

THE HUMAN BODY: AN ORIENTATION

Most of us have a natural curiosity about our bodies, and a study of anatomy and physiology elaborates on this interest. Anatomists have developed a universally acceptable set of reference terms that allows body structures to be located and identified with a high degree of clarity. Initially, students might have difficulties with the language used to describe anatomy and physiology, but without such a special vocabulary, confusion is bound to occur.

The topics in this chapter enable students to test their mastery of terminology commonly used to describe the body and its various parts, and concepts concerning functions vital for life and homeostasis. Body organization from simple to complex levels and an introduction to the organ systems forming the body as a whole are also covered.

AN OVERVIEW OF ANATOMY AND PHYSIOLOGY

1. Match the terms in Column B to the appropriate descriptions provided in Column A. Enter the correct letter or its corresponding term in the answer blanks.

Column A

- _____ 1. The branch of biological science that studies and describes how body parts work or function
- _____ 2. The study of the shape and structure of body parts
- _____ 3. The tendency of the body's systems to maintain a relatively constant or balanced internal environment
- _____ 4. The term that indicates *all* chemical reactions occurring in the body

Column B

- A. Anatomy
- B. Homeostasis
- C. Metabolism
- D. Physiology

2. Circle all the terms or phrases that correctly relate to the study of *physiology*. Use a highlighter to identify those terms or phrases that pertain to the study of *anatomy*.

- | | |
|---|----------------------|
| A. Measuring an organ's size, shape, and weight | H. Dynamic |
| B. Can be studied in dead specimens | I. Dissection |
| C. Often studied in living subjects | J. Experimentation |
| D. Chemistry principles | K. Observation |
| E. Measuring the acid content of the stomach | L. Directional terms |
| F. Principles of physics | M. Static |
| G. Observing a heart in action | |

LEVELS OF STRUCTURAL ORGANIZATION

3. The structures of the body are organized into successively larger and more complex structures. Fill in the answer blanks with the correct terms for these increasingly larger structures.



4. Circle the term that does not belong in each of the following groupings.

1. Electron Cell Tissue Alive Organ
2. Brain Stomach Heart Liver Epithelium
3. Epithelium Heart Muscle tissue Nervous tissue Connective tissue
4. Human Digestive system Horse Pine tree Amoeba

5. Using the key choices, identify the organ systems to which the following organs or functions belong. Insert the correct letter or term in the answer blanks.

Key Choices

- | | | | |
|-------------------|---------------------|-----------------|-------------|
| A. Cardiovascular | D. Integumentary | G. Nervous | J. Skeletal |
| B. Digestive | E. Lymphatic/Immune | H. Reproductive | K. Urinary |
| C. Endocrine | F. Muscular | I. Respiratory | |

- _____ 1. Rids the body of nitrogen-containing wastes
- _____ 2. Is affected by the removal of the thyroid gland
- _____ 3. Provides support and levers on which the muscular system can act
- _____ 4. Includes the heart
- _____ 5. Protects underlying organs from drying out and mechanical damage
- _____ 6. Protects the body; destroys bacteria and tumor cells
- _____ 7. Breaks down foodstuffs into small particles that can be absorbed
- _____ 8. Removes carbon dioxide from the blood
- _____ 9. Delivers oxygen and nutrients to the body tissues
- _____ 10. Moves the limbs; allows facial expression
- _____ 11. Conserves body water or eliminates excesses
- _____ 12. Provides for conception and childbearing
- _____ 13. Controls the body with chemicals called hormones
- _____ 14. Is damaged when you cut your finger or get a severe sunburn

6. Using the key choices from Exercise 5, choose the organ system to which each of the following sets of organs belongs. Enter the correct letter or term in the answer blanks.

- _____ 1. Blood vessels, heart
- _____ 2. Pancreas, pituitary, adrenal glands
- _____ 3. Kidneys, bladder, ureters
- _____ 4. Testis, vas deferens, urethra
- _____ 5. Esophagus, large intestine, rectum
- _____ 6. Breastbone, vertebral column, skull
- _____ 7. Brain, nerves, sensory receptors

7. Figures 1-1 to 1-6, on pages 4-6, represent the various body organ systems. First identify and name each organ system by labeling the organ system under each illustration. Then select a different color for each organ and use it to color the coding circles and corresponding structures in the illustrations.

Blood vessels

Heart

Nasal cavity

Lungs

Trachea

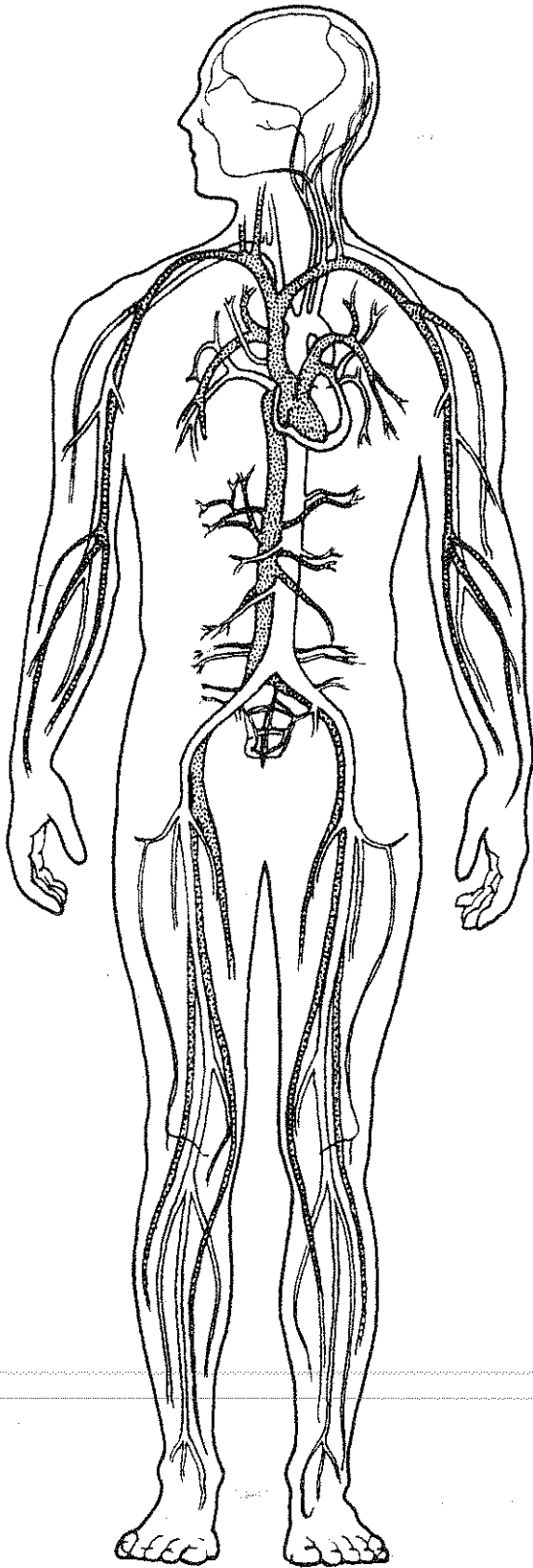


Figure 1-1

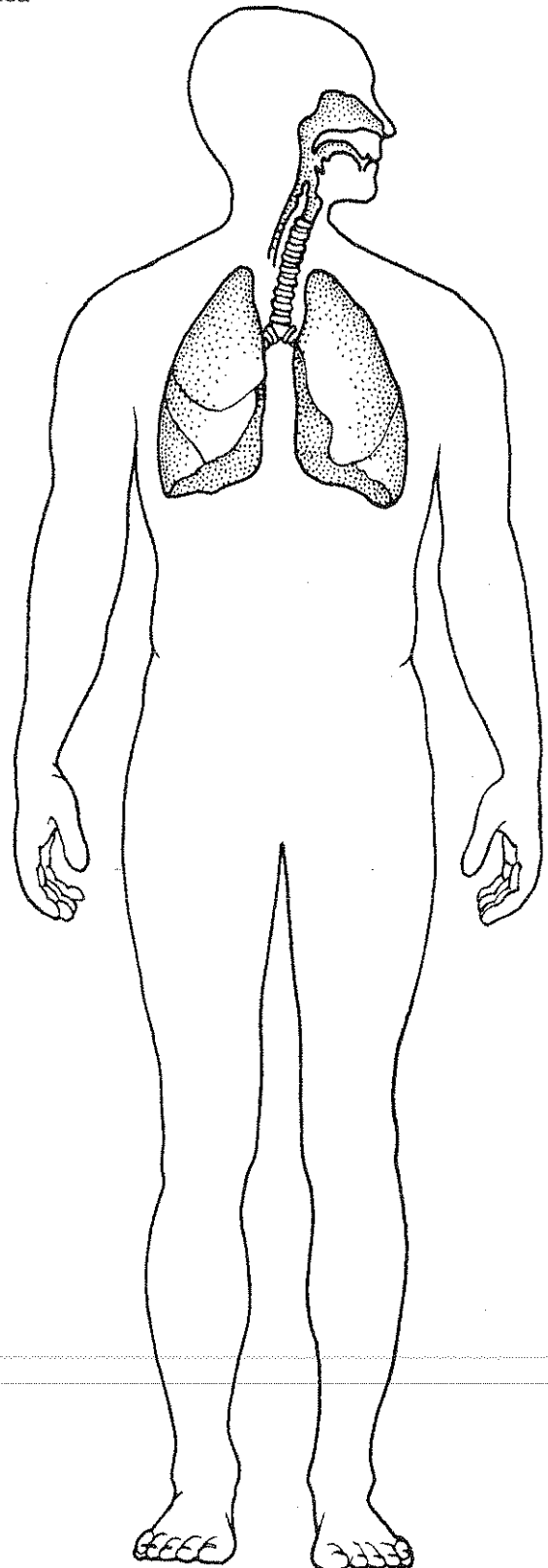


Figure 1-2

- Brain
- Spinal cord
- Nerves
- Kidneys
- Ureters
- Bladder

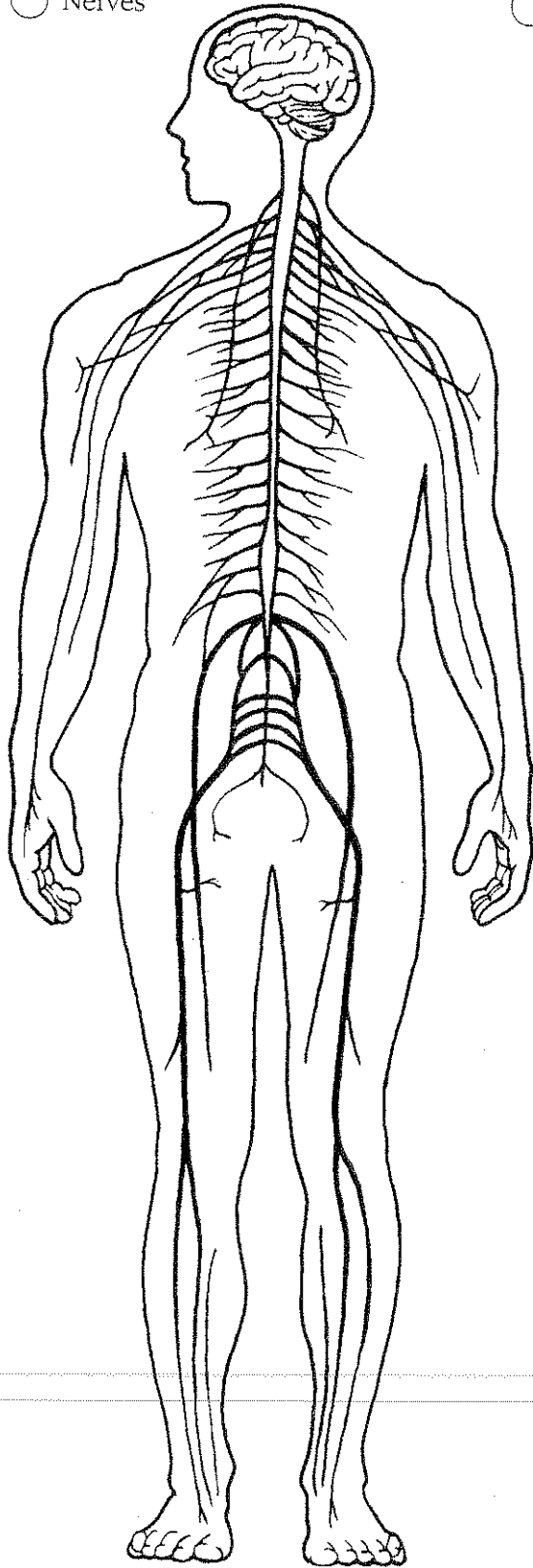


Figure 1-3

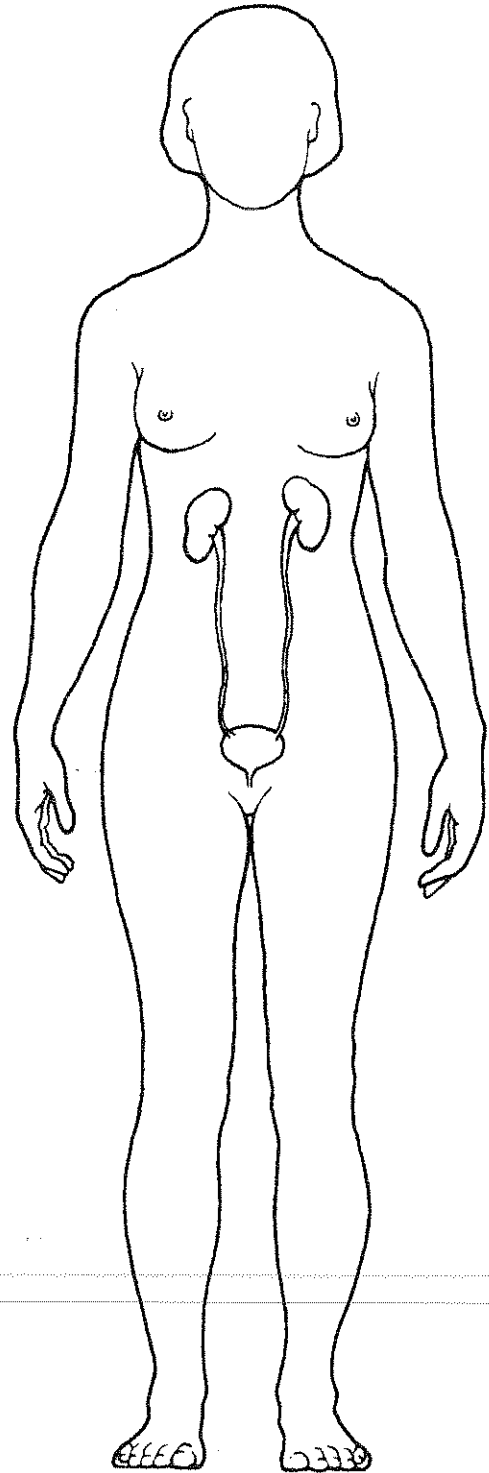


Figure 1-4

Stomach

Esophagus

Ovaries

Intestines

Oral cavity

Uterus

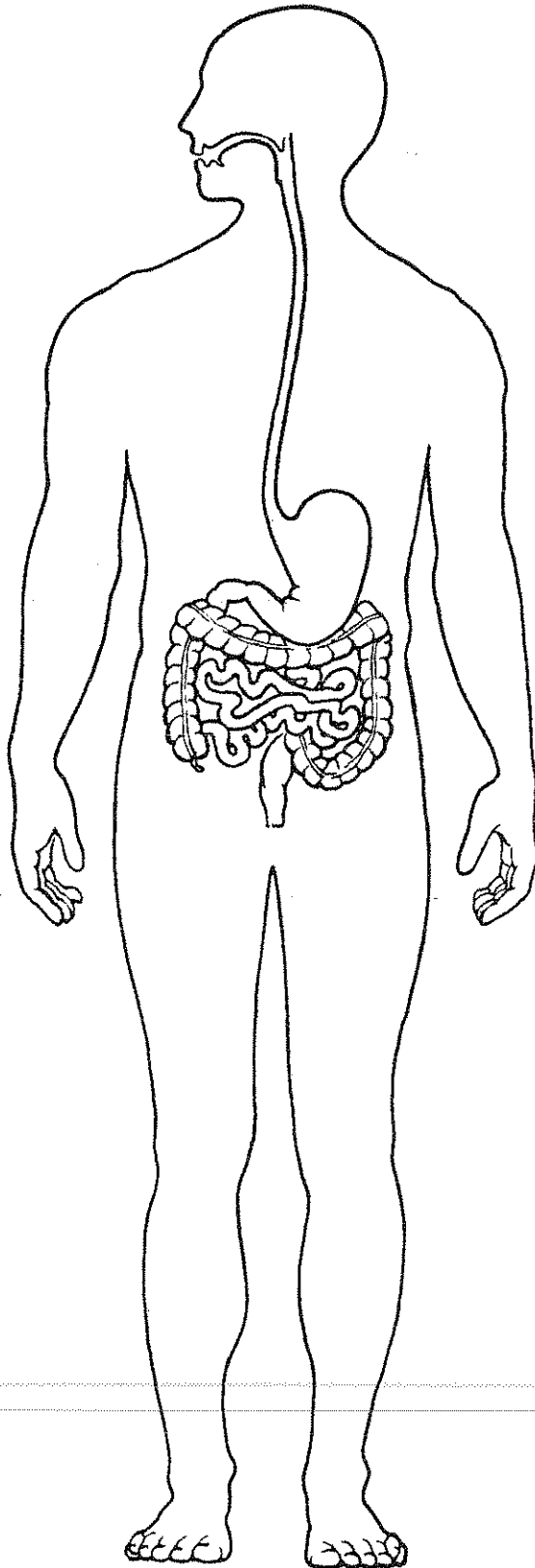


Figure 1-5

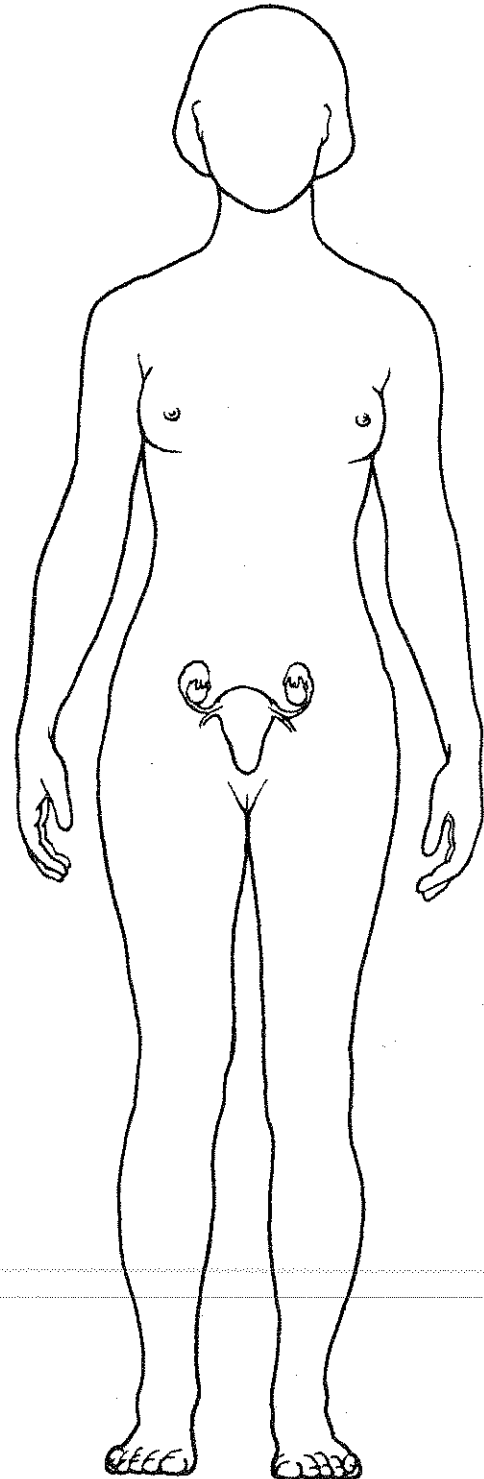


Figure 1-6

MAINTAINING LIFE

8. Match the terms pertaining to functional characteristics of organisms in Column B with the appropriate descriptions in Column A. Fill in the answer blanks with the appropriate letter or term.

Column A	Column B
_____ 1. Keeps the body's internal environment distinct from the external environment	A. Digestion
_____ 2. Provides new cells for growth and repair	B. Excretion
_____ 3. Occurs when constructive activities occur at a faster rate than destructive activities	C. Growth
_____ 4. The tuna sandwich you have just eaten is broken down to its chemical building blocks	D. Maintenance of boundaries
_____ 5. Elimination of carbon dioxide by the lungs and elimination of nitrogenous wastes by the kidneys	E. Metabolism
_____ 6. Ability to react to stimuli; a major role of the nervous system	F. Movement
_____ 7. Walking, throwing a ball, riding a bicycle	G. Responsiveness
_____ 8. All chemical reactions occurring in the body	H. Reproduction
_____ 9. At the cellular level, membranes; for the whole organism, the skin	

9. Using the key choices, correctly identify the survival needs that correspond to the following descriptions. Insert the correct letter or term in the answer blanks.

Key Choices

- | | | |
|---------------------------------|--------------|----------|
| A. Appropriate body temperature | C. Nutrients | E. Water |
| B. Atmospheric pressure | D. Oxygen | |

- | |
|--|
| _____ 1. Includes carbohydrates, proteins, fats, and minerals |
| _____ 2. Essential for normal operation of the respiratory system and breathing |
| _____ 3. Single substance accounting for more than 60% of body weight |
| _____ 4. Required for the release of energy from foodstuffs |
| _____ 5. Provides the basis for body fluids of all types |
| _____ 6. When too high or too low, physiological activities cease, primarily because molecules are destroyed or become nonfunctional |

HOMEOSTASIS

10. The following statements refer to homeostatic control systems. Complete each statement by inserting your answers in the answer blanks.

- _____ 1. There are three essential components of all homeostatic control mechanisms: control center, receptor, and effector. The _____ 2. _____ (1) senses changes in the environment and responds by sending information (input) to the _____ (2) along the _____ (3) pathway. The _____ (4) analyzes the input, determines the appropriate response, and activates the _____ (5) by sending information along the _____ (6) pathway. When the response causes the initial stimulus to decline, the homeostatic mechanism is referred to as a _____ (7) feedback mechanism. When the response enhances the initial stimulus, the mechanism is called a _____ (8) feedback mechanism. _____ (9) feedback mechanisms are much more common in the body.
- _____ 3.
- _____ 4.
- _____ 5.
- _____ 6.
- _____ 7.
- _____ 8.
- _____ 9.

THE LANGUAGE OF ANATOMY

11. Complete the following statements by filling in the answer blanks with the correct term.

- _____ 1. The abdominopelvic and thoracic cavities are subdivisions of the _____ (1) body cavity; the cranial and spinal cavities are parts of the _____ (2) body cavity. The _____ (3) body cavity is totally surrounded by bone and provides very good protection to the structures it contains.
- _____ 2.
- _____ 3.

12. Circle the term or phrase that does not belong in each of the following groupings.

- | | | | |
|-------------------|--------------|----------------|---------------------|
| 1. Transverse | Distal | Frontal | Sagittal |
| 2. Lumbar | Thoracic | Antecubital | Abdominal |
| 3. Calf | Brachial | Femoral | Popliteal |
| 4. Epigastric | Hypogastric | Right iliac | Left upper quadrant |
| 5. Orbital cavity | Nasal cavity | Ventral cavity | Oral cavity |

13. Select different colors for the *dorsal* and *ventral* body cavities. Color the coding circles below and the corresponding cavities in part A of Figure 1-7. Complete the figure by labeling those body cavity subdivisions that have a leader line. Complete part B by labeling each of the abdominal regions indicated by a leader line.

Dorsal body cavity

Ventral body cavity

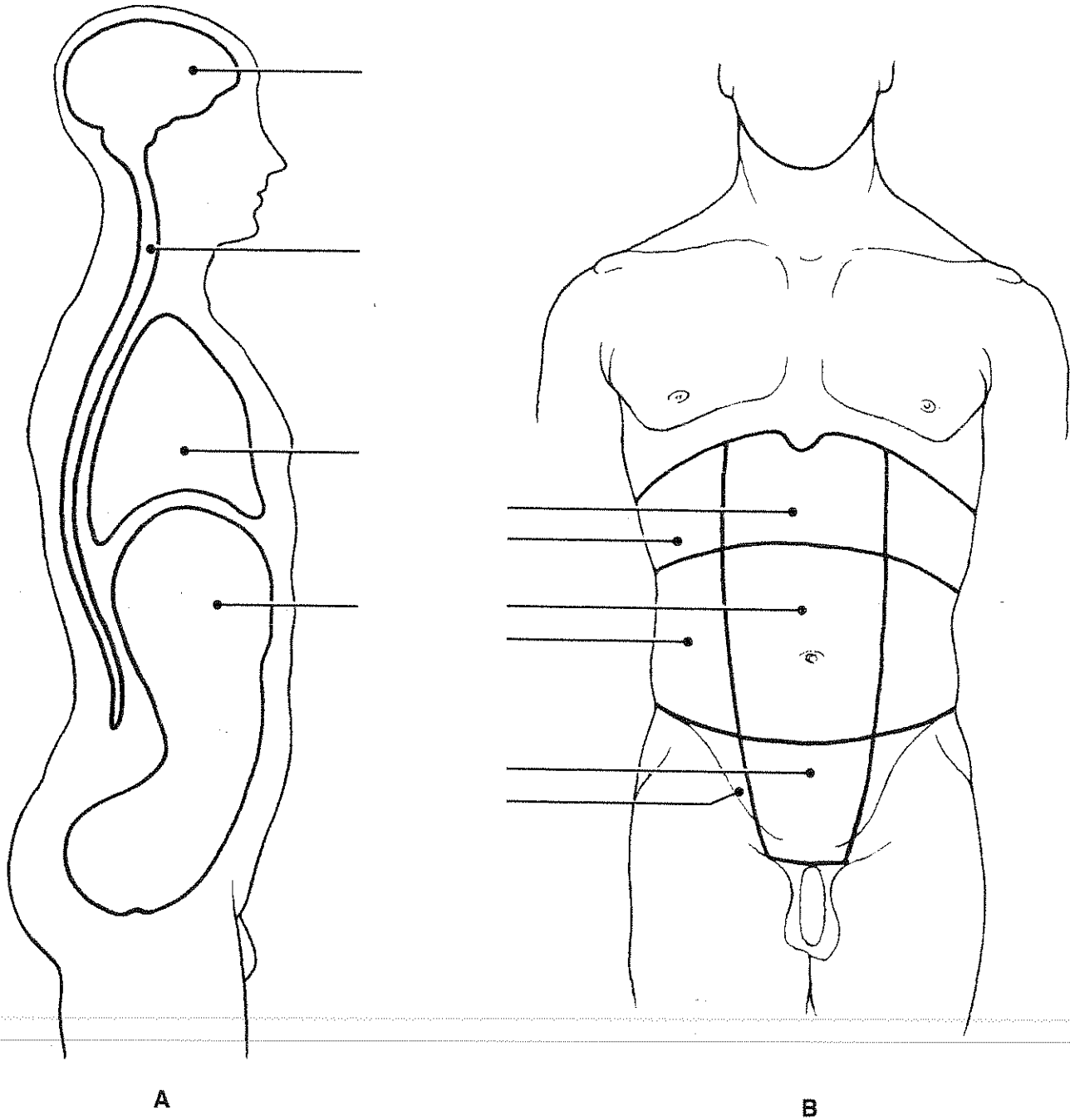


Figure 1-7

14. Select the key choices that identify the following body parts or areas.
Enter the appropriate letter or corresponding term in the answer blanks.

Key Choices

- | | | | |
|----------------|-------------|--------------|--------------|
| A. Abdominal | E. Buccal | I. Inguinal | M. Pubic |
| B. Antecubital | F. Cervical | J. Lumbar | N. Scapular |
| C. Axillary | G. Femoral | K. Occipital | O. Sural |
| D. Brachial | H. Gluteal | L. Popliteal | P. Umbilical |

- _____ 1. Armpit
- _____ 2. Thigh region
- _____ 3. Buttock area
- _____ 4. Neck region
- _____ 5. "Belly button" area
- _____ 6. Genital area
- _____ 7. Anterior aspect of elbow
- _____ 8. Posterior aspect of head
- _____ 9. Area where trunk meets thigh
- _____ 10. Back area from ribs to hips
- _____ 11. Pertaining to the cheek

15. Using the key terms from Exercise 14, correctly label all body areas indicated with leader lines on Figure 1-8.

In addition, identify the sections labeled A and B in the figure.

Section A: _____

Section B: _____

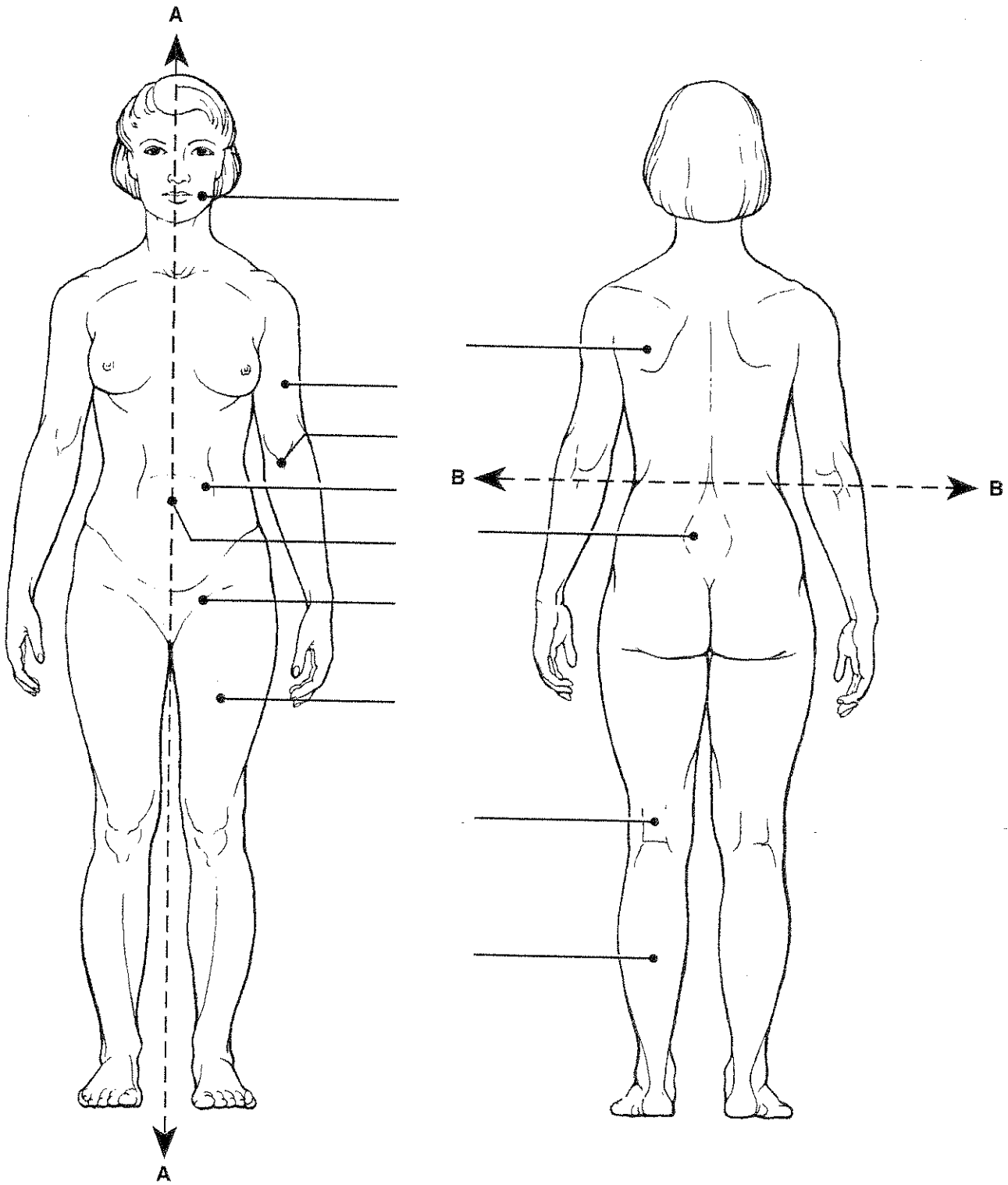


Figure 1-8

16. From the key choices, select the body cavities where the following surgical procedures would occur. Insert the correct letter or term in the answer blanks. Be precise. Also select the name of the cavity subdivision if appropriate.

Key Choices

- | | | | |
|--------------|-----------|-------------|------------|
| A. Abdominal | C. Dorsal | E. Spinal | G. Ventral |
| B. Cranial | D. Pelvic | F. Thoracic | |

- _____ 1. Removal of the uterus, or womb
- _____ 2. Coronary bypass surgery (heart surgery)
- _____ 3. Removal of a serious brain tumor
- _____ 4. Removal of a "hot" appendix
- _____ 5. A stomach ulcer operation

17. Complete the following statements by choosing an anatomical term from the key choices. Enter the appropriate letter or term in the answer blanks.

Key Choices

- | | | | |
|-------------|-------------|--------------|---------------|
| A. Anterior | D. Inferior | G. Posterior | J. Superior |
| B. Distal | E. Lateral | H. Proximal | K. Transverse |
| C. Frontal | F. Medial | I. Sagittal | |

- _____ 1. In the anatomical position, the face and palms are on the _____ (1) body surface, the buttocks and shoulder blades are on the _____ (2) body surface, and the top of the head is the most _____ (3) part of the body. The ears are _____ (4) to the shoulders and _____ (5) to the nose. The heart is _____ (6) to the spine and _____ (7) to the lungs. The elbow is _____ (8) to the fingers but _____ (9) to the shoulder. In humans, the dorsal surface can also be called the _____ (10) surface; however, in four-legged animals, the dorsal surface is the _____ (11) surface.
- _____ 2.
- _____ 3.
- _____ 4.
- _____ 5.
- _____ 6.
- _____ 7.
- _____ 8.
- _____ 9.
- _____ 10.
- _____ 11.

- _____ 12. If an incision cuts the heart into right and left parts, the section is a (12) section, but if the heart is cut so that anterior and posterior parts result, the section is a (13) section.
- _____ 13. You are told to cut an animal along two planes so that the paired kidneys are observable in both sections. The two sections that meet this requirement are the (14) and (15) sections.
- _____ 14.
- _____ 15.

18. Using the key choices, identify the body cavities where the following body organs are located. Enter the appropriate letter or term in the answer blanks.

Key Choices

A. Abdominopelvic

B. Cranial

C. Spinal

D. Thoracic

- | | |
|--------------------------|---------------------------|
| _____ 1. Stomach | _____ 7. Bladder |
| _____ 2. Small intestine | _____ 8. Trachea |
| _____ 3. Large intestine | _____ 9. Lungs |
| _____ 4. Spleen | _____ 10. Pituitary gland |
| _____ 5. Liver | _____ 11. Rectum |
| _____ 6. Spinal cord | _____ 12. Ovaries |

19. Number the following structures, from darkest (black) to lightest (white), as they would appear on an X ray. Number the darkest one 1, the next darkest 2, etc.

- _____ A. Soft tissue
- _____ B. Femur (bone of the thigh)
- _____ C. Air in lungs
- _____ D. Gold (metal) filling in a tooth



AT THE CLINIC

20. A jogger has stepped in a pothole and sprained his ankle. What systems have suffered damage?

- 21.** A newborn baby is unable to hold down any milk. Examination reveals a developmental disorder in which the esophagus fails to connect to the stomach. What survival needs are most immediately threatened?

 - 22.** The Chan family was traveling in their van and had a minor accident. The children in the backseat were wearing lap belts, but they still sustained bruises around the abdomen and had some internal organ injuries. Why is this area more vulnerable to damage than others?

 - 23.** John, a patient at Jones City Hospital, is in tough shape. He has a hernia in his inguinal region, pain from an infected kidney in his lumbar region, and severe bruises and swelling in his pubic region. Explain where each of these regions is located.

 - 24.** The hormone thyroxine is released in response to a pituitary hormone called TSH. As thyroxine levels increase in the blood, they exert negative feedback on the release of TSH by the pituitary gland. What effect will this have on the release of TSH?

 - 25.** In congestive heart failure, the weakened heart is unable to pump with sufficient strength to empty its own chambers. As a result, blood backs up in the veins, blood pressure rises, and circulation is impaired. Describe what will happen as this situation worsens owing to positive feedback. Then, predict how a heart-strengthening medication will reverse the positive feedback.
-

26. The following advanced imaging techniques are discussed in the text: CT, DSA, PET, ultrasound, and MRI. Which of these techniques uses X rays? Which uses radio waves and magnetic fields? Which uses radioisotopes? Which displays body regions in sections? (You may have more than one answer for each question.)
27. A patient reports stabbing pains in the right hypochondriac region. The medical staff suspects gallstones. What region of the body will be examined?



THE FINALE: MULTIPLE CHOICE

28. Select the best answer or answers from the choices given.
- Which of the following activities would not represent an anatomical study?
 - Making a section through the heart to observe its interior
 - Drawing blood from recently fed laboratory animals at timed intervals to determine their blood sugar levels
 - Examining the surface of a bone
 - Viewing muscle tissue through a microscope
 - Which of the following is (are) involved in maintaining homeostasis?
 - Effector
 - Control center
 - Receptor
 - Feedback
 - Lack of change
 - When a capillary is damaged, a platelet plug is formed. The process involves platelets sticking to each other. The more platelets that stick together, the more the plug attracts additional platelets. This is an example of:
 - negative feedback
 - positive feedback
 - A coronal plane through the head:
 - could pass through both the nose and the occiput
 - could pass through both ears
 - must pass through the mouth
 - could lie in a horizontal plane

5. Which of the following statements is correct?
 - A. The brachium is proximal to the antebrachium.
 - B. The femoral region is superior to the tarsal region.
 - C. The orbital region is inferior to the buccal region.
 - D. The axillary region is lateral to the sternal region.
 - E. The crural region is posterior to the sural region.

6. Which of the following body regions is (are) found on the torso?

A. Gluteal	D. Acromial
B. Inguinal	E. Olecranal
C. Popliteal	

7. A neurosurgeon orders a spinal tap for a patient. Into what body cavity will the needle be inserted?

A. Ventral	D. Cranial
B. Thoracic	E. Pelvic
C. Dorsal	

8. An accident victim has a collapsed lung. Which cavity has been entered?

A. Mediastinal	D. Vertebral
B. Pericardial	E. Ventral
C. Pleural	

9. Which body system would be affected by degenerative cartilage?

A. Muscular	D. Skeletal
B. Nervous	E. Lymphatic
C. Cardiovascular	

10. The position of the heart relative to the structures around it would be described accurately as:
 - A. deep to the sternum (breastbone)
 - B. lateral to the lungs
 - C. superior to the diaphragm
 - D. inferior to the ribs
 - E. anterior to the vertebral column

11. What term(s) could be used to describe the position of the nose?
 - A. Intermediate to the eyes
 - B. Inferior to the brain
 - C. Superior to the mouth
 - D. Medial to the ears
 - E. Anterior to the ears

12. The radiographic technique used to provide information about blood flow is:

A. DSR	D. ultrasonography
B. CT	E. any X-ray technique
C. PET	

13. A patient complains of pain in the lower right quadrant. Which system is most likely to be involved?

A. Respiratory	D. Skeletal
B. Digestive	E. Muscular
C. Urinary	