Figure 12.1 Label the major structures of this long bone (femur).

Critical Thinking Application

Explain how bone cells embedded in a solid ground substance obtain nutrients and eliminate wastes.

4. Observe the individual bone specimens and arrange them into groups according to the following shapes and examples:
- long—femur; humerus; phalanges
- irregular—vertebrae
- short—carpals; tarsals
- sesamoid (round)—patella
- flat—ribs; most cranial bones


6. Examine the sectioned long bones and locate the following:
- epiphysis
  proximal—nearest torso
  distal—farthest from torso
- epiphyseal plate—growth zone of hyaline cartilage
- articular cartilage—on ends of epiphyses
- diaphysis—shaft between epiphyses
- metaphysis—expanded end of diaphysis
- periosteum—membrane around bone (except articular cartilage) of dense irregular connective tissue
- compact bone—forms diaphysis and epiphyseal surfaces
- spongy bone—within epiphyses
  trabeculae—a structural lattice in spongy bone
- medullary cavity—hollow chamber
- endosteum—thin membrane lining medullary cavity of reticular connective tissue
- yellow marrow—occupies medullary cavity and stores adipose tissue
- red marrow—occupies spongy bone in some epiphyses and flat bones and produces blood cells
Figure 12.2  Label the features associated with the microscopic structure of bone.

Figure 12.3  Micrograph of ground compact bone tissue (200x).
Figure 13.1 Label the major bones of the skeleton: (a) anterior view; (b) posterior view.
Figure 14.1  Label the anterior bones and features of the skull. (If the line lacks the word bone, label the particular feature of that bone.)

Figure 14.2  Label the lateral bones and features of the skull.
Figure 16.3 Label the (a) anterior surface and (b) posterior surface of the right humerus.
Figure 16.4  Label the major anterior features of the right radius and ulna (anterior view). 

Figure 16.5  Label the bones and features of the right elbow, posterior view.
Figure 16.6  Label the bones and groups of bones in this anterior view of the right hand.

Learning Extension
Use different colored pencils to distinguish the individual bones in figure 16.6.
Figure 17.2  Label (a) the lateral and (b) the medial features of the right hip bone.
Critical Thinking Application

Examine the male and female pelvis. Look for major differences between them. Note especially the flare of the iliac bones, the angle of the pubic arch, the distance between the ischial spines and ischial tuberosities, and the curve and width of the sacrum. In what ways are the differences you observed related to the function of the female pelvis as a birth canal?

EXPLORE

Procedure B—Lower Limb

1. Review the section entitled “Lower Limb” in chapter 7 of the textbook.
2. As a review activity, label figures 17.3, 17.4, 17.5, and 17.6.

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Figure 17.3 Label the features of (a) the anterior surface and (b) the posterior surface of the right femur.
Figure 17.4  Label the bones and features of the right tibia and fibula in this anterior view.

Figure 17.5  Label the bones and features of the right knee, posterior view.
3. Examine the bones of the lower limb and locate each of the following:

**femur**
- proximal features
  - head
  - fovea capitis
  - neck
  - greater trochanter
  - lesser trochanter
- shaft
- gluteal tuberosity
- linea aspera
- distal features
  - lateral epicondyle
  - medial epicondyle
  - lateral condyle
  - medial condyle

**patella**
- medial condyle
- lateral condyle
- tibial tuberosity
- anterior crest (border)
- medial malleolus

**fibula**
- head
- lateral malleolus

**tarsal bones**
- talus
- calcaneus
- navicular
- cuboid
- lateral cuneiform
- intermediate cuneiform
- medial cuneiform

**metatarsal bones**

**phalanges**
- proximal phalanx
- middle phalanx
- distal phalanx


**Learning Extension**
Use different colored pencils to distinguish the individual bones in figure 17.6.
Figure 20.1  Label the muscles of expression and mastication.

Figure 20.2  Label these deep muscles of mastication.
muscles that move the hand
anterior flexor muscles
caput carpi radialis
flexor carpi ulnaris
flexor digitorum profundus
flexor digitorum superficialis

posterior extensor muscles
extensor carpi radialis longus
extensor carpi radialis brevis
extensor carpi ulnaris
extensor digitorum

Figure 21.1 Label the muscles of the posterior shoulder. Superficial muscles are illustrated on the left side and deep muscles on the right side.

Figure 21.2 Label the muscles of the anterior chest. Superficial muscles are illustrated on the left side and deep muscles on the right side.
Figure 21.3  Label (a) the muscles of the posterior shoulder and arm and (b) the muscles of the anterior shoulder and arm, with the rib cage removed.

4. Demonstrate the action of these muscles in your body.
5. Locate the origins and insertions of these muscles in the human skeleton.

Learning Extension
A long rubber band can be used to simulate muscle locations, origins, insertions, and actions on muscular models, the skeleton, or a laboratory partner. Hold one end of the rubber band firmly on the origin location of a muscle; then slightly stretch the rubber band and hold the other end on the insertion site. Allow the insertion end to slowly move toward the origin end to simulate the contraction and action of the muscle.
Figure 21.4 Label (a) the muscles of the anterior forearm and (b) the muscles of the posterior forearm.
**EXPLORE**

**Procedure B—Muscles of the Pelvic Outlet**

1. Review the section entitled "Muscles of the Pelvic Outlet" in chapter 9 of the textbook.
2. As a review activity, label figures 22.3 and 22.4.
3. Locate the following muscles in the models of the male and female pelvis:
   - levator ani
   - coccygeus
   - superficial transversus perinei
   - bulbospongiosus
   - ischiocavernosus
4. Locate the origin and insertion of each of these muscles in the human skeleton.
5. Complete Part B of the laboratory report.
posterior leg muscles
  gastrocnemius
  soleus
  flexor digitorum longus
  tibialis posterior
  lateral leg muscles
  fibularis (peroneus) longus
  fibularis (peroneus) brevis

4. Demonstrate the action of each of these muscles in your body.
5. Locate the origin and insertion of each of these muscles in the human skeleton.

Learning Extension
A long rubber band can be used to simulate muscle locations, origins, insertions, and actions on muscular models, the skeleton, or a laboratory partner. Hold one end of the rubber band firmly on the origin location of a muscle; then slightly stretch the rubber band and hold the other end on the insertion site. Allow the insertion end to slowly move toward the origin end to simulate the contraction and action of the muscle.

Figure 23.1 Label the muscles of the anterior right hip and thigh.
Figure 23.2  Label the muscles of the lateral right hip and thigh.
Figure 23.3  Label the muscles of the posterior right hip and thigh.
Figure 23.4  Label the muscles of the anterior right leg.