

Answers

Chapter 2 Skeletal System

PRE-LAB WORKSHEETS

- List five functions of the skeletal system.
Supports and gives shape to body
Protects vital organs
Assists movement
Manufactures blood
Stores calcium and other mineral salts
- Complete the table that follows, indicating whether the listed body parts are part of the axial or appendicular skeleton.

Body Part	Axial	Appendicular
Arms		X
Head	X	
Vertebrae	X	
Lower extremities		X

- The organic (living) component of bone provides bone elasticity.
The inorganic (nonliving) component of bone provides bone strength and hardness.
- Match the term to the appropriate description.

<u>E</u> Compact bone	A. Area at each end of long bones
<u>J</u> Cancellous bone	B. Flared part of bone
<u>A</u> Epiphysis	C. Center of bone
<u>H</u> Epiphyseal plate	D. Lining of medullary canal
<u>I</u> Diaphysis	E. Hard, dense outer layer of all bones
<u>C</u> Medullary canal	F. Responsible for bone resorption
<u>D</u> Endosteum	G. Outer membrane of bone
<u>F</u> Osteoclasts	H. Area of new bone growth
<u>B</u> Metaphysis	I. Main shaft of bone
<u>G</u> Periosteum	J. Porous and spongy interior of bone
- A pressure epiphysis is located at the ends of long bones and is where bone growth occurs.
A traction epiphysis is located where tendons attach to bone and is subjected to pulling or tension force.
- Where are osteoclasts located? In the endosteum.

- Enter the letter by the structures in Figure 2-1 next to the correct label for that structure. You can also write the names of the structures on the figure.
A Diaphysis
D Epiphysis
B Endosteum
H Epiphyseal plate
F Medullary canal
E Metaphysis
C Periosteum
- List five functions of the periosteum.
 A. Attachment for tendons and ligaments
 B. Promotes growth of diameter of immature bone
 C. Contains pain receptors—this alerts to an injury or inflammation
 D. Contains blood vessels to provide nourishment
 E. Promotes bone repair
 F. Covers all bone except articular surfaces, thereby offering some protection to bone
- Where does longitudinal bone growth occur? At the epiphysis.

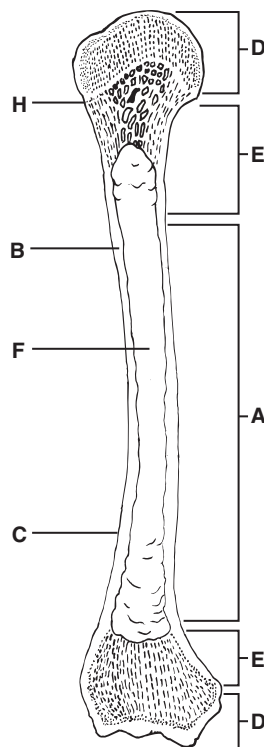


FIGURE 2-1 Longitudinal cross section of a long bone.

10. Complete the table that follows, indicating whether the terms are related to compact or cancellous bone.

Characteristic	Compact Bone	Cancellous Bone
Porous and spongy		<u>X</u>
Hard and dense	<u>X</u>	
Covers outside of bone	<u>X</u>	
Inside portion of bone		<u>X</u>

11. On Figure 2-2, label the bones, using the terms listed below.

D Flat bone B Irregular bone C Long bone A Short bone

LAB ACTIVITIES

- The patella can be considered a sesamoid bone. With your partner long sitting (sitting on a mat or table with knees extended) and with muscles relaxed, grasp the patella with the thumb and index finger of one hand proximally and the thumb and index finger of the other hand distally.
 - Gently move the patella medially and laterally, superiorly and inferiorly. Note the amount of motion in each direction.

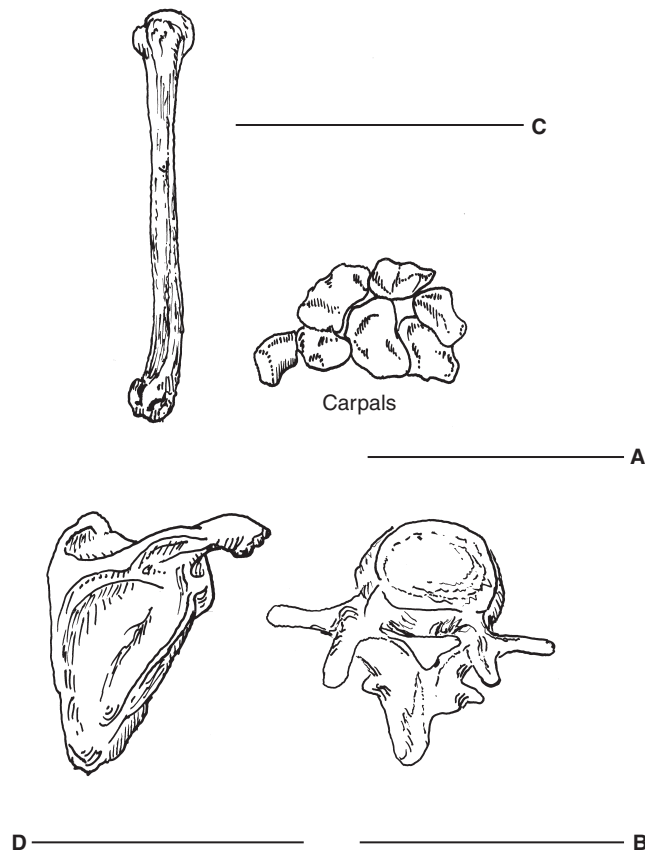


FIGURE 2-2 Types of bones.

- Palpate for other sesamoid bones such as on either side of the flexor hallucis longus on the bottom of the foot, at the head of the first metatarsal, and the flexor tendons of the thumb near the metacarpophalangeal and interphalangeal joints.

Students' responses may vary.

- Using skeletons and models, find examples of the bony landmarks that follow. Describe where the landmark is located (using terms such as *proximal/distal*, *medial/lateral*, *superior/inferior*, and *anterior/posterior*) and give the name of the bone where you found the landmark.
 - On your partner, palpate as many of the bony landmarks as possible.
Students' answers may vary.

Landmark	Location
EXAMPLE	
Trochanter	<u>Proximal and lateral on femur</u>
Foramen	<u>Vertebral foramen of cervical vertebra</u>
Fossa	<u>Scapula: On posterior surface superior to the spine</u>
Groove	<u>Humerus: On proximal anterior surface between the greater and lesser tubercles</u>
Meatus	<u>Skull: Midpoint of lateral aspect</u>
Sinus	<u>Skull: Anterior aspect, lateral to the nose</u>
Condyle	<u>Femur: Distal end; lateral and medial aspects</u>
Eminence	<u>Tibia: Proximal end, anterior midline</u>
Facet	<u>Rib: Posterior surface near end that articulates with the vertebra</u>
Head	<u>Humerus: Proximal medial aspect</u>
Crest	<u>Ilium: Superior margin</u>
Epicondyle	<u>Humerus: Distal and lateral</u>
Line	<u>Femur: Midline of the posterior surface</u>
Spine	<u>Scapula: Posterior surface and superior</u>
Tubercle	<u>Humerus: Proximal end, anterior medial surface</u>
Tuberosity	<u>Humerus: Distal to the greater tubercle on lateral aspect</u>
Trochanter	<u>Femur: Proximal lateral aspect</u>

3. On a skeleton, identify the bones and bone groups that make up the axial skeleton and the appendicular skeleton. List the bones that are found in each group.

Skeleton	Bones and Bone Groups (e.g., carpals, ribs)
Axial	Skull, vertebrae, mandible, ribs, sternum, sacrum, coccyx, hyoid
Appendicular	Scapula, clavicle, humerus, radius, ulna, carpals, metacarpals, phalanges, ilium, femur, tibia, fibula, patella, tarsals, metatarsals, phalanges

4. Using bones in the bone box, arrange the bones of the upper extremity and the bones of the lower extremity in proper anatomical orientation to one another to create the appendicular skeleton. Arrange an entire right side or left side.
Students to arrange an entire right or left side of skeleton using disarticulated bones, if available.
5. Compare a cross section of the diaphysis of a long bone and a cross section of the epiphysis of a long bone. Complete the table below.

	Diaphysis	Epiphysis
Type of bone	Compact	Cancellous
Thickness of outer layer of bone	Relatively thick	Relatively thin
In living bone, the outer layer is covered in	periosteum	cartilage

6. Using disarticulated bones, identify the structures listed below on several different bones. Can all the parts be found on each bone? Students' answers may vary depending on bones available.
- | | | |
|-----------|------------------|------------|
| Epiphysis | Epiphyseal plate | Diaphysis |
| Endosteum | Metaphysis | Periosteum |
7. Using the skeleton and models:
- Find examples of the types of bones that follow.
 - Name an example of each type of bone.
- Students' answers may vary.

Type of Bone	Example
Short	Phalanges
Flat	Skull, ilium
Long	Humerus, radius, ulna, femur, tibia, fibula
Irregular	Sacrum, vertebra
Sesamoid	Patella

POST-LAB QUESTIONS

- The function of the skull is to protect the brain. As the skull matures, the bones fuse together. Under what circumstances is this a disadvantage of the mature skull? The skull is a rigid sphere that cannot enlarge should the brain swell.
- Describe the function of the:
 - Axial skeleton:
The axial skeleton forms the upright part of the body and consists of the head, thorax, and trunk. Its function is to protect vital organs.
 - Appendicular skeleton:
The appendicular skeleton attaches to the axial skeleton and consists of the upper and lower extremities. The function of the appendicular skeleton is to provide attachment for muscles and rigidity for leverage.
- What is the result of a loss of the inorganic component of bone?
The loss of the inorganic component of bone results in osteoporosis or weakening of the bone.
- Why is cancellous bone lighter than compact bone?
Cancellous bone is lighter than compact bone because it is largely made up of porous and spongy trabecular matter.
- How does a traction epiphysis affect the shape of a bone?
A traction epiphysis often causes the bone to enlarge, forming a protuberance or tubercle.
- What is the function of the parts of a bone that follow?

Bone Part	Function
Epiphysis	Location of epiphyseal plate
Epiphyseal plate	Place where bone growth occurs
Diaphysis	Provides the strength for bones
Medullary canal	Place for blood formation and location of arteries
Endosteum	Lines the medullary canal and contains the osteoclasts
Osteoclasts	Responsible for bone regeneration
Metaphysis	Supports the epiphysis
Periosteum	Provides for nourishment and attachment for tendon and muscle

7. Identify whether the types of bones listed below are typically part of the axial or appendicular skeleton.

Type of Bone	Axial Skeleton	Appendicular Skeleton
Long		X
Short		X
Flat	X	X
Irregular	X	

8. Match the descriptions of bone markings that follow with the correct term. Use each term only once.
- | | |
|----------------------------------------------------------|---------------|
| <u>M</u> Projection above a condyle | A. Sinus |
| <u>F</u> Rounded projection at the end of a joint | B. Tubercle |
| <u>E</u> Hole | C. Crest |
| <u>A</u> Sponge-like space filled with air | D. Spine |
| <u>K</u> Tube-shaped opening | E. Foramen |
| <u>J</u> Rounded projection beyond a narrow neck portion | F. Condyle |
| <u>N</u> Less prominent ridge | G. Groove |
| <u>I</u> Large, rounded projection | H. Fossa |
| <u>O</u> Flat articular surface | I. Tuberosity |
| <u>L</u> Very large projection | J. Head |
| <u>H</u> Large depression | K. Meatus |
| <u>G</u> Linear depression | L. Trochanter |
| <u>C</u> Ridge | M. Epicondyle |
| <u>B</u> Small, rounded projection | N. Line |
| <u>D</u> Sharp projection | O. Facet |
9. Where does growth of long bones occur?
Epiphysis
10. Why are epiphyseal plates not found in mature bone?
Epiphyseal plates are the areas where bone growth occurs. In mature bone, growth no longer occurs, so the epiphyseal plates close.
11. What function do sesamoid bones serve?
The function of sesamoid bones is to protect tendons.