If time is a problem, most of this exercise can be done as an out-of-class assignment.

**Time Allotment:** 1/2 hour (in lab).

**Laboratory Materials**

*Ordering information is based on a lab size of 24 students, working in groups of 4. A list of supply house addresses appears in Appendix A.*

- 1–2 human torso models
- 2 human skeletons, one male and one female
- 3–4 preserved kidneys (sheep)
- Scalpels
- Gelatin-spaghetti molds

**Advance Preparation**

1. Set out human torso models and have articulated skeletons available.
2. Obtain three preserved kidneys (sheep kidneys work well). Cut one in transverse section, one in longitudinal section (usually a sagittal section), and leave one uncut. Label the kidneys and put them in a demonstration area. You may wish to add a fourth kidney to demonstrate a frontal section.
3. The day before the lab, prepare gelatin or Jell-O® using slightly less water than is called for and cook the spaghetti until it is al dente. Pour the gelatin into several small molds and drop several spaghetti strands into each mold. Refrigerate until lab time.
4. Set out gelatin-spaghetti molds and scalpels.

**Comments and Pitfalls**

1. Students will probably have the most trouble understanding proximal and distal, often confusing these terms with superior and inferior. They also find the terms anterior/ventral and posterior/dorsal confusing because these terms refer to the same directions in humans, but different directions in four-legged animals. Other than that there should be few problems.

**Answers to Pre-Lab Quiz (p. 1)**

1. false
2. axial
3. b, toward or at the body surface
4. b, sagittal
5. cranial, vertebral
Answers to Activity Questions

Activity 2: Practicing Using Correct Anatomical Terminology (p. 4)
The wrist is proximal to the hand.
The trachea (windpipe) is anterior or ventral to the spine.
The brain is superior or cephalad to the spinal cord.
The kidneys are inferior or caudal to the liver.
The nose is medial to the cheekbones.
The thumb is lateral to the ring finger.
The thorax is superior or cephalad to the abdomen.
The skin is superficial to the skeleton.

Activity 4: Identifying Organs in the Abdominopelvic Cavity (p. 8)
Name two organs found in the left upper quadrant: stomach, spleen, large intestine
Name two organs found in the right lower quadrant: small intestine, large intestine, appendix
What organ is divided into identical halves by the median plane line? urinary bladder

Answer to Group Challenge (p. 10)
1. nasal, mental, cervical, sternal, lumbar, coxal, femoral, crural, tarsal, plantar
2. brachial, antecubital, antebraclial, carpal, palmar, digital
3. umbilical, buccal, otic, axillary, acromial, pollex
4. hallux, plantar, calcaneal, sural, popliteal, femoral
5. transverse
6. hypogastric
7. appendicitis
Surface Anatomy

1. Match each of the numbered descriptions with the related term in the key, and record the key letter or term in front of the description.

   Key:
   a. buccal    b. calcaneal  c. cephalic    d. digital    e. patellar    f. scapular

   a; buccal  1. cheek
   d; digital 2. fingers
   f; scapular 3. shoulder blade region

2. Indicate the following body areas on the accompanying diagram by placing the correct key letter at the end of each line.

   Key:
   a. abdominal  b. antecubital  c. brachial  d. cervical  e. crural  f. femoral  g. fibular  h. gluteal  i. lumbar  j. occipital  k. oral  l. popliteal  m. pubic  n. sural  o. thoracic  p. umbilical

   k  o  a  b  p  m  f  g  e  d  j  c  i  h  l

3. Classify each of the terms in the key of question 2 above into one of the large body regions indicated below. Insert the appropriate key letters on the answer blanks.

   b, c, e, f, g, l, n  1. appendicular
   a, d, h, i, j, k, m, o, p  2. axial

Body Orientation, Direction, Planes, and Sections

4. Describe completely the standard human anatomical position. Standing erect, feet together, head and toes pointed forward, arms hanging at sides with palms forward.
5. Define section. A cut along an imaginary plane through the body wall or organ.

6. Several incomplete statements are listed below. Correctly complete each statement by choosing the appropriate anatomical term from the key. Record the key letters and/or terms on the corresponding numbered blanks below. Some terms are used more than once.

   Key: a. anterior    d. inferior    g. posterior    j. superior
       b. distal      e. lateral      h. proximal    k. transverse
       c. frontal     f. medial      i. sagittal

   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 and 5 to the shoulders and 6 to the nose. The heart is 7 to the vertebral column (spine) and 8 to the lungs. The elbow is 9 to the fingers but 10 to the shoulder. The abdominopelvic cavity is 11 to the thoracic cavity and 12 to the spinal cavity. In humans, the dorsal surface can also be called the 13 surface; however, in quadruped animals, the dorsal surface is the 14 surface.

   If an incision cuts the heart into right and left parts, the section is a 15 section; but if the heart is cut so that superior and inferior portions result, the section is a 16 section. You are told to cut a dissection animal along two planes so that both kidneys are observable in each section. The two sections that will always meet this requirement are the 17 and 18 sections. A section that demonstrates the continuity between the spinal and cranial cavities is a 19 section.

   1. a; anterior
   2. g; posterior
   3. j; superior
   4. f; medial
   5. j; superior
   6. e; lateral
   7. a; anterior
   8. f; medial
   9. h; proximal
   10. b; distal
   11. d; inferior
   12. a; anterior
   13. g; posterior
   14. j; superior
   15. i; sagittal
   16. k; transverse
   17. c; frontal
   18. k; transverse
   19. i; sagittal

7. Correctly identify each of the body planes by inserting the appropriate term for each on the answer line below the drawing.

(a) (b) (c)
   median (mid-sagittal) plane  frontal plane  transverse plane
8. Draw a kidney as it appears when sectioned in each of the three different planes.

![Kidney Diagrams]

9. Correctly identify each of the nine regions of the abdominopelvic cavity by inserting the appropriate term for each of the letters indicated in the drawing.

(a) epigastric region
(b) right hypochondriac region
(c) left hypochondriac region
(d) umbilical region
(e) right lumbar region
(f) left lumbar region
(g) hypogastric (pubic) region
(h) right iliac region
(i) left iliac region

Body Cavities

10. Which body cavity would have to be opened for the following types of surgery or procedures? (Insert letter of key choice in same-numbered blank. More than one choice may apply.)

Key: 
- a. abdominopelvic 
- b. cranial 
- c. dorsal 
- d. spinal 
- e. thoracic 
- f. ventral

(e, f) 1. surgery to remove a cancerous lung lobe
(a, f) 4. appendectomy
(a, f) 2. removal of the uterus, or womb
(a, f) 5. stomach ulcer operation
(b, c) 3. removal of a brain tumor
(d, c) 6. delivery of pre-operative “saddle” anesthesia
11. Name the muscle that subdivides the ventral body cavity: Diaphragm

12. What are the bony landmarks of the abdominopelvic cavity? Dorsally, the vertebral column; laterally and anteriorly, the pelvis

13. Which body cavity affords the least protection to its internal structures? Abdominal

14. What is the function of the serous membranes of the body? The serous membranes produce a lubricating fluid (serous fluid) that reduces friction as organs slide across one another or against the cavity walls during their functioning.

15. Using the key choices, identify the small body cavities described below.

Key: a. middle ear cavity b. nasal cavity c. oral cavity d. orbital cavity e. synovial cavity

- d: orbital cavity 1. holds the eyes in an anterior-facing position
- a: middle ear cavity 2. houses three tiny bones involved in hearing
- b: nasal cavity 3. contained within the nose
- c: oral cavity 4. contains the tongue
- e: synovial cavity 5. surrounds a joint

16. On the incomplete flowchart provided below:

- Fill in the cavity names as appropriate to boxes 3–8.
- Then, using either the name of the cavity or the box numbers, identify the descriptions in the list that follows.

Body cavities

![Flowchart](image)

- 1. contained within the skull and vertebral column
- 2. the most protective body cavity
- 3. cranial cavity (superior)
- 4. vertebral/spinal cavity (inferior)
- 5. thoracic cavity (superior)
- 6. abdominopelvic cavity (inferior)
- 7. abdominal cavity (superior)
- 8. pelvic cavity (inferior)

- 1, 3, or 4: the most protective body cavity
- 2: its name means belly
- 5: contains the heart
- 6 or 7: contained within the skull and vertebral column
- 5: contains the small intestine
- 6 or 7: bounded by the ribs
- 8: houses female reproductive organs
- 5: its walls are muscular