



The Skeletal System

The skeleton is constructed of two of the most supportive tissues found in the human body—cartilage and bone. Besides supporting and protecting the body as an internal framework, the skeleton provides a system of levers that the skeletal muscles use to move the body. In addition, the bones provide a storage depot for substances such as lipids and calcium, and blood cell formation goes on within their red marrow cavities.

The skeleton consists of bones connected at joints, or articulations, and is subdivided into two divisions. The axial skeleton includes those bones that lie around the body's center of gravity. The appendicular skeleton includes the bones of the limbs.

Topics for student review include structure and function of long bones, location and naming of specific bones in the skeleton, fracture types, and a classification of joint types in the body.

BONES—AN OVERVIEW

1. Classify each of the following terms as a projection (*P*) or a depression or opening (*D*). Enter the appropriate letter in the answer blanks.

___ 1. Condyle	___ 4. Foramen	___ 7. Ramus
___ 2. Crest	___ 5. Head	___ 8. Spine
___ 3. Fissure	___ 6. Meatus	___ 9. Tuberosity

2. Group each of the following bones into one of the four major bone categories. Use *L* for long bone, *S* for short bone, *F* for flat bone, and *I* for irregular bone. Enter the appropriate letter in the space provided.

___ 1. Calcaneus	___ 4. Humerus	___ 7. Radius
___ 2. Frontal	___ 5. Mandible	___ 8. Sternum
___ 3. Femur	___ 6. Metacarpal	___ 9. Vertebra

3. Using the key choices, characterize the following statements relating to long bones. Enter the appropriate term(s) or letter(s) in the answer blanks.

Key Choices

- | | | |
|---------------------|---------------|-------------------------|
| A. Diaphysis | C. Epiphysis | E. Yellow marrow cavity |
| B. Epiphyseal plate | D. Red marrow | |

- _____ 1. Site of spongy bone in the adult
- _____ 2. Site of compact bone in the adult
- _____ 3. Site of hematopoiesis in the adult
- _____ 4. Scientific name for bone shaft
- _____ 5. Site of fat storage in the adult
- _____ 6. Site of longitudinal growth in a child

4. Complete the following statements concerning bone formation and destruction, using the terms provided in the key. Insert the key letter or corresponding term in the answer blanks.

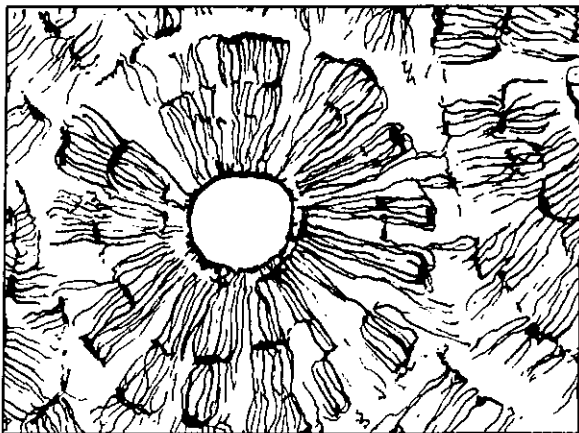
Key Choices

- | | | | |
|---------------|----------------|----------------|--------------------------|
| A. Atrophy | C. Gravity | E. Osteoclasts | G. Parathyroid hormone |
| B. Calcitonin | D. Osteoblasts | F. Osteocytes | H. Stress and/or tension |

- _____ 1. When blood calcium levels begin to drop below homeostatic levels, (1) is released, causing calcium to be released from bones.
- _____ 2. Mature bone cells, called (2), maintain bone in a viable state.
- _____ 3. Disuse such as that caused by paralysis or severe lack of exercise results in muscle and bone (3).
- _____ 4. Large tubercles and/or increased deposit of bony matrix occur at sites of (4).
- _____ 5. Immature, or matrix-depositing, bone cells are referred to as (5).
- _____ 6. (6) causes blood calcium to be deposited in bones as calcium salts.
- _____ 7. Bone cells that liquefy bone matrix and release calcium to the blood are called (7).
- _____ 8. Our astronauts must do isometric exercises when in space because bones atrophy under conditions of weightlessness or lack of (8).

5. Five descriptions of bone structure are provided in Column A. First identify the structure by choosing the appropriate term from Column B and placing the corresponding answer in the answer blank. Then consider Figure 5-1A, a diagrammatic view of a cross section of bone, and 5-1B, a higher magnified view of compact bone tissue. Select different colors for the structures and bone areas in Column B, and use them to color the coding circles and corresponding structures on the figure diagrams. Since the concentric lamellae would be difficult to color without confusing other elements, identify one lamella by using a bracket and label.

Column A	Column B
_____ 1. Layers of calcified matrix	A. Central (Haversian) canal <input type="radio"/>
_____ 2. "Residences" of osteocytes	B. Concentric lamellae
_____ 3. Longitudinal canal, carrying blood vessels and nerves	C. Lacunae <input type="radio"/>
_____ 4. Nonliving, structural part of bone	D. Canaliculi <input type="radio"/>
_____ 5. Tiny canals, connecting lacunae	E. Bone matrix <input type="radio"/>
	F. Osteocyte <input type="radio"/>



A



B

Figure 5-1

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

1. Hematopoiesis Red marrow Yellow marrow Spongy bone
2. Lamellae Canaliculi Circulation Osteoblasts
3. Osteon Marrow cavity Central canal Canaliculi
4. Epiphysis surface Articular cartilage Periosteum Hyaline cartilage

7. Figure 5–2A is a midlevel, cross-sectional view of the diaphysis of the femur. Label the membrane that lines the cavity and the membrane that covers the outside surface.

Figure 5–2B is a drawing of a longitudinal section of the femur. Color the bone tissue gold. Do *not* color the articular cartilage; leave it white. Select different colors for the bone regions listed at the coding circles below. Color the coding circles and the corresponding regions on the drawing. Complete Figure 5–2B by labeling compact bone and spongy bone.

- Diaphysis
- Epiphyseal plate
- Area where red marrow is found
- Area where yellow marrow is found

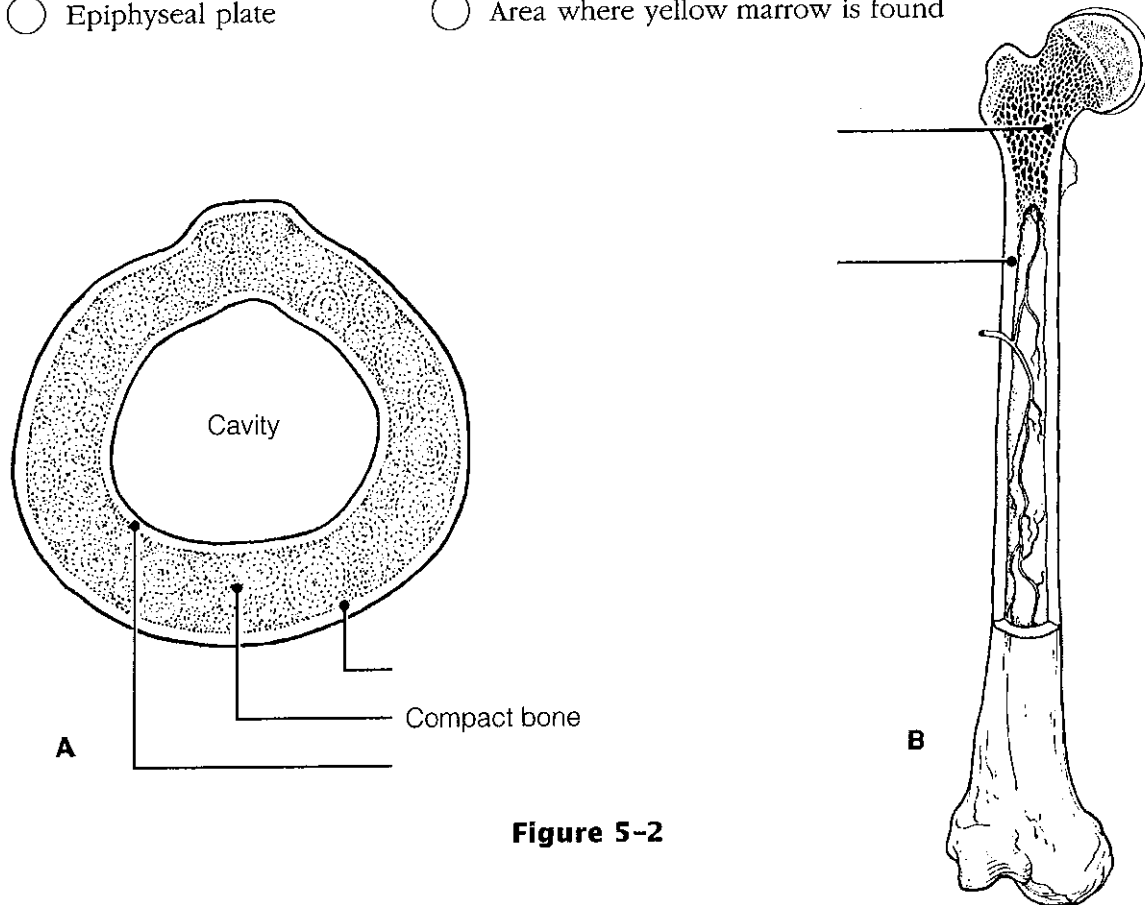


Figure 5–2

AXIAL SKELETON

Skull

8. Using key choices, identify the bones indicated by the following descriptions. Enter the appropriate term or letter in the answer blanks.

Key Choices

- | | | | |
|--------------|--------------|--------------|--------------|
| A. Ethmoid | E. Mandible | I. Palatines | L. Temporals |
| B. Frontal | F. Maxillae | J. Parietals | M. Vomer |
| C. Hyoid | G. Nasals | K. Sphenoid | N. Zygomatic |
| D. Lacrimals | H. Occipital | | |

- _____ 1. Forehead bone
- _____ 2. Cheekbone
- _____ 3. Lower jaw
- _____ 4. Bridge of nose
- _____ 5. Posterior part of hard palate
- _____ 6. Much of the lateral and superior cranium
- _____ 7. Most posterior part of cranium
- _____ 8. Single, irregular, bat-shaped bone, forming part of the cranial floor
- _____ 9. Tiny bones, bearing tear ducts
- _____ 10. Anterior part of hard palate
- _____ 11. Superior and middle nasal conchae formed from its projections
- _____ 12. Site of mastoid process
- _____ 13. Site of sella turcica
- _____ 14. Site of cribriform plate
- _____ 15. Site of mental foramen
- _____ 16. Site of styloid process
- _____ 17. _____ 18. Four bones, containing paranasal sinuses
- _____ 19. _____ 20.
- _____ 21. Its condyles articulate with the atlas
- _____ 22. Foramen magnum contained here
- _____ 23. Middle ear found here
- _____ 24. Nasal septum
- _____ 25. Bears an upward protrusion, the "cock's comb," or crista galli

9. Figure 5-3, A-C shows lateral, anterior, and inferior views of the skull. Select different colors for the bones listed below and color the coding circles and corresponding bones in the figure. Complete the figure by labeling the bone markings indicated by leader lines.

- | | | | |
|--------------------------------|--------------------------------|---------------------------------|--------------------------------|
| <input type="radio"/> Frontal | <input type="radio"/> Sphenoid | <input type="radio"/> Zygomatic | <input type="radio"/> Nasal |
| <input type="radio"/> Parietal | <input type="radio"/> Ethmoid | <input type="radio"/> Palatine | <input type="radio"/> Lacrimal |
| <input type="radio"/> Mandible | <input type="radio"/> Temporal | <input type="radio"/> Occipital | <input type="radio"/> Vomer |
| <input type="radio"/> Maxilla | | | |

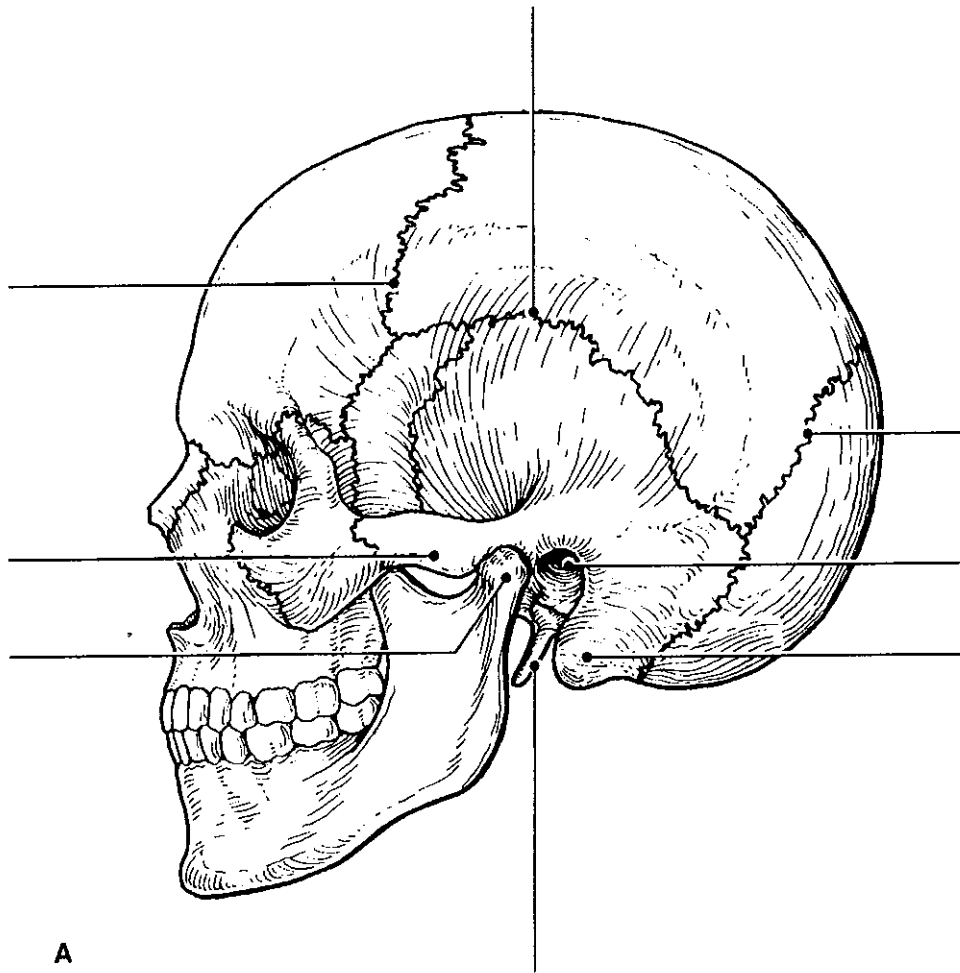
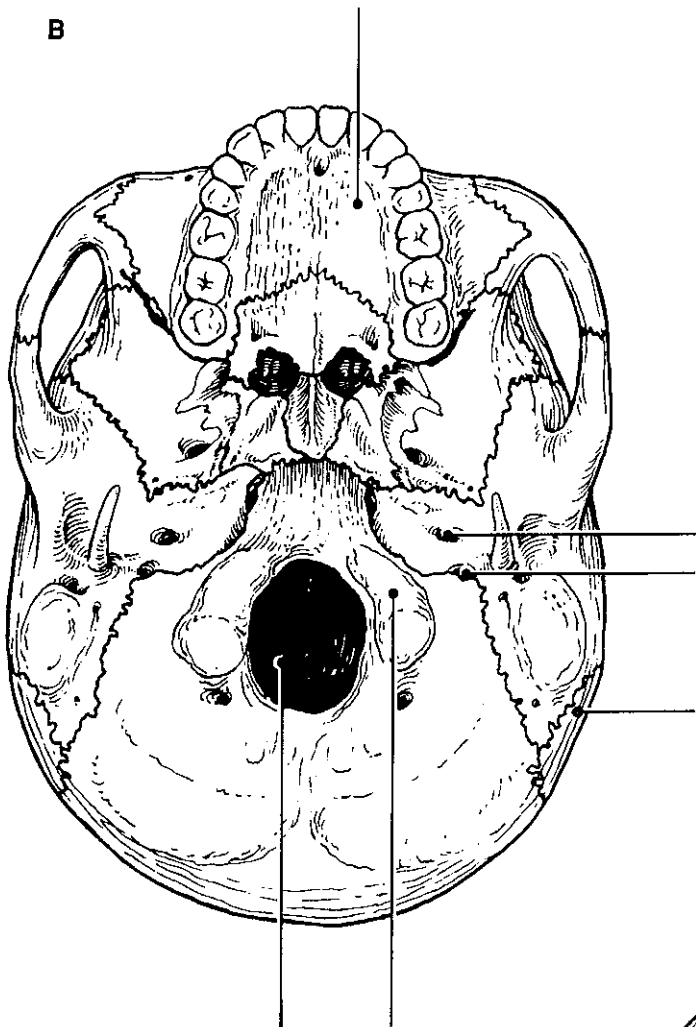
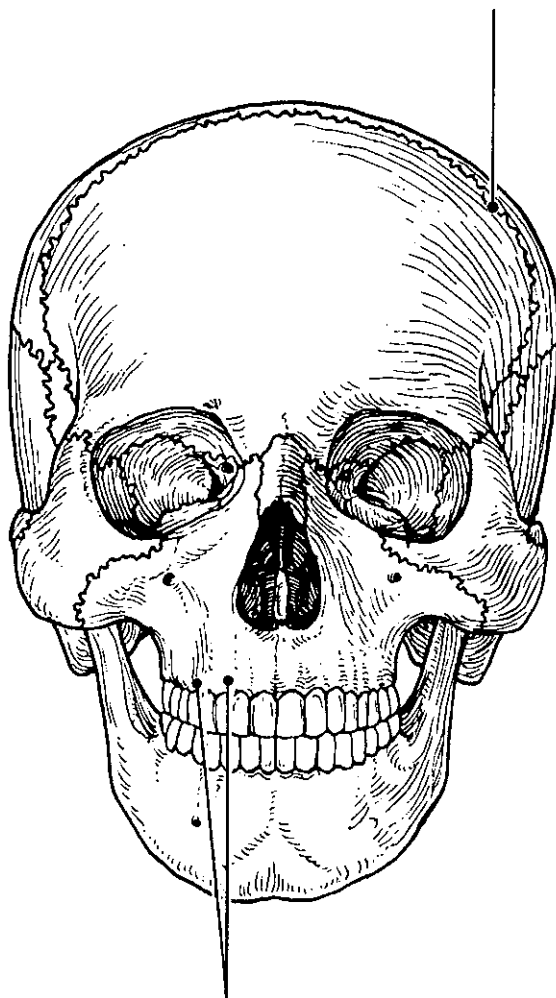


Figure 5-3, A-C

B



C



10. An anterior view of the skull, showing the positions of the sinuses, is provided in Figure 5-4. First select different colors for each of the sinuses and use them to color the coding circles and the corresponding structures on the figure. Then briefly answer the following questions concerning the sinuses.

1. What *are* sinuses? _____

2. What purpose do they serve in the skull? _____

3. Why are they so susceptible to infection? _____

Sphenoid sinus

Ethmoid sinuses

Frontal sinus

Maxillary sinus

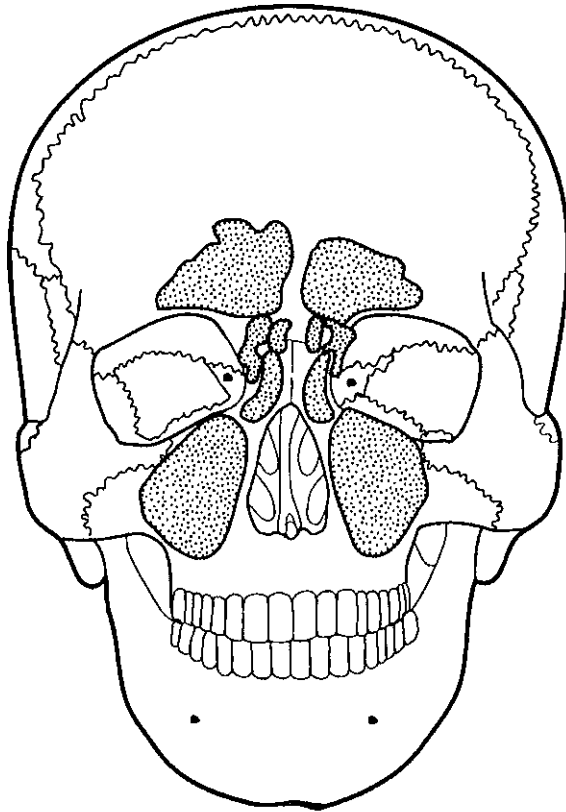


Figure 5-4

Vertebral Column

11. Using the key choices, correctly identify the vertebral parts/areas described as follows. Enter the appropriate term(s) or letter(s) in the spaces provided.

Key Choices

- | | | |
|----------------------------|-------------------------------|-----------------------|
| A. Body | C. Spinous process | E. Transverse process |
| B. Intervertebral foramina | D. Superior articular process | F. Vertebral arch |

- _____ 1. Structure that encloses the nerve cord
- _____ 2. Weight-bearing portion of the vertebra
- _____ 3. Provide(s) levers for the muscles to pull against
- _____ 4. Provide(s) an articulation point for the ribs
- _____ 5. Openings providing for exit of spinal nerves

12. The following statements provide distinguishing characteristics of the vertebrae composing the vertebral column. Using key choices, identify each described structure or region by inserting the appropriate term(s) or letter(s) in the spaces provided.

Key Choices

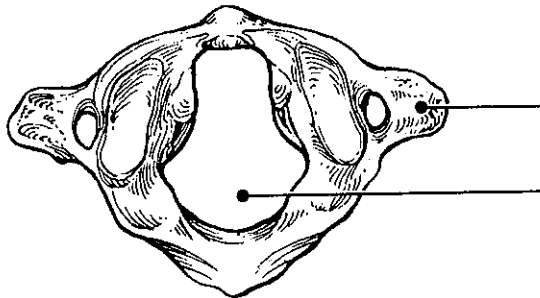
- | | | |
|------------------------------|--------------------|----------------------|
| A. Atlas | D. Coccyx | F. Sacrum |
| B. Axis | E. Lumbar vertebra | G. Thoracic vertebra |
| C. Cervical vertebra—typical | | |

- _____ 1. Type of vertebra(e) containing foramina in the transverse processes, through which the vertebral arteries ascend to reach the brain
- _____ 2. Its dens provides a pivot for rotation of the first cervical vertebra
- _____ 3. Transverse processes have facets for articulation with ribs; spinous process points sharply downward
- _____ 4. Composite bone; articulates with the hip bone laterally
- _____ 5. Massive vertebrae; weight-sustaining
- _____ 6. Tailbone; vestigial fused vertebrae
- _____ 7. Supports the head; allows the rocking motion of the occipital condyles
- _____ 8. Seven components; unfused
- _____ 9. Twelve components; unfused

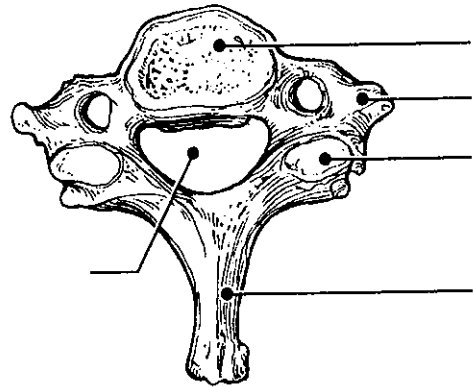
13. Complete the following statements by inserting your answers in the answer blanks.

- _____ 1. In describing abnormal curvatures, it could be said that (1) is an exaggerated thoracic curvature, and in (2) the vertebral column is displaced laterally.
- _____ 2.
- _____ 3. Intervertebral discs are made of (3) tissue. The discs provide (4) to the spinal column.
- _____ 4.

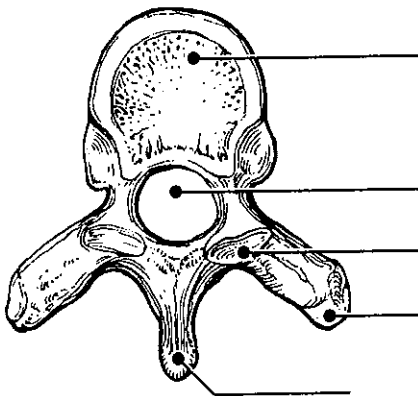
14. Figure 5-5, A-D shows superior views of four types of vertebrae. In the spaces provided below each vertebra, indicate in which region of the spinal column it would be found. In addition, specifically identify Figure 5-5A. Where indicated by leader lines, identify the vertebral body, spinous and transverse processes, superior articular processes, and vertebral foramen.



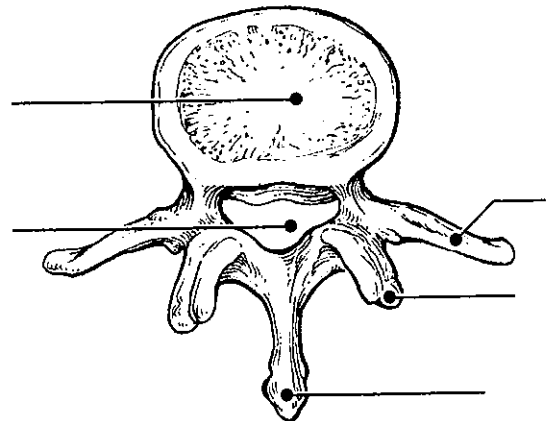
A _____



B _____



C _____



D _____

Figure 5-5

15. Figure 5–6 is a lateral view of the vertebral column. Identify each numbered region of the column by listing in the numbered answer blanks the region name first and then the specific vertebrae involved (for example, sacral region, S# to S#). Also identify the modified vertebrae indicated by numbers 6 and 7 in Figure 5–6. Select different colors for each vertebral region and use them to color the coding circles and the corresponding regions.

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

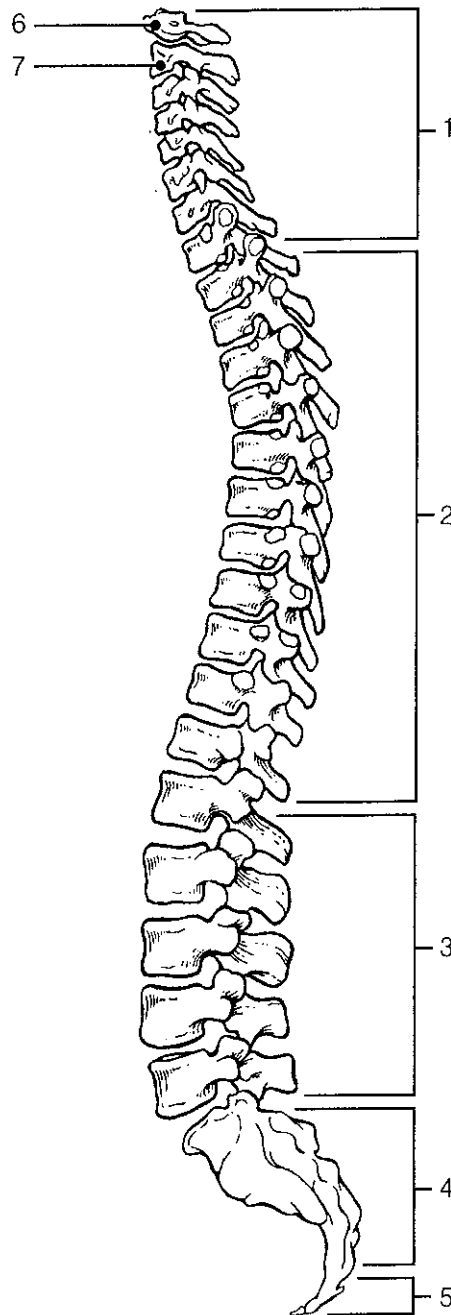


Figure 5–6

Bony Thorax

16. Complete the following statements referring to the bony thorax by inserting your responses in the answer blanks.

- _____ 1. The organs protected by the thoracic cage include the (1) and the (2). Ribs 1 through 7 are called (3) ribs, _____ 2. whereas ribs 8 through 12 are called (4) ribs. Ribs 11 and _____ 3. 12 are also called (5) ribs. All ribs articulate posteriorly with the (6), and most connect anteriorly to the (7), _____ 4. either directly or indirectly.
 _____ 5. The general shape of the thoracic cage is (8).
 _____ 6.
 _____ 7.
 _____ 8.

17. Figure 5-7 is an anterior view of the bony thorax. Select different colors to identify the structures below and color the coding circles and corresponding structures. Then label the subdivisions of the sternum indicated by leader lines.

- | | |
|---|--------------------------------------|
| <input type="radio"/> All true ribs | <input type="radio"/> All false ribs |
| <input type="radio"/> Costal cartilages | <input type="radio"/> Sternum |

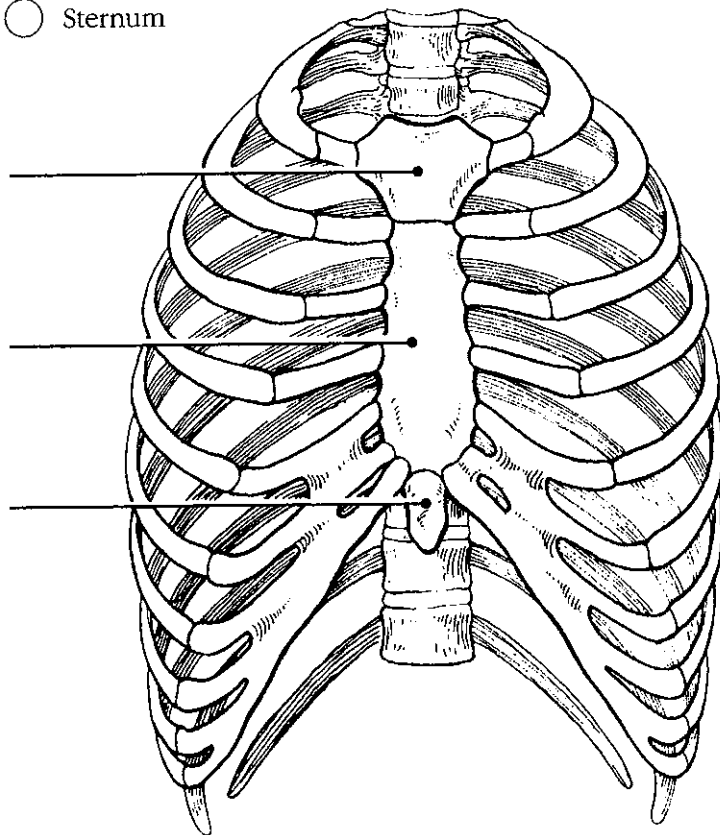


Figure 5-7

APPENDICULAR SKELETON

Several bones forming part of the upper limb and/or shoulder girdle are shown in Figures 5–8 to 5–11. Follow the specific directions for each figure.

18. Identify the bone in Figure 5–8. Insert your answer in the blank below the illustration. Select different colors for each structure listed below and use them to color the coding circles and the corresponding structures in the diagram. Then, label the angles indicated by leader lines.

- Spine
 Glenoid cavity
 Coracoid process
 Acromion

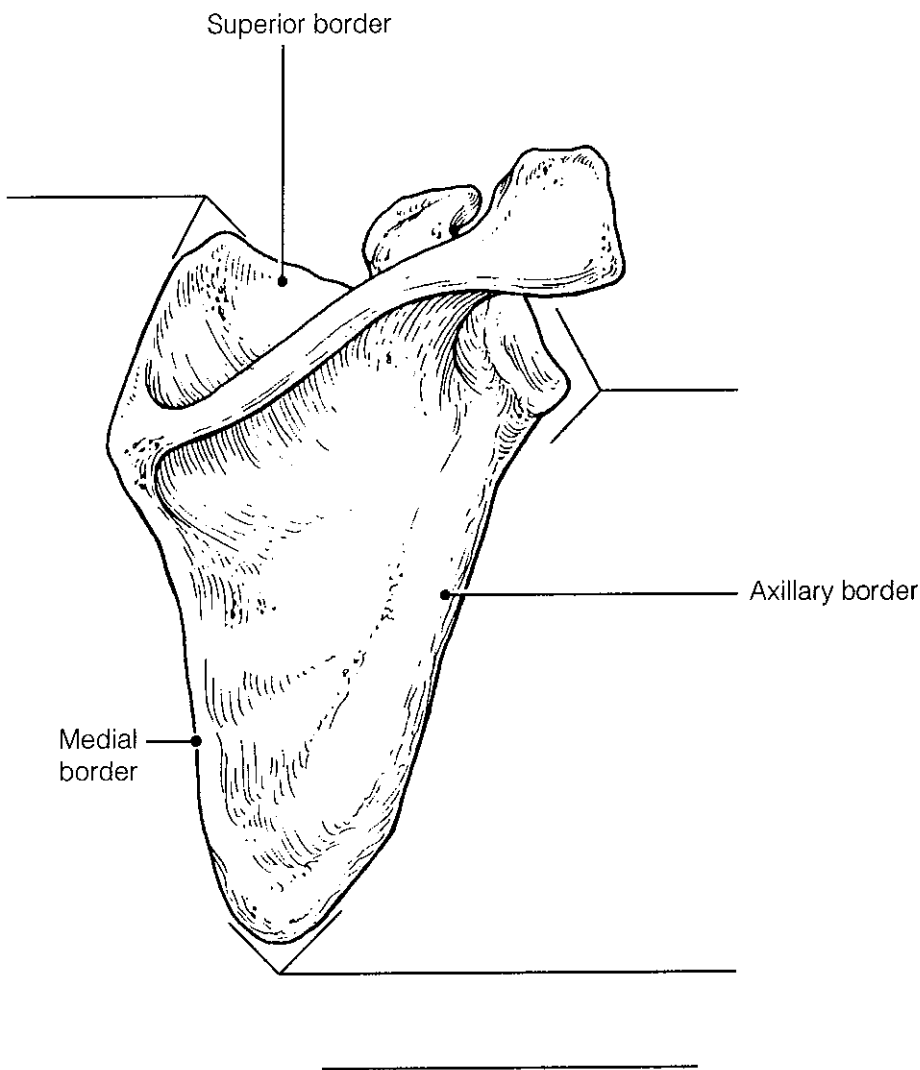


Figure 5–8

19. Identify the bones in Figure 5-9 by labeling the leader lines identified as A, B, and C. Color the bones different colors. Using the following terms, complete the illustration by labeling all bone markings provided with leader lines.

- | | | |
|-------------------|--------------------|-------------------|
| Trochlear notch | Capitulum | Coronoid process |
| Trochlea | Deltoid tuberosity | Olecranon process |
| Radial tuberosity | Head (three) | Greater tubercle |
| | Styloid process | Lesser tubercle |

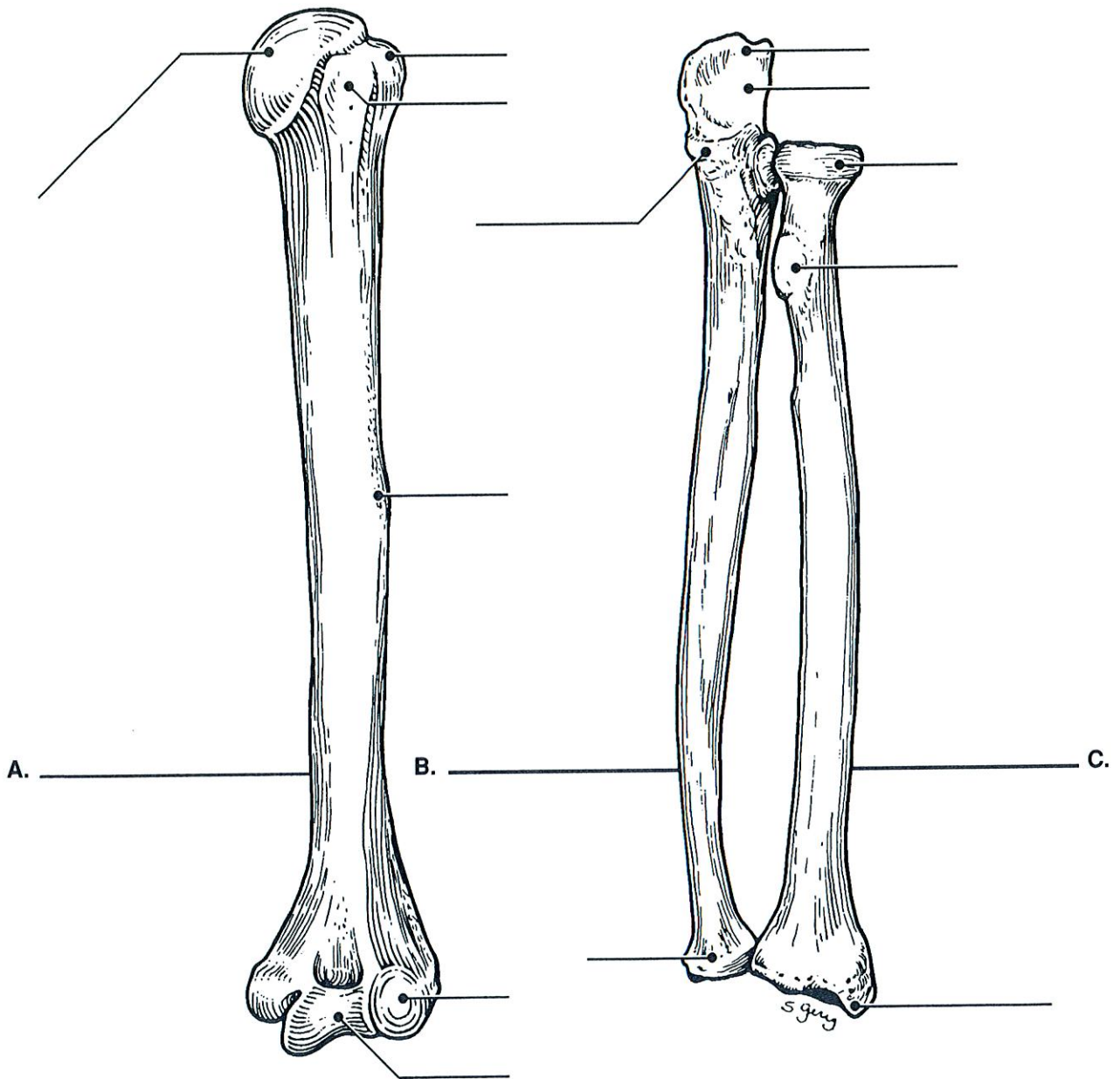


Figure 5-9

20. Figure 5–10 is a diagram of the hand. Select different colors for the following structures, and use them to color the coding circles and the corresponding structures in the diagram.

- Carpals Metacarpals Phalanges

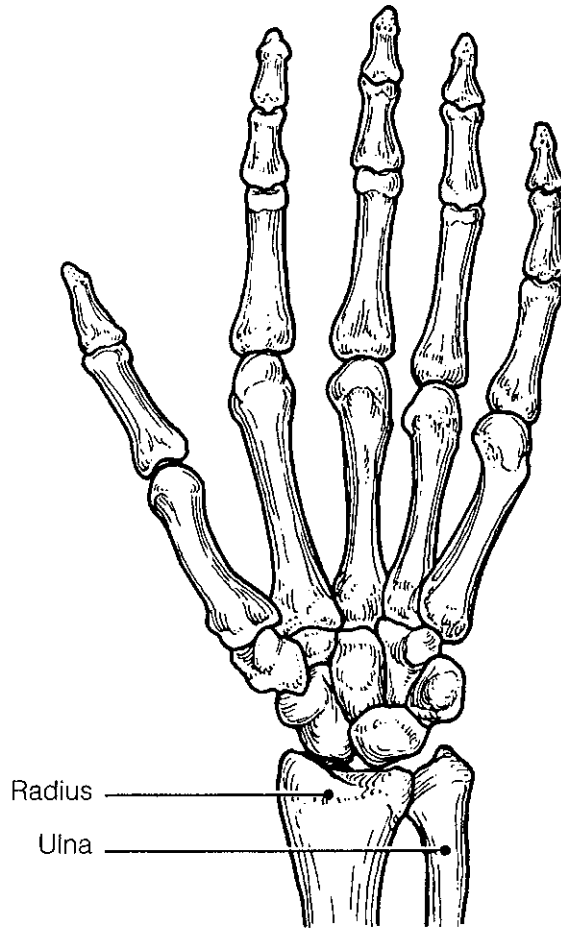


Figure 5–10

21. Compare the pectoral and pelvic girdles by choosing descriptive terms from the key choices. Insert the appropriate key letters in the answer blanks.

Key Choices

- | | |
|----------------|--|
| A. Flexibility | D. Shallow socket for limb attachment |
| B. Massive | E. Deep, secure socket for limb attachment |
| C. Lightweight | F. Weight-bearing |

Pectoral: _____, _____, _____ Pelvic: _____, _____, _____

22. Using key choices, identify the bone names or markings according to the descriptions that follow. Insert the appropriate term or letter in the answer blanks.

Key Choices

- | | | | |
|---------------------|-----------------------|----------------------|--------------------|
| A. Acromion | F. Coronoid fossa | K. Olecranon fossa | P. Scapula |
| B. Capitulum | G. Deltoid tuberosity | L. Olecranon process | Q. Sternum |
| C. Carpals | H. Glenoid cavity | M. Phalanges | R. Styloid process |
| D. Clavicle | I. Humerus | N. Radial tuberosity | S. Trochlea |
| E. Coracoid process | J. Metacarpals | O. Radius | T. Ulna |

- _____ 1. Raised area on lateral surface of humerus to which deltoid muscle attaches
- _____ 2. Arm bone
- _____ 3. _____ 4. Bones composing the shoulder girdle
- _____ 5. _____ 6. Forearm bones
- _____ 7. Point where scapula and clavicle connect
- _____ 8. Shoulder girdle bone that has no attachment to the axial skeleton
- _____ 9. Shoulder girdle bone that articulates anteriorly with the sternum
- _____ 10. Socket in the scapula for the arm bone
- _____ 11. Process above the glenoid cavity that permits muscle attachment
- _____ 12. Commonly called the collarbone
- _____ 13. Distal medial process of the humerus; joins the ulna
- _____ 14. Medial bone of the forearm in anatomical position
- _____ 15. Rounded knob on the humerus that articulates with the radius
- _____ 16. Anterior depression; superior to the trochlea; receives part of the ulna when the forearm is flexed
- _____ 17. Forearm bone involved in formation of elbow joint
- _____ 18. _____ 19. Bones that articulate with the clavicle
- _____ 20. Bones of the wrist
- _____ 21. Bones of the fingers
- _____ 22. Heads of these bones form the knuckles

23. Figure 5-11 is a diagram of the articulated pelvis. Identify the bones and bone markings indicated by leader lines on the figure. Select different colors for the structures listed below and use them to color the coding circles and the corresponding structures in the figure. Also, label the dashed line showing the dimensions of the true pelvis and that showing the diameter of the false pelvis. Complete the illustration by labeling the following bone markings: obturator foramen, iliac crest, anterior superior iliac spine, ischial spine, pubic ramus, and pelvic brim. Last, list three ways in which the female pelvis differs from the male pelvis and insert your answers in the answer blanks.

- Coxal bone
- Pubic symphysis
- Sacrum
- Acetabulum

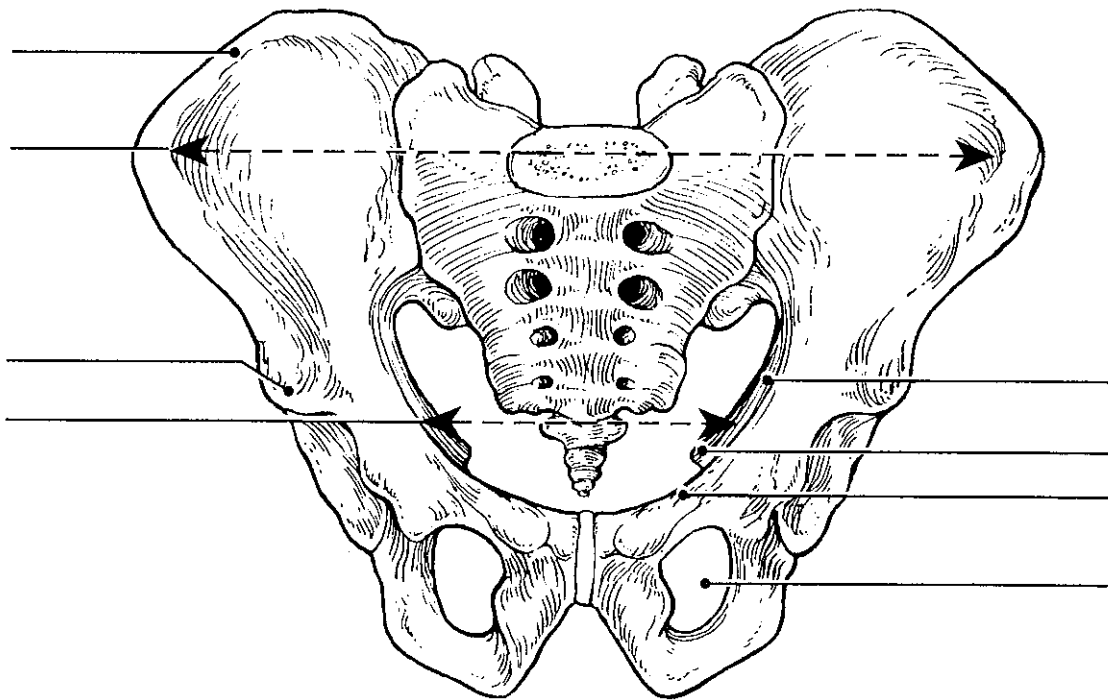


Figure 5-11

1. _____
2. _____
3. _____

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

1. Tibia Ulna Fibula Femur
2. Skull Rib cage Vertebral column Pelvis
3. Ischium Scapula Ilium Pubis
4. Mandible Frontal bone Temporal bone Occipital bone
5. Calcaneus Tarsals Carpals Talus

25. Using key choices, identify the bone names and markings, according to the descriptions that follow. Insert the appropriate key term(s) or letter(s) in the answer blanks.

Key Choices

- | | | |
|-----------------------------------|-------------------------|----------------------|
| A. Acetabulum | I. Ilium | Q. Patella |
| B. Calcaneus | J. Ischial tuberosity | R. Pubic symphysis |
| C. Femur | K. Ischium | S. Pubis |
| D. Fibula | L. Lateral malleolus | T. Sacroiliac joint |
| E. Gluteal tuberosity | M. Lesser sciatic notch | U. Talus |
| F. Greater sciatic notch | N. Medial malleolus | V. Tarsals |
| G. Greater and lesser trochanters | O. Metatarsals | W. Tibia |
| H. Iliac crest | P. Obturator foramen | X. Tibial tuberosity |

- _____ 1. Fuse to form the coxal bone (hip bone)
- _____ 2. Receives the weight of the body when sitting
- _____ 3. Point where the coxal bones join anteriorly
- _____ 4. Upper margin of iliac bones
- _____ 5. Deep socket in the hip bone that receives the head of the thigh bone
- _____ 6. Point where axial skeleton attaches to the pelvic girdle
- _____ 7. Longest bone in body, articulates with the coxal bone
- _____ 8. Lateral bone of the leg
- _____ 9. Medial bone of the leg
- _____ 10. Bones forming the knee joint
- _____ 11. Point where the patellar ligament attaches
- _____ 12. Kneecap
- _____ 13. Shinbone
- _____ 14. Distal process on medial tibial surface
- _____ 15. Process forming the outer ankle
- _____ 16. Heel bone

- _____ 17. Bones of the ankle
- _____ 18. Bones forming the instep of the foot
- _____ 19. Opening in a coxal bone formed by the pubic and ischial rami
- _____ 20. Sites of muscle attachment on the proximal end of the femur
- _____ 21. Tarsal bone that articulates with the tibia
- 26.** For each of the following statements that is true, insert *T* in the answer blank. If any of the statements are false, correct the underlined term by inserting the correct term in the answer blank.
- _____ 1. The pectoral girdle is formed by the articulation of the hip bones and the sacrum.
- _____ 2. Bones present in both the hand and the foot are carpals.
- _____ 3. The tough, fibrous connective tissue covering of a bone is the periosteum.
- _____ 4. The point of fusion of the three bones forming a coxal bone is the glenoid cavity.
- _____ 5. The large nerve that must be avoided when giving injections into the buttock muscles is the femoral nerve.
- _____ 6. The long bones of a fetus are constructed of hyaline cartilage.
- _____ 7. Bones that provide the most protection to the abdominal viscera are the ribs.
- _____ 8. The largest foramen in the skull is the foramen magnum.

27. The bones of the thigh and the leg are shown in Figure 5–12. Identify each and put your answers in the blanks labelled A, B, and C. Select different colors for the lower limb bones listed below and use them to color in the coding circles and corresponding bones on the diagram. Complete the illustration by inserting the terms indicating bone markings at the ends of the appropriate leader lines in the figure.

- | | | |
|-----------------------------|-----------------------------|------------------------------|
| <input type="radio"/> Femur | <input type="radio"/> Tibia | <input type="radio"/> Fibula |
| Head of femur | Anterior crest of tibia | Head of fibula |
| Intercondylar eminence | Lesser trochanter | Medial malleolus |
| Tibial tuberosity | Greater trochanter | Lateral malleolus |

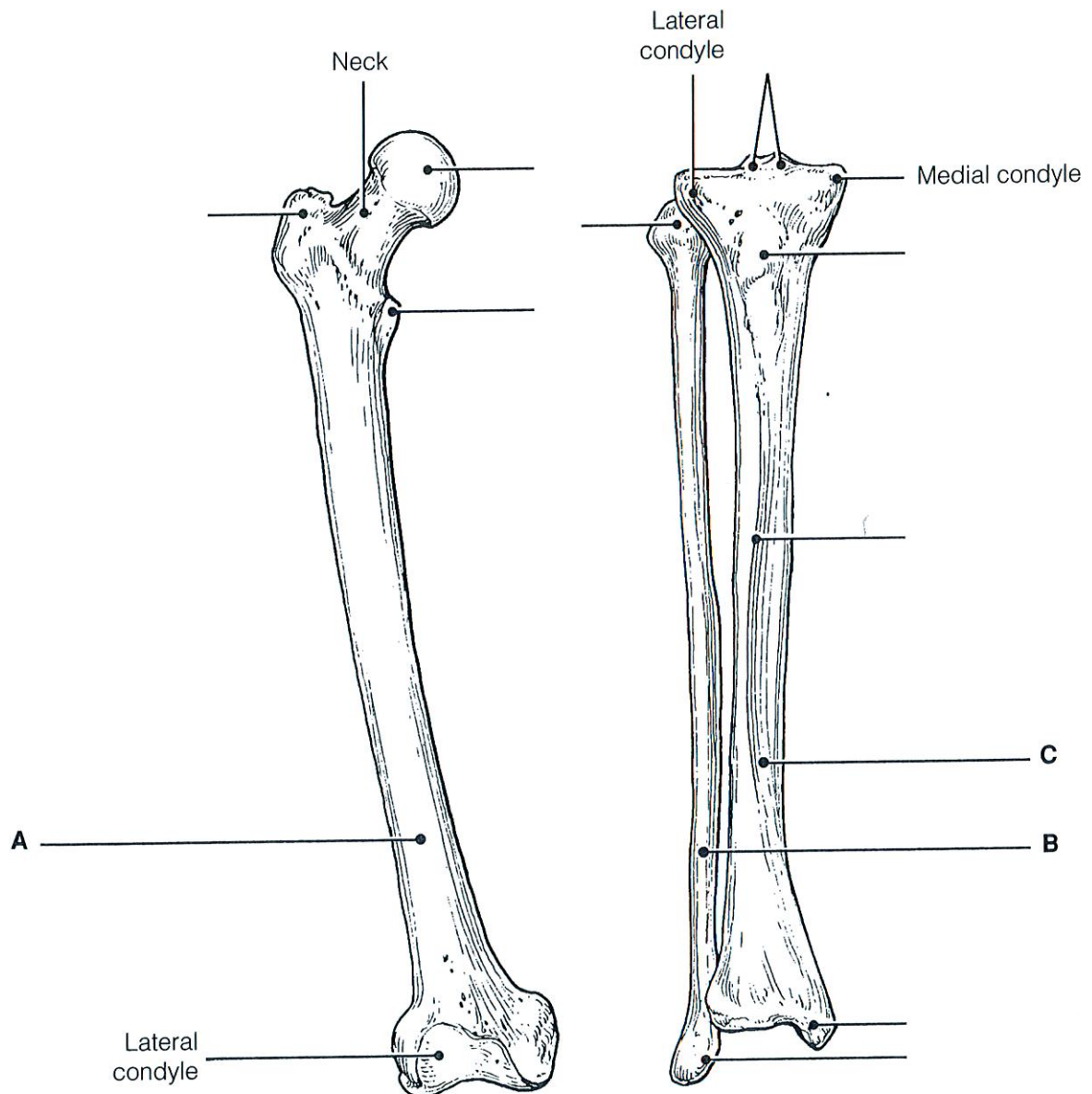


Figure 5-12

28. Figure 5–13 is a diagram of the articulated skeleton. Identify all bones or groups of bones by writing the correct labels at the end of the leader lines. Then, select two different colors for the bones of the axial and appendicular skeletons and use them to color in the coding circles and corresponding structures in the diagram.

- Axial skeleton Appendicular skeleton

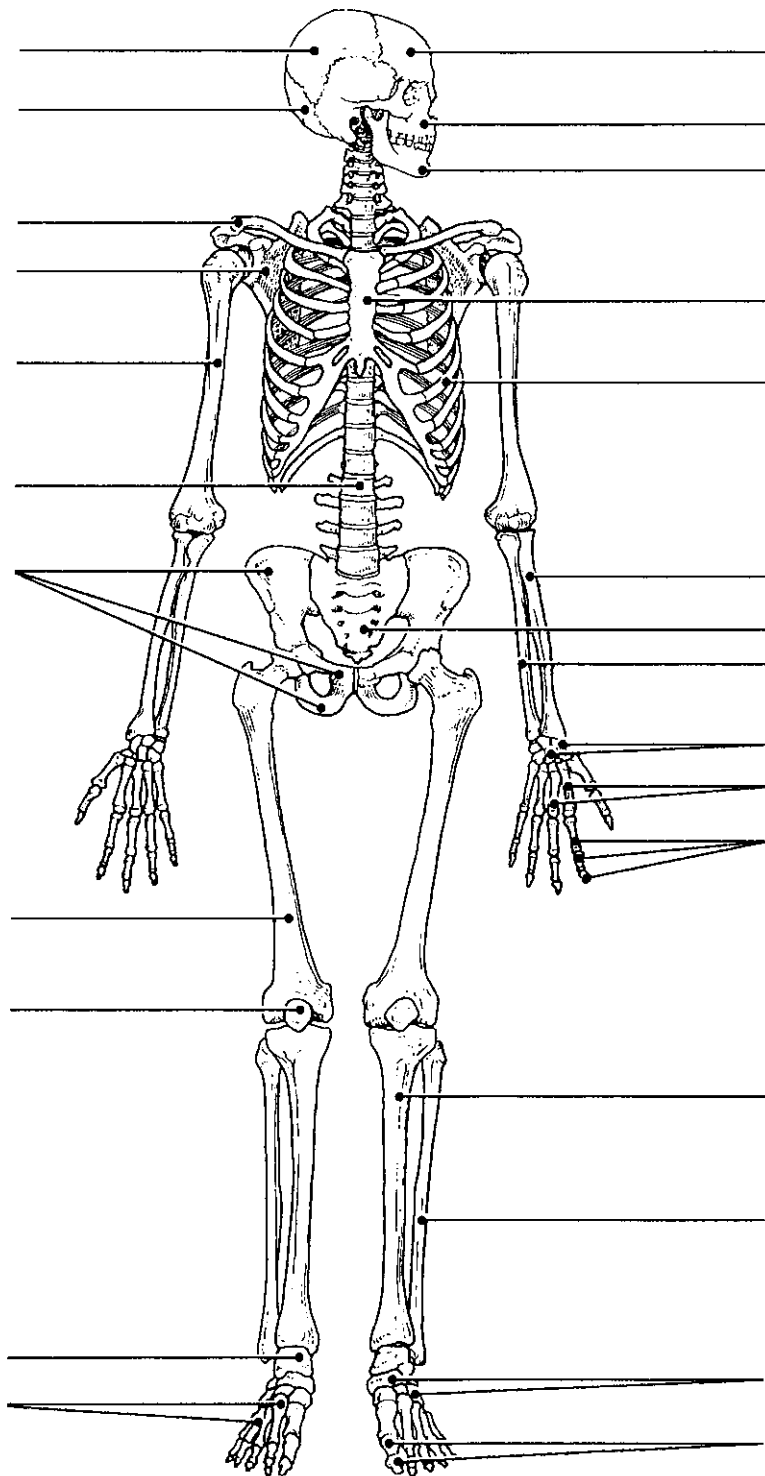


Figure 5-13

BONE FRACTURES

29. Using the key choices, identify the fracture (fx) types shown in Figure 5-14 and the fracture types and treatments described below. Enter the appropriate key letter or term in each answer blank.

Key Choices

- | | | |
|-------------------------|------------------------|--------------------|
| A. Closed reduction | D. Depressed fracture | G. Simple fracture |
| B. Compression fracture | E. Greenstick fracture | H. Spiral fracture |
| C. Compound fracture | F. Open reduction | |

- _____ 1. Bone is broken cleanly; the ends do not penetrate the skin
- _____ 2. Nonsurgical realignment of broken bone ends and splinting of bone
- _____ 3. A break common in children; bone splinters, but break is incomplete
- _____ 4. A fracture in which the bone is crushed; common in the vertebral column
- _____ 5. A fracture in which the bone ends penetrate through the skin surface
- _____ 6. Surgical realignment of broken bone ends
- _____ 7. A result of twisting forces

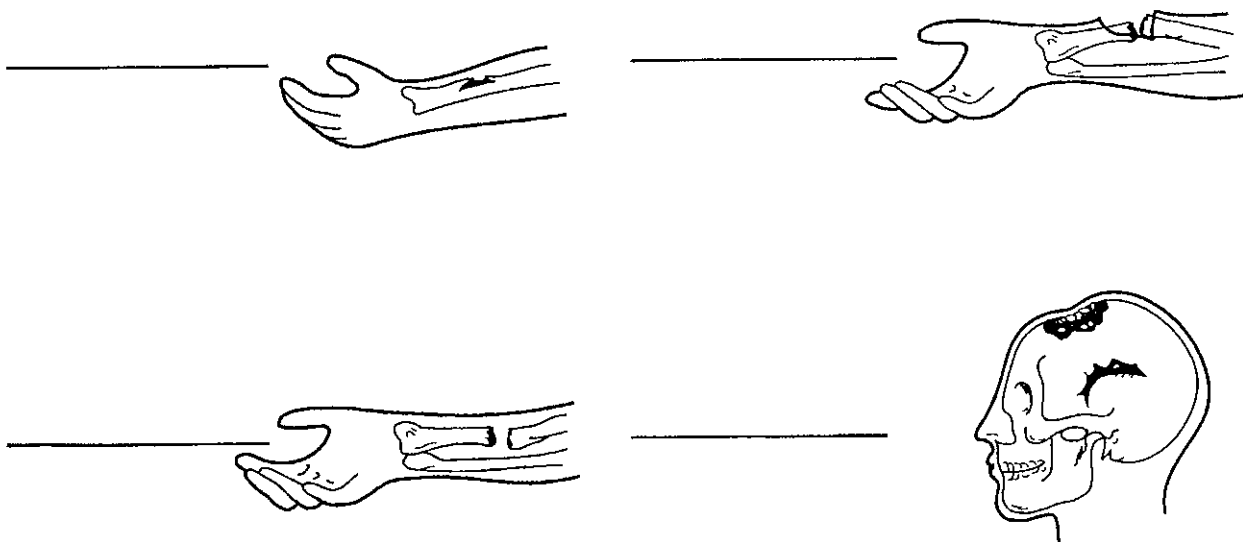


Figure 5-14

30. For each of the following statements about bone breakage and the repair process that is true, insert *T* in the answer blank. For false statements, correct the underlined terms by inserting the correct term in the answer blank.

- _____ 1. A hematoma usually forms at a fracture site.
- _____ 2. Deprived of nutrition, osteocytes at the fracture site die.
- _____ 3. Non-bony debris at the fracture site is removed by osteoclasts.
- _____ 4. Growth of a new capillary supply into the region produces granulation tissue.
- _____ 5. Osteoblasts from the medullary cavity migrate to the fracture site.
- _____ 6. The fibrocartilage callus is the first repair mass to splint the broken bone.
- _____ 7. The bony callus is initially composed of compact bone.

JOINTS

31. Figure 5-15 shows the structure of a typical diarthrotic joint. Select different colors to identify each of the following areas and use them to color the coding circles and the corresponding structures on the figure. Then, complete the statements below the figure.

- Articular cartilage of bone ends
- Fibrous capsule
- Synovial membrane
- Joint cavity

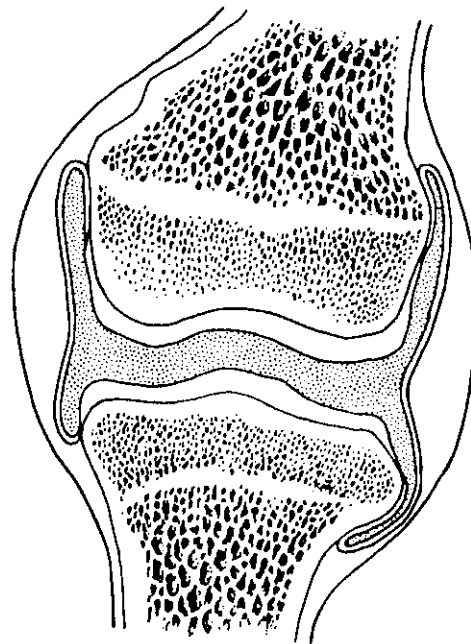


Figure 5-15

1. _____ The lubricant that minimizes friction and abrasion of joint surfaces is (1).
2. _____ The resilient substance that keeps bone ends from crushing when compressed is (2).
3. _____ (3) which reinforce the fibrous capsule help to prevent dislocation of the joint.

32. For each joint described below, select an answer from Key A. Then, if the Key A selection is *other than C* (a synovial joint), see if you can classify the joint further by making a choice from Key B.

Key Choices

- Key A: A. Cartilaginous
 B. Fibrous
 C. Synovial

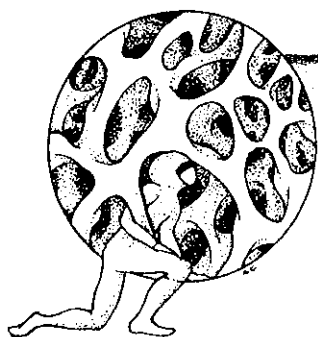
- Key B: 1. Epiphyseal disk
 2. Suture
 3. Symphysis

- _____ 1. Has amphiarthrotic and synarthrotic examples
- _____ 2. All have a fibrous capsule lined with synovial membrane surrounding a joint cavity
- _____ 3. Bone regions united by fibrous connective tissue
- _____ 4. Joints between skull bones
- _____ 5. Joint between atlas and axis
- _____ 6. Hip, elbow, and knee
- _____ 7. All examples are diarthroses
- _____ 8. Pubic symphysis
- _____ 9. All are reinforced by ligaments
- _____ 10. Joint providing the most protection to underlying structures
- _____ 11. Often contains a fluid-filled cushion
- _____ 12. Child's long-bone growth plate made of hyaline cartilage
- _____ 13. Most joints of the limbs
- _____ 14. Often associated with bursae
- _____ 15. Have the greatest mobility

33. Which structural joint type is *not* commonly found in the axial skeleton and why not?

36. Complete the following statements concerning fetal and infant skeletal development. Insert the missing words in the answer blanks.

- _____ 1. "Soft spots," or membranous joints called (1) in the fetal skull, allow the skull to be (2) slightly during birth passage. They also allow for continued brain (3) during the later months of fetal development and early infancy.
- _____ 2. _____ 3. Eventually these soft spots are replaced by immovable joints called (4).
- _____ 4. _____ 5. The two spinal curvatures well developed at birth are the (5) and (6) curvatures. Because they are present at birth, they are called (7) curvatures. The secondary curvatures develop as the baby matures. The (8) curvature develops as the baby begins to lift his or her head. The (9) curvature matures when the baby begins to walk or assume the upright posture.
- _____ 6. _____ 7. _____ 8. _____ 9.



INCREDIBLE JOURNEY

A Visualization Exercise for the Skeletal System

... stalagmite- and stalactite-like structures that surround you. ... Since the texture is so full of holes. . .

37. Where necessary, complete statements by inserting the missing words in the answer blanks.

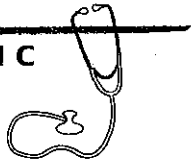
- _____ 1. For this journey you are miniaturized and injected into the interior of the largest bone of your host's body, the (1).
- _____ 2. Once inside this bone, you look around and find yourself examining the stalagmite- and stalactite-like structures that surround you. Although you feel as if you are in an underground cavern, you know that it has to be bone. Since the texture is so full of holes, it obviously is (2) bone.
- _____ 3. Although the arrangement of these bony spars seems to be haphazard, as if someone randomly dropped straws, they are precisely arranged to resist points of (3). All about you is frantic, hurried activity. Cells are dividing rapidly, nuclei are being ejected, and disk-like cells are appearing. You decide that these disk-like cells are (4), and that this is the (5)

cavity. As you explore further, strolling along the edge of the cavity, you spot many tunnels leading into the solid bony area on which you are walking. Walking into one of these drainpipe-like openings, you notice that it contains a glistening white rope-like structure (a (6), no doubt), and blood vessels running the length of the tube. You eventually come to a point in the channel where

- _____ 7. the horizontal passageway joins with a vertical passage that runs with the longitudinal axis of the bone. This is obviously a (7) canal. Since you would like to see how nutrients are brought into (8) bone, you decide to follow this channel.
- _____ 8. Reasoning that there is no way you can possibly scale the slick walls of the channel, you leap and grab onto a white cord hanging down its length. Since it is easier to slide down than to try to climb up the cord, you begin to lower yourself, hand over hand. During your descent, you notice small openings in the wall, which are barely large enough for you to wriggle through. You conclude that these are the (9) that connect all the (10) to the nutrient supply in the central canal. You decide to investigate one of these tiny openings
- _____ 9. _____ 10. _____ 11. _____ 12.

and begin to swing on your cord, trying to get a foothold on one of the openings. After managing to anchor yourself and squeezing into an opening, you use a flashlight to illuminate the passageway in front of you. You are startled by a giant cell with many dark nuclei. It appears to be plastered around the entire lumen directly ahead of you. As you watch this cell, the bony material beneath it, the (11), begins to liquefy. The cell apparently is a bone-digesting cell, or (12), and since you are unsure whether or not its enzymes can also liquefy you, you slither backwards hurriedly and begin your trek back to your retrieval site.

AT THE CLINIC



38. Antonio is hit in the face with a football during practice. An X-ray reveals multiple fractures of the bones around an orbit. Name the bones that form margins of the orbit.
39. Mrs. Brusio, a woman in her 80s, is brought to the clinic with a fractured hip. X-rays reveal compression fractures in her lower vertebral column and extremely low bone density in her vertebrae, hip bones, and femurs. What are the condition, cause, and treatment?
40. Jack, a young man, is treated at the clinic for an accident in which he hit his forehead. When he returns for a checkup, he complains that he can't smell anything. A hurried X-ray of his head reveals a fracture. What part of which bone was fractured to cause his loss of smell?

41. A middle-aged woman comes to the clinic complaining of stiff, painful joints and increasing immobility of her finger joints. A glance at her hands reveals knobby, deformed knuckles. What condition will be tested for?
42. At his 94th birthday party, James was complimented on how good he looked and was asked about his health. He replied, "I feel good most of the time, but some of my joints ache and are stiff, especially my knees, hips, and lower back, and especially in the morning when I wake up." A series of X-rays and an MRI scan taken a few weeks earlier had revealed that the articular cartilages of these joints was rough and flaking off, and that bone spurs (overgrowths) were present at the ends of some of James's bones. What is James's probable condition?
43. Janet, a 10-year-old girl, is brought to the clinic after falling out of a tree. An X-ray shows she has small fractures of the transverse processes of T3 to T5 on the right side. Janet will be watched for what abnormal spinal curvature over the next several years?