Organization of the Body

Many explorers use maps, figures, and photographs to help orient themselves to the terrain to be explored. The anatomist uses maps, figures, and photos to explore the body and its parts. The use of maps and other aids to find a geographical position is called *orienteering* and is a useful analogy to human anatomical study. At the beginning of this exercise, you will learn how anatomical "maps" and models are read. Later in this exercise, you will become familiar with the major body systems and some of their organs so that you will be comfortable with the "lay of the land" in the human body.

Before you begin

- ❑ Read Chapter 1 in your textbook.
- ❑ Set your learning goals. When you finish this exercise, you should be able to
  - ❑ use anatomical terms correctly
  - ❑ discuss the nature of an anatomical section
  - ❑ describe the basic plan of the human body
  - ❑ identify the major body cavities
  - ❑ list the major systems of the body, their principal organs, and their primary functions
- ❑ Prepare your materials:
  - ❑ dissectible human torso model (or comparable charts)
  - ❑ models or figures showing different anatomical sections
  - ❑ computer setup with DISSECTIBLE HUMAN or similar human dissection program (optional)
- ❑ Read the directions and safety tips for this exercise carefully before starting any procedure.

A. Planes and sections

All terms describing the anatomy of organisms assume that the body is in the classic **anatomical position.** For the human, that means standing, facing the viewer. The hands are held down along the side of the trunk, with the palms facing forward.

It is often useful to show a figure of a *sectioned* human body or organ. A section refers to a part cut in a **plane.** A plane is a geometrical concept referring to an imagined flat surface. The term *cross section (c.s.),* for example, refers to a part cut crosswise. A *longitudinal section (l.s.)* is a cut made lengthwise. These terms are useful only in limited circumstances because they do not really identify whether the cuts are made top to bottom, front to back, or side to side. There are three anatomical planes used to describe sections of the body:

HINT

The anatomical position of a four-legged animal, such as a rat, cat, or fetal pig, is standing on all four limbs, head facing forward. See Exercise 2 for an example.

- ❑ 1 **Sagittal plane**—A sagittal plane extends from front to back and top to bottom, dividing the body into left and right portions. A *midsagittal plane* refers to a sagittal plane that divides the body into exactly equal left and right portions.
- ❑ 2 **Frontal plane**—The frontal plane, also called a *coronal plane,* divides the body into front and back portions.
- ❑ 3 **Horizontal plane**—Also called a *transverse plane,* the horizontal plane divides the body into top and bottom portions.

Using the models or figures provided, find at least three examples of each of the sections described (Figure 1-1). For each, ask yourself what perspective the section gives that a section cut along a different plane does not give.

B. Anatomical directions

To locate structures within a body, you must use *directional terms.* Actually, you use these kinds of terms all the time: left, right, up, down, north, south, for example.

- ❑ 1 Review the directional terms given in Table 1-1. Notice that they are grouped in relative pairs. Each member of a pair is the opposite, or complement, of the other member of the pair. For example, *right* is the opposite direction of *left.*

To make the reading of anatomical figures a little easier, an *anatomical compass* is used throughout this lab manual, just as it is in the textbook. On many figures, you will notice a small compass rosette similar to those on geographical maps. Rather than being labeled N, S, E, and W, the anatomical rosette is labeled with abbreviated anatomical directions.

- ❑ 2 Review this list of directional terms and abbreviations:

A = Anterior
I = Inferior
L (opposite R) = Left
L (opposite M) = Lateral
M = Medial
P = Posterior
R = Right
S = Superior

COLORING EXERCISE
Using colored pens or pencils, shade in the figure and accompanying labels in contrasting colors of your choice as indicated by the red numerals.

Anatomical Planes and Directions

PLANES

SAGITTAL 1
MIDSAGITTAL 2
FRONTAL 3
HORIZONTAL 4

DIRECTIONS

LATERAL 5
MEDIAL 6
ANTERIOR 7
POSTERIOR 8
SUPERIOR 9
INFERIOR 10
PROXIMAL 11
DISTAL 12

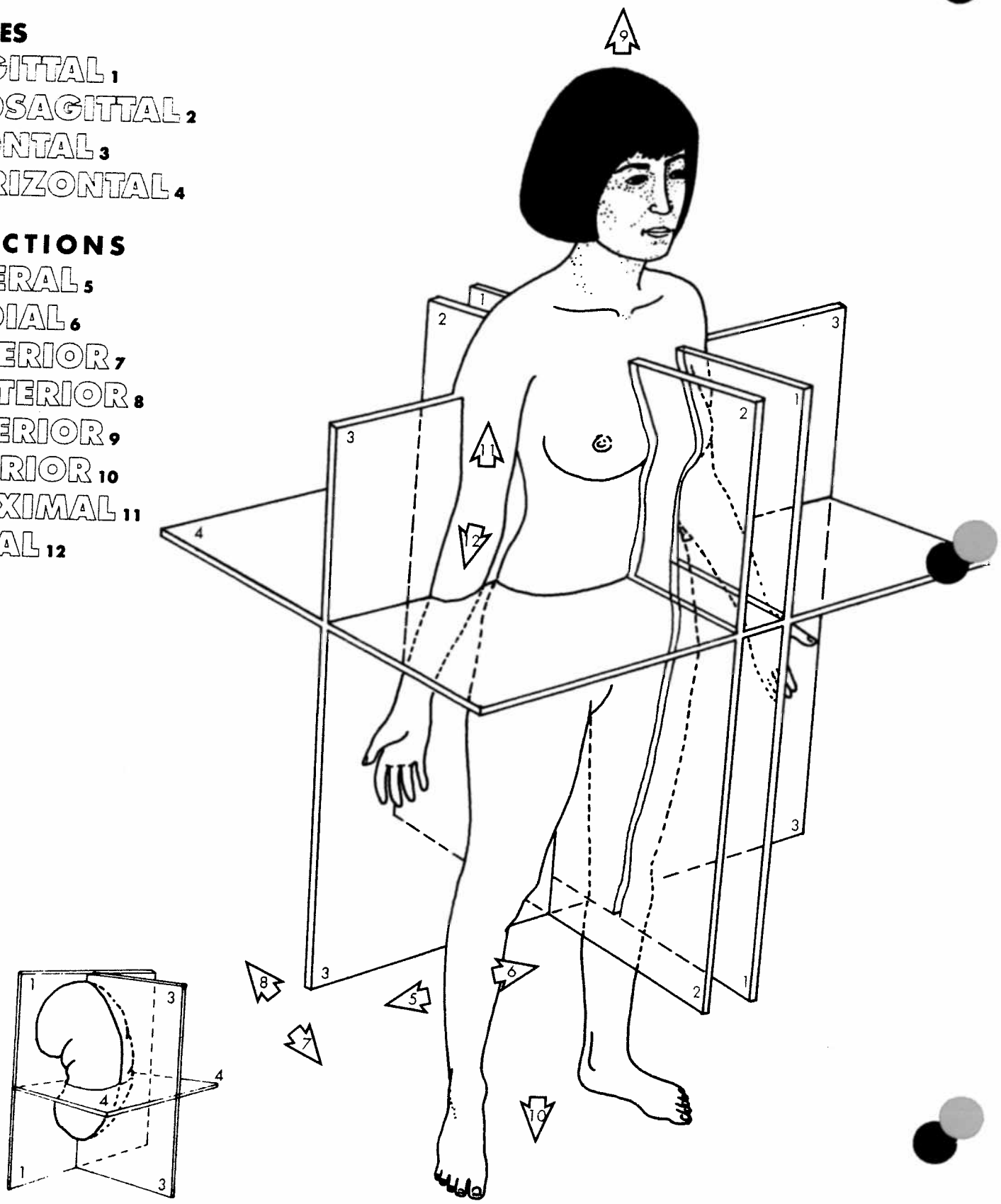

Figure 1-1

DIRECTIONAL TERMS — Table 1-1

Directional Term	Definition	Example of Usage
Left	To the left of the body (not *your* left, the subject's)	The stomach is to the *left* of the liver.
Right	To the right of the body or structure being studied	The *right* kidney is damaged.
Lateral	Toward the side; away from the midsagittal plane	The eyes are *lateral* to the nose.
Medial	Toward the midsagittal plane; away from the side	The eyes are *medial* to the ears.
Anterior	Toward the front of the body	The nose is on the *anterior* of the head.
Posterior	Toward the back (rear) of the body	The heel is *posterior* to the toes.
Superior	Toward the top of the body	The shoulders are *superior* to the hips.
Inferior	Toward the bottom of the body	The stomach is *inferior* to the heart.
Dorsal	Along (or toward) the vertebral surface of the body	Her scar is along the *dorsal* surface.
Ventral	Along (toward) the belly surface of the body	The navel is on the *ventral* surface.
Caudad (caudal)	Toward the tail	The neck is *caudad* to the skull.
Cephalad	Toward the head	The neck is *cephalad* to the tail.
Proximal	Toward the trunk (describes relative position in a limb or other appendage)	This joint is *proximal* to the toenail.
Distal	Away from the trunk or point of attachment.	The hand is *distal* to the elbow.
Visceral	Toward an internal organ; away from the outer wall (describes positions inside a body cavity)	This organ is covered with the *visceral* layer of the membrane.
Parietal	Toward the wall; away from internal structures	The abdominal cavity is lined with the *parietal* peritoneal membrane.
Deep	Toward the inside of a part; away from the surface	The thigh muscles are *deep* to the skin.
Superficial	Toward the surface of a part; away from the inside	The skin is a *superficial* organ.
Medullary	Refers to an inner region, or *medulla*	The *medullary* portion of the organ contains nerve tissue.
Cortical	Refers to an outer region, or *cortex*	The *cortical* area produces hormones.

❑ 3 Review the examples of how the anatomical compass is used in illustrations by looking at Figure 1-2, *A* through *D*. Test your knowledge of directions and the use of the anatomical compass by labeling the rosettes given in Figure 1-2, *E* through *J*.

HINT

A handy summary of anatomical terms and their usage is found on the inside front cover of this manual, for easy location later in your studies.

C. Body cavities and regions

The inside of the human body contains the viscera, or internal organs. The viscera are found in any of a number of cavities (spaces) within the body (Figure 1-3). The two principal body cavities are the dorsal body cavity and the ventral body cavity. Because these spaces are so large, they are subdivided into smaller units.

❑ 1 Using a dissectible torso model, find these divisions of the dorsal body (and organs within):
- ❑ **Cranial cavity**—Within the skull
  Organ: *brain*
- ❑ **Spinal cavity**—Within the vertebral column
  Organ: *spinal cord*

❑ 2 Using the torso model, find these divisions and organs of the ventral body cavity:
- ❑ **Thoracic cavity**—Within the rib cage
- ❑ **Pleural cavities**—Left one third and right one third of the thoracic cavity
  Organ: *lung*
- ❑ **Mediastinum**—Middle one third of thorax
  Organs: *heart, trachea, esophagus*

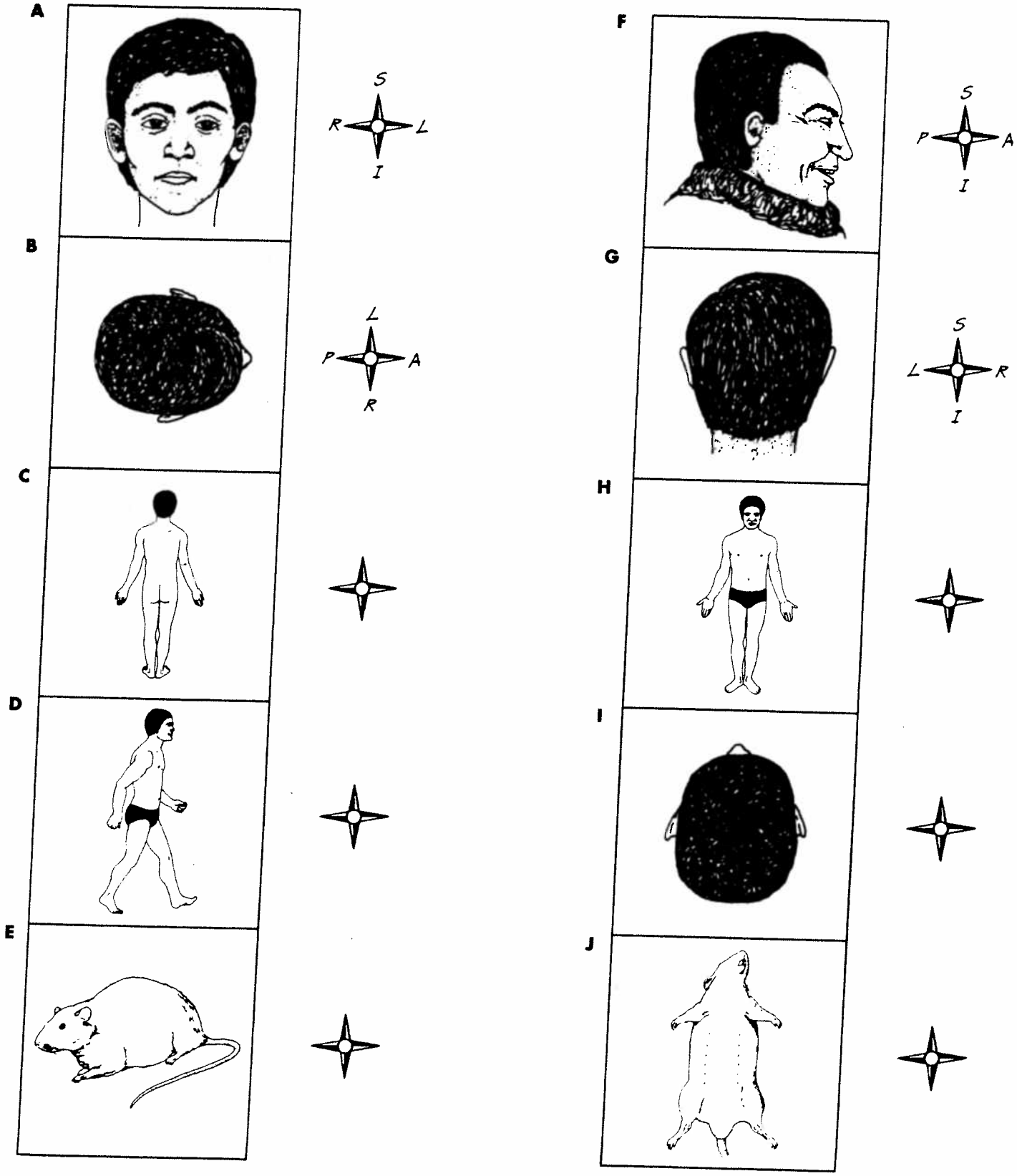

Figure 1-2 Look at the examples of labeling anatomical directions (**A** and **B**, **F** and **G**), then label the rosettes in **C**, **D** and **E**, **H**, **I** and **J** yourself with the appropriate letters: *S, I, A, P, L,* and *R.*

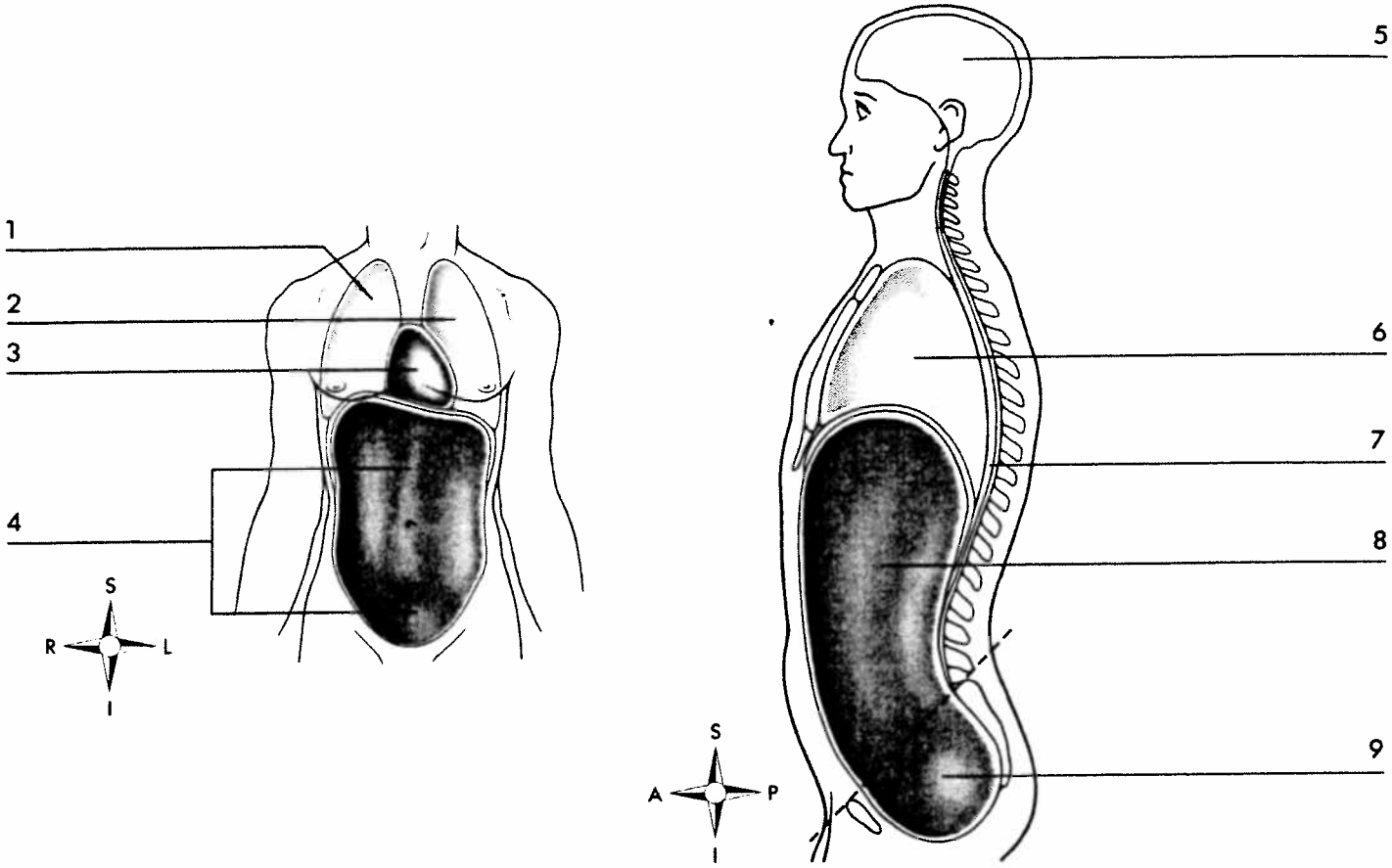

Figure 1-3 Label the names of the body cavities in the lines provided and on the blanks in the Lab Report at the end of this exercise.

- ❑ **Abdominopelvic cavity**—From the diaphragm to the bottom of the trunk
- ❑ **Abdominal cavity**—From the diaphragm to the rim of the pelvic bones
  Organs: *stomach, liver, most of the intestines, pancreas, spleen, kidneys*
- ❑ **Pelvic cavity**—From the pelvic rim to the floor of the trunk
  Organs: *portions of the intestines, ovaries, uterus, urinary bladder*

❑ 3 Because the abdominopelvic cavity is so large and contains so many different organs, it is often convenient to subdivide it into nine abdominopelvic regions (Figure 1-4). The regions are bounded by a grid made by imagining two horizontal planes (one just below the ribs, the other just above the hip bones) and two sagittal planes (each just medial to a nipple). This arrangement forms a 3-D, tic-tac-toe grid in the abdominopelvic cavity. Identify the approximate locations of each of the nine regions on a model of the human torso.

- ❑ **Right hypochondriac region**—Top right region (*hypochondriac* means "below [rib] cartilage")
- ❑ **Epigastric region**—Top middle region (*epigastric* means "near the stomach")
- ❑ **Left hypochondriac region**—Top left region
- ❑ **Right lumbar region**—Middle right region (*lumbar* refers to lumbar vertebrae in lower back)
- ❑ **Umbilical region**—Central region (*umbilical* refers to the umbilicus, or navel)
- ❑ **Left lumbar region**—Lower right region (*iliac* refers to ilium, the bowl-like part of the hip bone)
- ❑ **Right iliac region**—Lower right region (*iliac* refers to ilium, the bowl-like part of the hip bone)
- ❑ **Hypogastric region**—Lower middle region (*hypogastric* means "below the stomach")
- ❑ **Left iliac region**—Lower left region

D. Surface regions

There are hundreds of terms that describe specific locations on the surface of the human body. These names are useful for identifying not only surface features but also underlying muscles, bones, nerves, and blood vessels. In this activity, locate regions named by a few of the more common terms.

❑ 1 Locate the following surface regions on the anterior aspect of a human model or Figure 1-5:

- ❑ **Abdominal**—Area overlying the abdominal cavity
- ❑ **Antebrachial**—Forearm

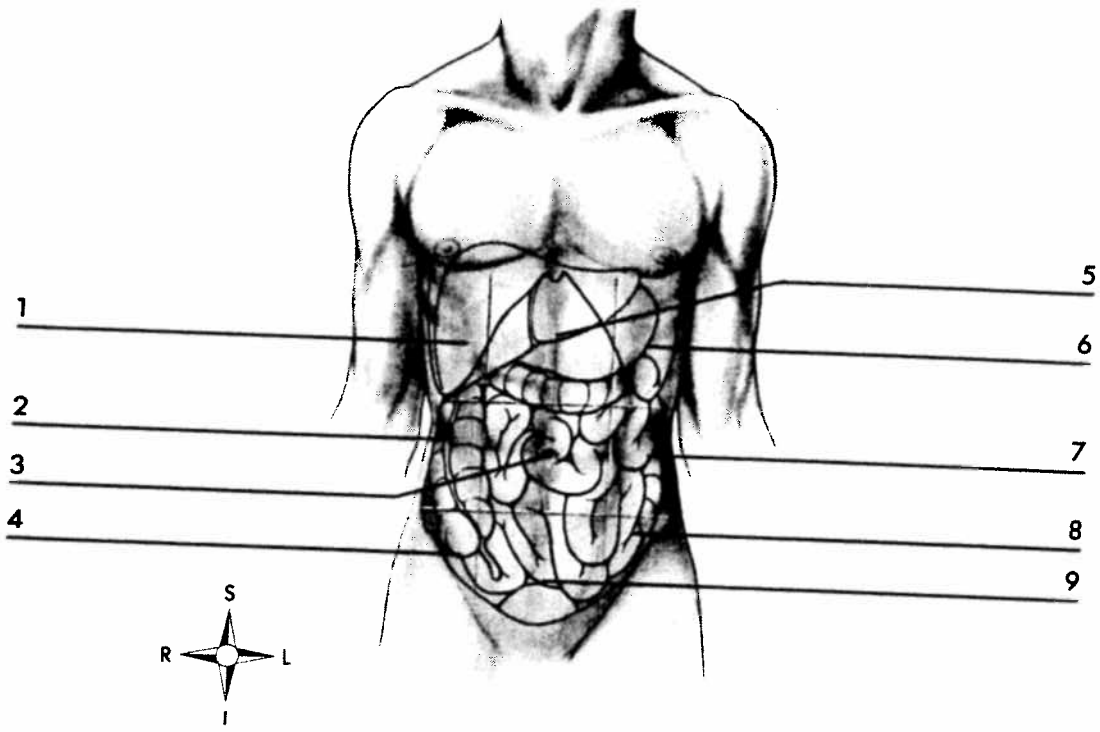

Figure 1-4 Label the nine regions of the abdominopelvic cavity on the blanks in the Lab Report at the end of this exercise.

- ❑ **Axillary**—Armpit
- ❑ **Brachial**—Upper arm
- ❑ **Buccal**—Cheek (side of mouth)
- ❑ **Carpal**—Wrist
- ❑ **Cervical**—Neck
- ❑ **Coxal**—Hip
- ❑ **Crural**—Anterior lower leg (shin)
- ❑ **Cubital**—Anterior of elbow
- ❑ **Femoral**—Upper leg (thigh)
- ❑ **Mental**—Chin
- ❑ **Orbital**—Eye
- ❑ **Patellar**—Anterior knee joint
- ❑ **Pubic**—Lower front of trunk, between legs
- ❑ **Tarsal**—Ankle
- ❑ **Thoracic**—Chest

❑ 2 Identify these regions on the posterior aspect of your subject:

- ❑ **Cervical**—Neck
- ❑ **Gluteal**—Buttocks
- ❑ **Lumbar**—Lower back
- ❑ **Occipital**—Posterior of head
- ❑ **Popliteal**—Posterior knee joint
- ❑ **Scapular**—Shoulder blade
- ❑ **Sural**—Calf
- ❑ **Thoracic**—Upper back

E. Body systems

As you know, the human organism is composed of organ groups called *systems*. The organs of a system work together in an organized manner to accomplish the function(s) of the system.

As an introduction to human body systems, study Table 1-2. Each of the systems will be discussed in more detail later in this course.

HINT

Now would be a good time to familiarize yourself with the DISSECTIBLE HUMAN or similar computerized human dissection program. Explore the human body and try to find some of the structures listed in this activity. Try looking at the body at different angles, or anatomical planes, and see if you can orient yourself regarding anatomical directions such as anterior, posterior, superior, or inferior.

Name: _____ **Date:** _____ **Section:** _____

LAB REPORT 1

Organization of the Body

Figure 1-3

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

Figure 1-4

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

Multiple Choice

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

5

1. _____
2. _____

Multiple Choice (only one response is correct in each item)

1. An anatomist cuts a cadaver (preserved body) with a large saw in a way that divides the cadaver into equal left and right halves. The cut is along a ___?___ plane.
   a. sagittal
   b. midsagittal
   c. frontal
   d. horizontal
   e. a and b are correct

2. In many study skulls, the top of the skull can be removed so that inner features can be seen. Along which plane should one cut to open the top of a human study skull?
   a. sagittal
   b. coronal
   c. horizontal
   d. frontal
   e. b and d are correct

3. A surgeon makes an incision medially from the left axillary region, turning inferiorly at the midline and proceeding to the pubic region. The path of the cut can be mapped on the patient's chest as:

   a. ⌐ b. + c. ⌊ d. ¬ e. — f. /

4. Which of these regions contains the spleen?
   a. epigastric
   b. hypogastric
   c. left hypochondriac
   d. right hypochondriac
   e. right lumbar

5. Soccer players often wear shin protectors, which shield the ___?___ region of each leg.
   a. femoral
   b. tibial
   c. popliteal
   d. crural
   e. gluteal

6. Control and regulation of other systems are primary functions of the
   a. nervous system
   b. cardiovascular system
   c. endocrine system
   d. urinary system
   e. a and c are correct

3. _____
4. _____
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25. _____

Fill-in

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

Fill-in (give the correct anatomical term for each item below)

1. The head is __?__ to the feet.
2. The liver is part of the __?__ system.
3. A leg amputation is likely to involve a __?__ cut, or section, through bone.
4. My lower back, or __?__, is sore.
5. The first finger is __?__ to the hand, no matter which position it is in.
6. The popliteal vein is found in the __?__.
7. The heart is __?__ to the right lung.
8. The shoulder is __?__ to the elbow, no matter how one's arm is held.
9. The skin is __?__ relative to the skeleton.
10. Adipose tissue is often just __?__ to the skin.
11. An occipital scar is on the back of the __?__.
12. The thoracic wall is lined with the __?__ layer of the double-layered pleural membrane.

Sketch (make a rough sketch of a human figure in the position indicated by the compass rosette and label)

COLORING EXERCISE

Using colored pens or pencils, shade in the figure and accompanying labels in contrasting colors of your choice as indicated by the red numerals.

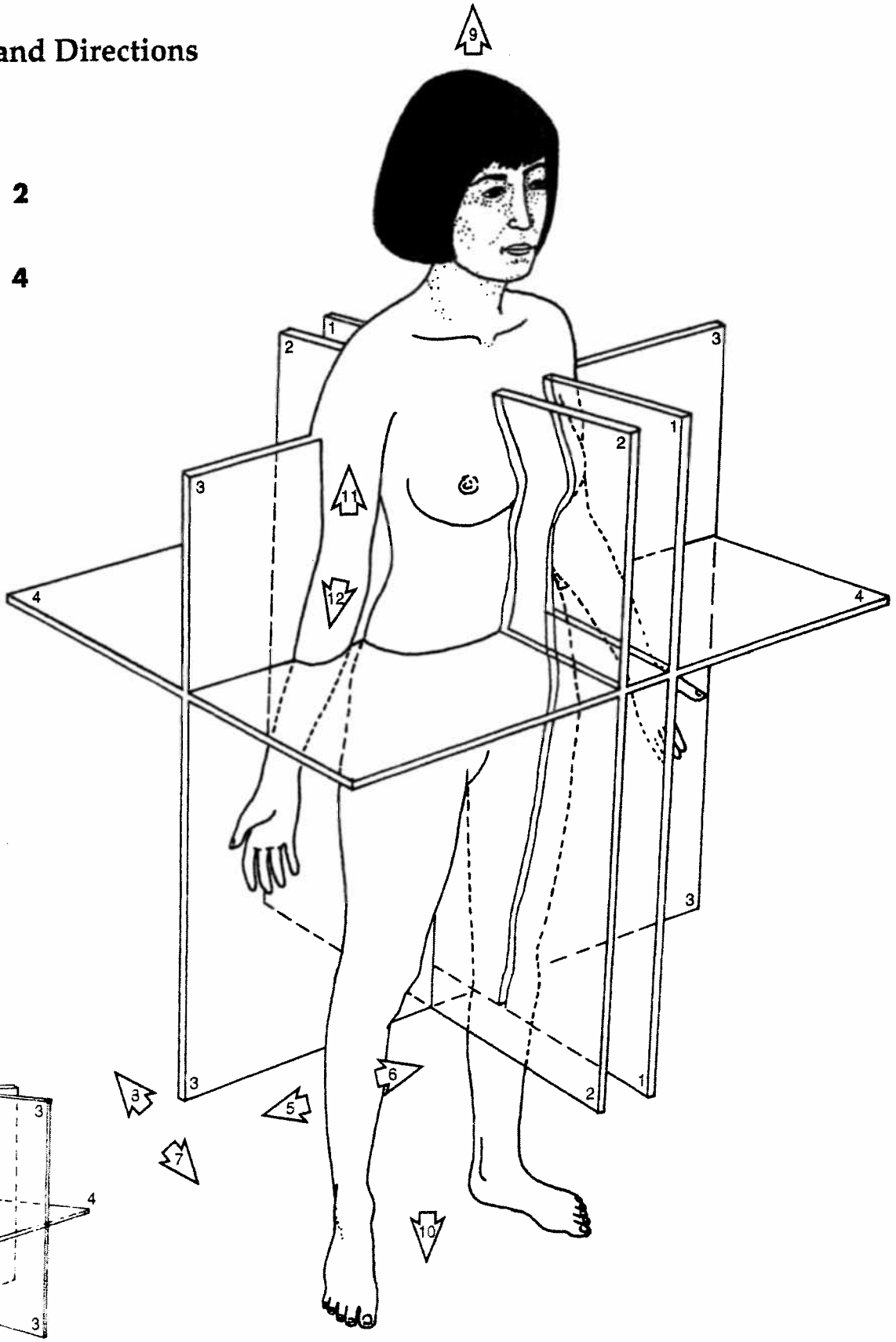
Anatomical Planes and Directions

Planes

SAGITTAL **1**
MIDSAGITTAL **2**
FRONTAL **3**
HORIZONTAL **4**

Directions

LATERAL **5**
MEDIAL **6**
ANTERIOR **7**
POSTERIOR **8**
SUPERIOR **9**
INFERIOR **10**
PROXIMAL **11**
DISTAL **12**



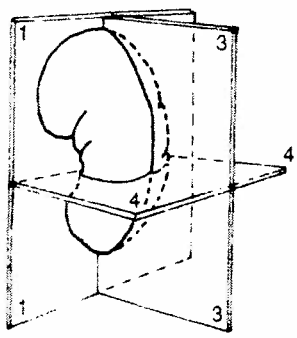


Figure 1-1

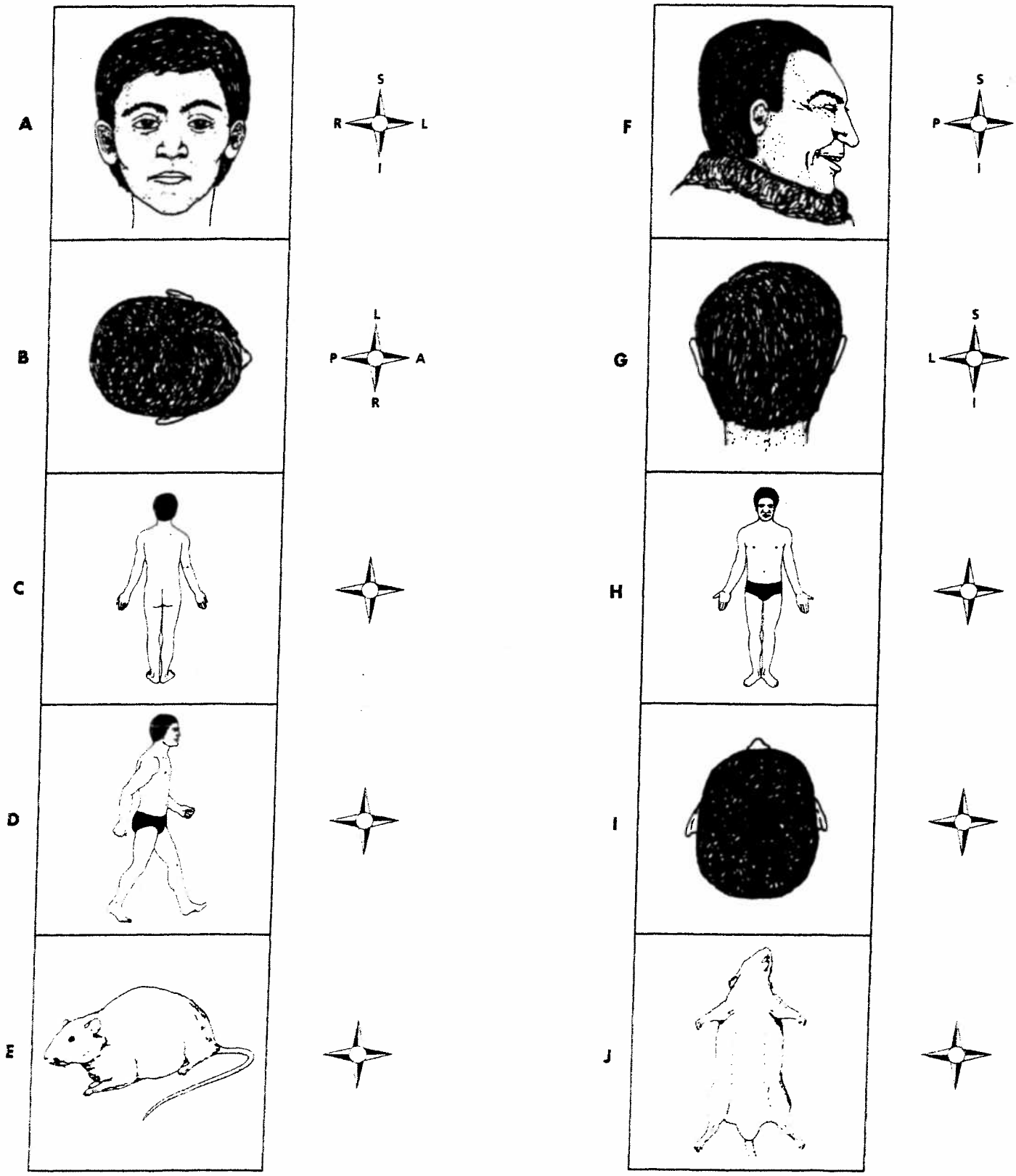


Figure 1-2 Look at the examples of labeling anatomical directions (**A** and **B**, **F** and **G**), then label the rosettes in **C**, **D**, **E**, **H**, **I** and **J** with the appropriate letters: *S, I, A, P, L,* and *R.*

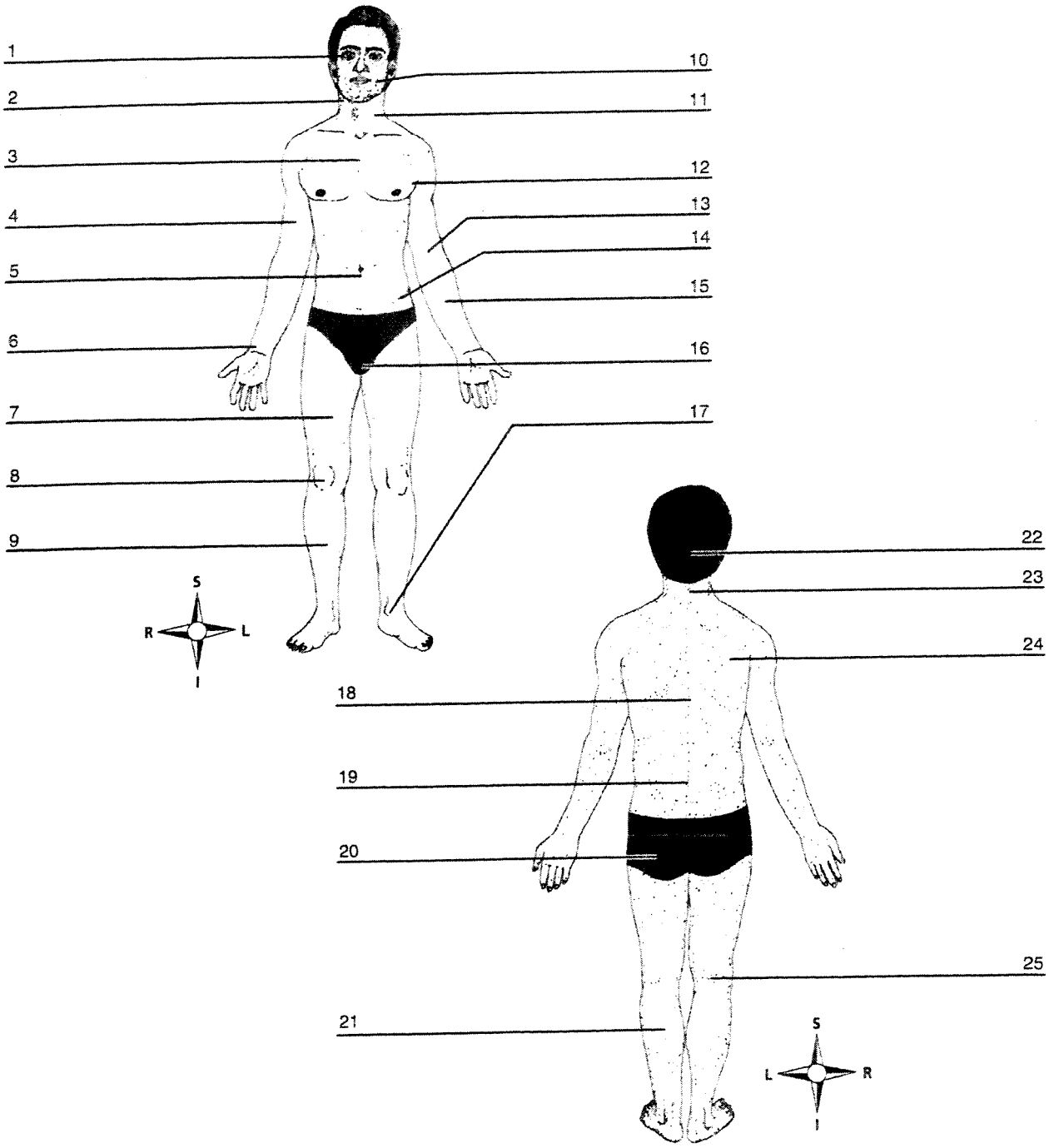
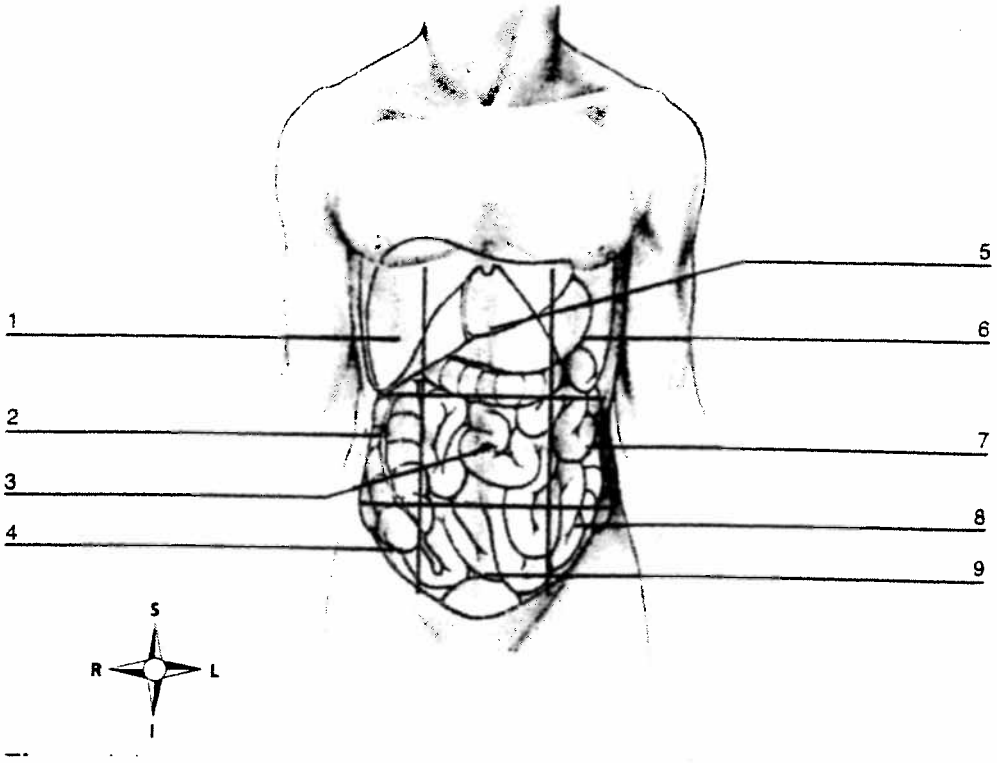


Figure 1-5 Label these figures using the regional terms listed in activity D, pages 5-6, and on the blanks in the Lab Report at the end of this exercise.



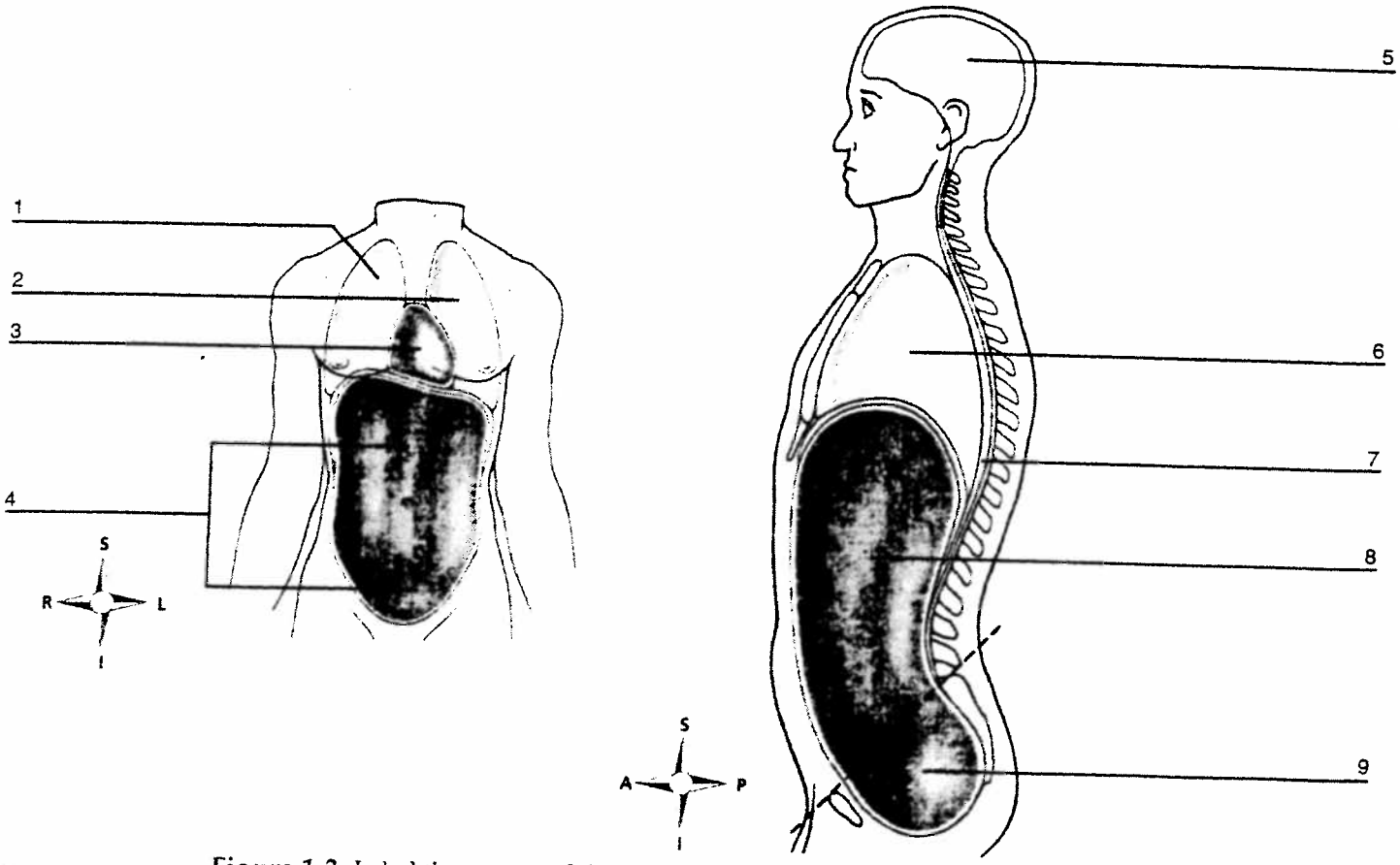


Figure 1-3 Label the names of the body cavities in the lines provided and on the blanks in the Lab Report at the end of this exercise.

- **Pleural cavities**—Left one third and right one third of the thoracic cavity

locations of each of the nine regions on a model of the human torso:

- **Right hypochondriac region**—Top right region