided by imaginary lines into four quadrants or nine regions. The quadrants or regions can be used as reference points for locating underlying organs.

Body Cavities

“The body contains several large trunk cavities that do not open to the exterior of the body.”

A. Match these terms with the correct statement or definition:

Abdominal cavity
Pelvic cavity
Thoracic cavity

- _____ 1. Cavity surrounded by the rib cage, bounded inferiorly by the diaphragm, and divided by the mediastinum.
- _____ 2. Cavity bounded primarily by the abdominal muscles.
- _____ 3. Cavity containing the stomach and kidneys.
- _____ 4. Small space enclosed by the bones of the pelvis.



There is no physical separation between the abdominal and pelvic cavities, which sometimes are called the abdominopelvic cavity.

B. Match these terms with the correct statement or definition:

Mesentery	Pleural membrane
Parietal serous membrane	Retroperitoneal
Pericardial membrane	Visceral serous membrane
Peritoneal membrane	

- _____ 1. Portion of a serous membrane in contact with an organ.
- _____ 2. Serous membrane that surrounds the lungs and lines the thoracic cavity.
- _____ 3. Serous membrane that surrounds the heart and lines a connective tissue sac.
- _____ 4. Serous membrane that lines the abdominal and pelvic cavities and their organs.
- _____ 5. Double-layered serous membrane that anchors some abdominal organs to the body wall.
- _____ 6. Location of organs covered only by parietal peritoneum.



A potential space or cavity is located between the visceral and parietal serous membranes. The cavity is filled with serous fluid that reduces friction between the visceral and parietal serous membranes.

C. Match these terms with the correct parts labeled in Figure 1-3:

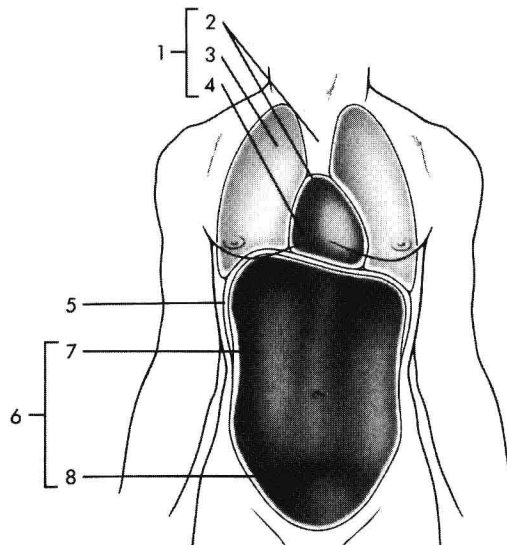


Figure 1-3

Abdominal cavity
 Abdominopelvic cavity
 Diaphragm
 Mediastinum
 Pelvic cavity
 Pericardial cavity
 Pleural cavity
 Thoracic cavity

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

QUICK RECALL

1. From smallest to largest, list the seven structural levels of the human body.
2. List the four primary tissue types.
3. Name the three components of many negative-feedback mechanisms.
4. Describe the anatomical position.
5. List the three major planes used to cut the human body and the three sections used to cut an organ.
6. List the three trunk cavities of the human body.
7. Name the three serous membranes lining the trunk cavities and their organs.
8. List four retroperitoneal organs.

MASTERY LEARNING ACTIVITY

Place the letter corresponding to the correct answer in the space provided.

- _____ 1. Physiology
- deals with the processes or functions of living things.
 - is the scientific discipline that investigates the body's structure.
 - is concerned with organisms and does not deal with different levels of organization such as cells and systems.
 - recognizes the unchanging (as opposed to dynamic) nature of living things.
- _____ 2. An organ is
- a specialized structure within a cell that carries out a specific function.
 - at a lower level of organization than a cell.
 - two or more tissues that perform a specific function.
 - a group of cells that perform a specific function.
- _____ 3. The systems that are most important in the regulation or control of the other systems of the body are the
- circulatory and muscular systems.
 - circulatory and endocrine systems.
 - nervous and muscular systems.
 - nervous and endocrine systems.
- _____ 4. Negative-feedback mechanisms
- make deviations from normal smaller.
 - maintain homeostasis.
 - are responsible for an increased sense of hunger the longer a person goes without eating.
 - all of the above
- _____ 5. The following events are part of a negative-feedback mechanism.
- Blood pressure increases.
 - Control center compares actual blood pressure to the blood pressure set point.
 - The heart beats faster.
 - Receptors detect a decrease in blood pressure.
- Choose the arrangement that lists the events in the order they occur.
- 1, 2, 3, 4
 - 1, 3, 2, 4
 - 4, 2, 3, 1
 - 4, 3, 2, 1
- _____ 6. Which of the following terms mean the same thing when referring to a human in the anatomical position?
- superior and dorsal
 - deep and distal
 - anterior and ventral
 - proximal and medial
- _____ 7. A term that means nearer the attached end of a limb is
- medial.
 - lateral.
 - distal.
 - proximal.
 - superficial.
- _____ 8. Which of the following directional terms are paired most appropriately as opposites?
- superficial and deep
 - medial and proximal
 - distal and lateral
 - superior and posterior
 - anterior and inferior
- _____ 9. The chin is _____ to the umbilicus (belly button).
- lateral
 - posterior
 - distal
 - superior