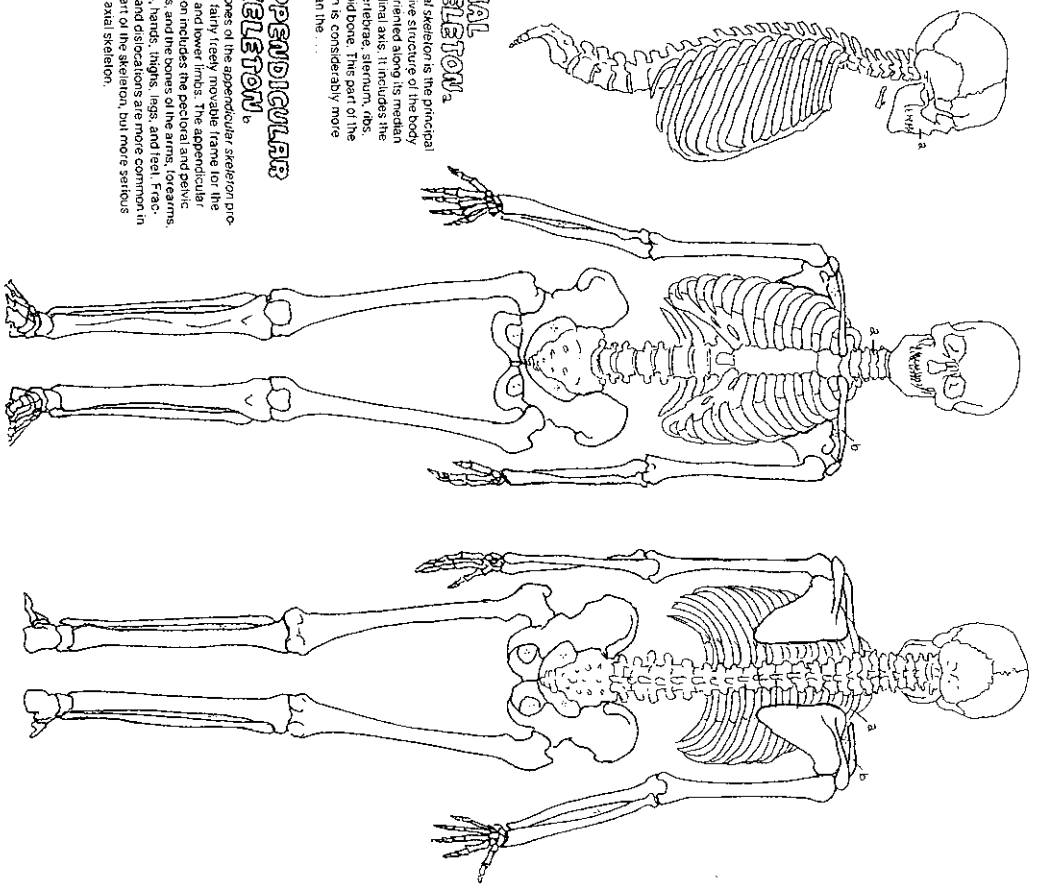


AXIAL & APPENDICULAR CLASSIFICATION*

- ON 2
 1. Color the axial skeleton and its tilts (in light lines). You may color over the entire rib cage including the space between the ribs.
 2. With the second color fill in the appendicular skeleton and its tilts (heavier lines).



AXIAL SKELETON

The axial skeleton is the principal supportive structure of the body and is oriented along its median longitudinal axis. It includes the skull, vertebrae, sternum, ribs, and hyoid bone. The part of the skeleton is considerably more rigid than the...

APPENDICULAR SKELETON

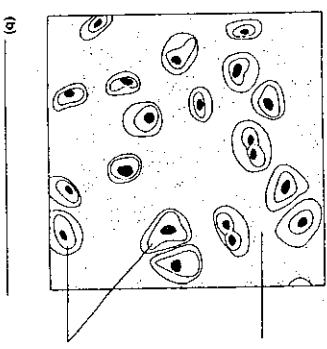
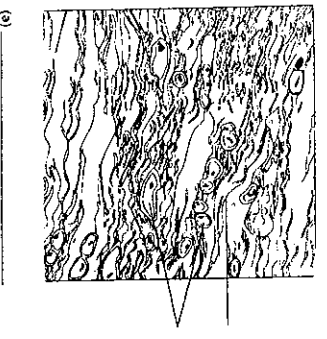
The bones of the appendicular skeleton provide a fairly freely movable frame for the upper and lower limbs. The appendicular skeleton includes the pectoral and pelvic girdles and the bones of the arms, forearms, wrists, hands, fingers, legs, and feet. Freedom of movement and positions are more serious in this part of the skeleton, but more serious in the axial skeleton.

1. Using key choices, identify each type of cartilage described (in terms of its body location or function) below.

- Key: a. elastic b. fibrocartilage c. hyaline

1. supports the external ear
2. between the vertebrae
3. forms the walls of the voice box (larynx)
4. the epiglottis
5. articular cartilages
6. meniscus in a knee joint
7. connects the ribs to the sternum
8. most effective at resisting compression
9. most springy and flexible
10. most abundant

2. Identify the two types of cartilage diagrammed below. On each, label the *chondrocytes in lacunae* and the *matrix*.



Skeletal Cartilages

1. Use the key choices to identify the type of cartilage tissue found in the following body locations:

Key Choices

- A. Elastic cartilage B. Fibrocartilage C. Hyaline cartilage

1. At the junction of a rib and the sternum
2. The skeleton of the external ear
3. Supporting the trachea walls
4. Forming the intervertebral discs
5. Forming the epiglottis
6. At the ends of long bones
7. Most of the fetal skeleton
8. Knee menisci

Classification of Bones

- The four major anatomical classifications of bones are long, short, flat, and irregular. Which category has the least amount of spongy bone relative to its total volume?
- Classify each of the bones in the next chart into one of the four major categories by checking the appropriate column. Use appropriate references as necessary.

Review Sheet 9 511

	Long	Short	Flat	Irregular
umerus				
halarx				
arnelal				
alcaneus				
to				
vertebra				
ulna				

Bone Markings

Match the terms in column B with the appropriate description in column A:

Column A	Column B
1. sharp, slender process*	a. condyle
2. small rounded projection*	b. crest
3. narrow ridge of bone*	c. epicondyle
4. large rounded projection*	d. fissure
5. structure supported on neck*	e. foramen
6. armlike projection*	f. fossa
7. rounded, convex projection*	g. head
8. narrow depression or opening*	h. meatus
9. canal-like structure*	i. process
10. opening through a bone*	j. ramus
11. shallow depression*	k. sinus
12. air-filled cavity	l. spine
13. large, irregularly shaped projection*	m. trochanter
14. raised area of a condyle*	n. tubercle
15. projection or prominence	o. tuberosity

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- In comparing bone and cartilage tissue, indicate whether each of the following statements is true (T) or false (F).
 - Cartilage is more resilient than bone.
 - Cartilage is especially strong in resisting shear (bending and twisting) forces.
 - Cartilage can grow faster than bone in the growing skeleton.
 - In the adult skeleton, cartilage regenerates faster than bone when damaged.
 - Neither bone nor cartilage contains capillaries.
 - Bone tissue contains relatively little water compared to cartilage tissue, which contains a large amount of water.
 - Nutrients diffuse quickly through cartilage matrix but very poorly through solid bone matrix.
- What single structural characteristic accounts for the resilience of cartilage and its ability to grow rapidly in the developing skeleton?

Functions of the Bones

- List and explain five important functions of bones. Write your answers in the answer blanks below:
 - _____
 - _____
 - _____
 - _____
 - _____

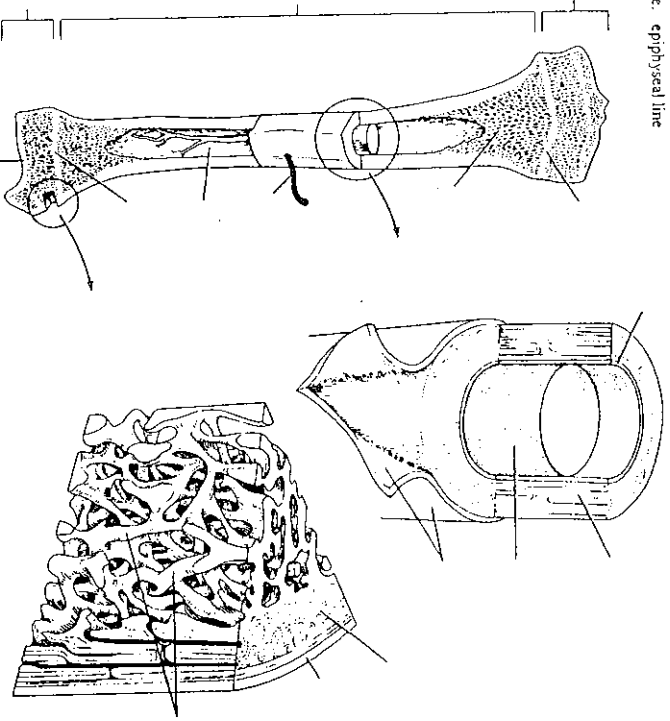
Classification of Bones

- Identify each of the following bones as a member of 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 letters in the answer blanks.

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

1. Use the terms below to identify the structures marked by leader lines and braces in the diagram. (Some terms are used more than once).

- Key:
- a. articular cartilage
 - b. compact bone
 - c. diaphysis
 - d. endosteum
 - e. epiphyseal line
 - f. epiphysis
 - g. medullary cavity
 - h. nutrient artery
 - i. periosteum
 - j. red marrow cavity
 - k. trabeculae of spongy bone
 - l. yellow marrow



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2. Match the terms in question 1 with the information below.

- | | |
|--|--|
| _____ 1. contains spongy bone in adults | _____ 5. scientific term for bone shaft |
| _____ 2. made of compact bone | _____ 6. contains fat in adult bones |
| _____ 3. site of blood cell formation | _____ 7. growth plate remnant |
| _____ 4. major submembranous site of osteoclasts | _____ 8. major submembranous site of osteoblasts |
3. What differences between compact and spongy bone can be seen with the naked eye? _____
4. What is the function of the periosteum? _____

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2. Using the key choices, characterize the following statements relating to the structure of a long bone. Enter the appropriate answers in the answer blanks.

- Key Choices**
- A. Diaphysis
 - B. Epiphyseal plate
 - C. Epiphysis
 - D. Red marrow
 - E. Yellow marrow cavity

- 1. Location of spongy bone in an adult's bone _____
- 2. Location of compact bone in an adult's bone _____
- 3. Site of hematopoiesis in an adult's bone _____
- 4. Scientific name for bone shaft _____
- 5. Site of fat storage _____
- 6. Region of longitudinal growth in a child _____
- 7. Composed of hyaline cartilage until the end of adolescence _____

3. Figure 6.2 is a sectional diagram showing the five-layered structure of a typical flat bone. Select different colors for the layers below. Add labels and leaders to identify Sharpey's fibers and trabeculae. Then answer the questions that follow, referring to Figure 6.2 and inserting your answers in the answer blanks.

- Spongy bone
- Compact bone
- Periosteum

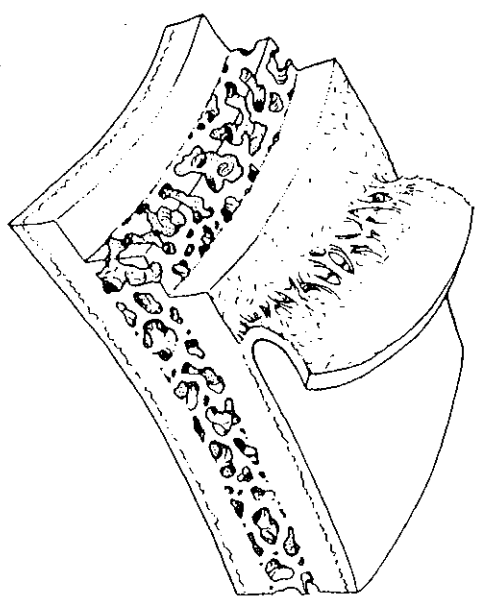
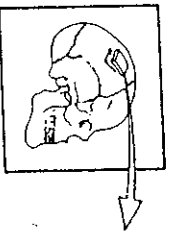


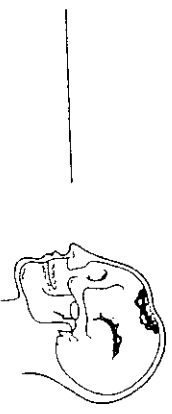
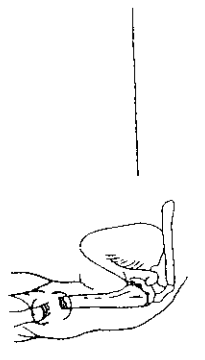
Figure 6.2

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
- B. Calcitonin
- C. Gravity
- D. Osteoblast
- E. Osteoclast
- F. Osteocytes
- G. Parathyroid hormone
- 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. Imature, 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).



4. Use the key choices to identify the fracture (FS) types shown in Figure 6.6 and the fracture types and treatments described below. Enter the appropriate answer in each answer blank.

KEY CHOICES

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

1. Bone is broken cleanly; the ends do not penetrate the skin.
2. Nonsurgical realignment of broken bone ends and splinting of bone.
3. Bone breaks from twisting forces.
4. A break common in children; bone splinters, but break is incomplete.
5. A fracture in which the bone is crushed; common in the vertebral column.
6. A fracture in which the bone ends penetrate through the skin surface.
7. Broken ends are pushed into each other.
8. Surgical realignment of broken bone ends.
9. A common type of skull fracture.
10. Also called a closed fracture.
11. A common sports fracture.
12. Often seen in the brittle bones of the elderly.

5. 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 words by inserting the correct words in the answer blanks.

1. A hematoma usually forms at a fracture site.
2. Deprived of nutrition, osteocytes at the fracture site die.
3. Nonbony debris at the fracture site is removed by fibroblasts.
4. Osteocytes produce collagen fibers that span the break.
5. Osteoblasts from the medullary cavity migrate to the fracture site.
6. The fibrocartilaginous callus is the first repair mass to splint the broken bone.
7. The bony callus is composed of compact bone.

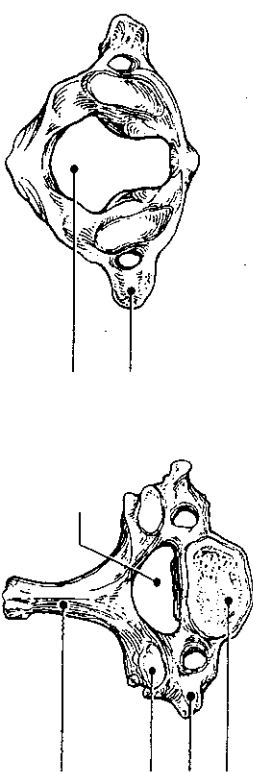
Figure 6.6

- The 3 main types of abnormal spine curvature are scoliosis, kyphosis, and _____.
- These can result from poor posture, disease, unequal pull of muscles, or could be congenital.
- Structure of Vertebrae: label the picture provided with the following structures: centrum/body, vertebral arch, vertebral foramen, transverse process, spinous process, and the superior and inferior articular processes
- Cervical Vertebrae: Identified as C1-C7. The _____ have specific functions so they are different. The _____ (C1) has no _____, instead it has large depressions that receive the occipital condyle of the skull. This joint allows you to _____.
- The _____ (C2) acts as a _____ for rotating the atlas. The joint between C1 and C2 allows you to turn your head _____.
- The other typical vertebrae have an additional feature called a _____.
- _____ which allows arteries to pass through on the way to the brain.
- Thoracic vertebrae: Identifies as T1-T12 are all typical vertebrae but there is a _____ on the transverse process for the _____ to articulate and the spinous process is long and hook downward causing the bone to look like a _____ head from the side.
- Lumbar vertebrae: identified as L1-L5 they have massive block like _____ and _____ are the _____ of the vertebrae.
- Sacrum: made from five fused vertebrae. Articulates superiorly with the _____ vertebrae, inferiorly with the _____ and laterally with the _____ bones. The surface has median sacral crests which are the fused spinous processes of the original vertebrae. The sacral canal is an extension of the vertebral canal for the spinal cord.
- Coccyx: formed by the fusion of 3-5 irregular vertebrae. This is the remnant of a _____ Bony thorax (thoracic cavity)
 - _____: flat bone that forms from the fusion of the _____, the _____ body, and the xiphoid process. The first seven ribs attach to the sternum and it has three important markings:
 - o Jugular notch: concave upper border of the manubrium that is easily palpated.
 - o _____: place where the manubrium and body meet at a slight angle creating a transverse ridge that provides a reference for counting ribs to find the second intercostal space to listen to certain heart valves.
 - o _____: point of fusion between the sterna body and the xiphoid process.
- Ribs: there are twelve pairs of ribs. The first _____ are called _____ ribs because they articulate to the sternum _____. Then there are three pairs that articulate indirectly and two pairs that are called _____ ribs because they do not articulate at all. These five pairs are called _____ ribs. Remember all ribs articulate to a vertebra. The intercostals spaces are filled with muscle that aids in breathing.

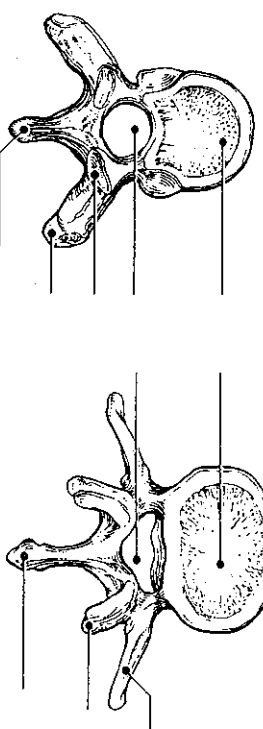
13. Complete the following statements by inserting your answers in the answer blanks.

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

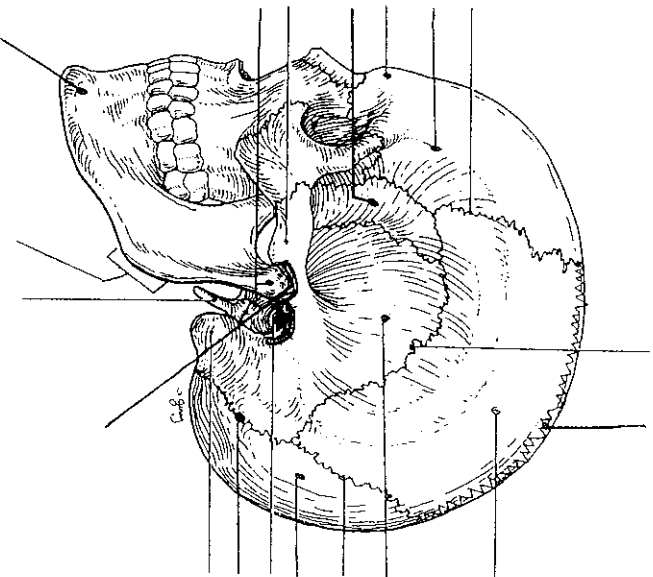
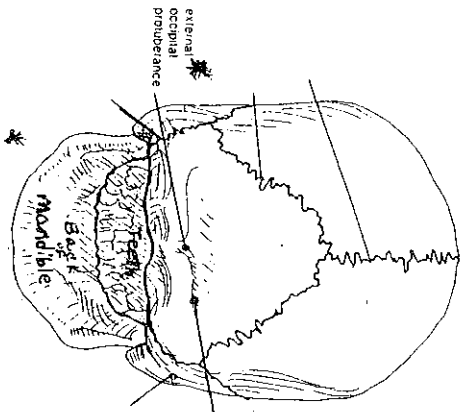
- A. Parietals
- B. Frontal
- C. Hyoid
- D. Lacrimals
- F. Maxillae
- G. Nasals
- H. Occipital
- J. Parietals
- K. Sphenoid
- N. Zygomatic
- M. Vomer

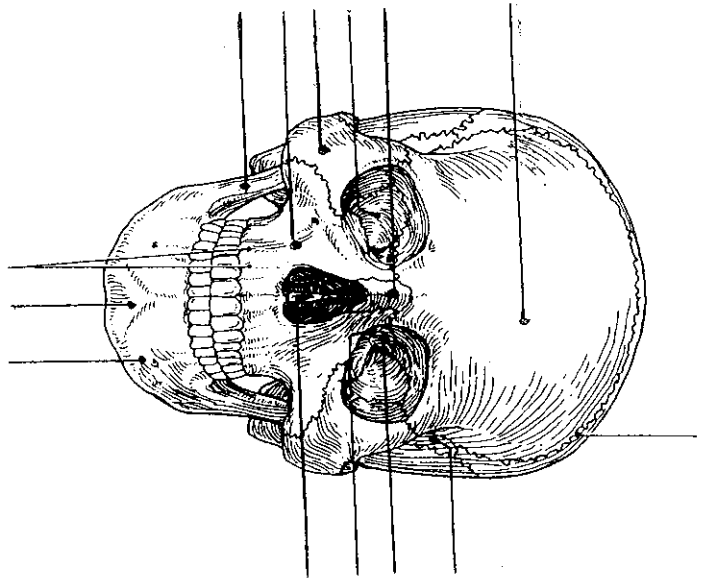
1. Forehead bone
2. Cheekbone
3. Lower jaw
4. Bridge of nose
5. Posterior part of hard palate
6. Much of the lateral and superior cranium
7. Most posterior part of cranium
8. Single, irregular, bat-shaped bone, forming part of the cranial floor
9. Tiny bones, bearing tear ducts
10. Anterior part of hard 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

Bones of the Skeleton

Axial Skeleton

A. Face and Skull



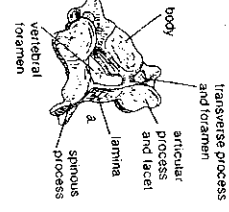


**SKELETAL SYSTEM
VERTEBRAL & VERTEBRAL COLUMN***

1. Color the individual cervical vertebra and the 7 cervical vertebrae in both posterior and lateral views.
2. Do the same for the thoracic and lumbar vertebrae as well as the sacrum and coccyx - of the column. (lateral view. Also color the 8 foramina in the sacrum posterior view of the column.)
3. Color in the intervertebral discs.
4. Do not color the skull.

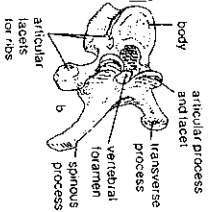
7 CERVICAL

The flexible group of cervical vertebrae support the skull and neck. Holding the head erect, denoting and maintaining its curvature. The 1st and 2nd cervical vertebrae are unique as is the 7th with its prominent spine. The foramina in the transverse processes of C1-C6 transmit the vertebral arteries to the base of the brain. The series of vertebral foramina form a canal for the spinal cord.



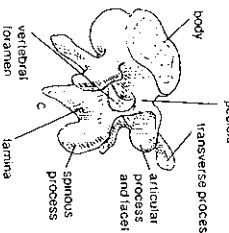
12 THORACIC

This is the rigid group of thoracic vertebrae and the 26 ribs with which they articulate superiorly. The bodies are wedged in like the gable-roofed eaves are characterized by long slender spines, heart-shaped bodies, and facets for rib articulation.



5 LUMBAR

These sturdy, quadrilateral lumbar vertebrae, the most numerous, support the most massive part of the body weight, balancing the torso on the sacrum. The lumbar curvature results from walking and standing erect. This vertebral group is quite mobile, when tilting from the floor by flexing the trunk, great pressure is often put on the discs, which may induce their rupture. This may injure the spinal nerves which pass from the spinal cord through the intervertebral foramina.

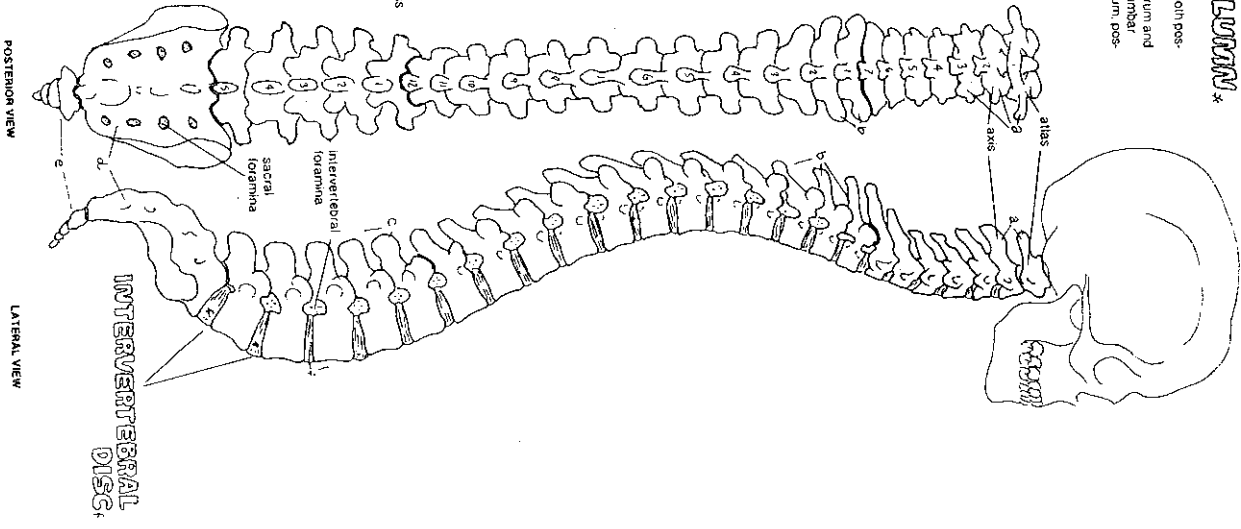


SACRUM

Five sacral vertebrae fuse to form this single bone. It transmits the body weight to the hip bones via its articulation with the pelvic girdle.

COCCYX

Consisting of 2 to 4 fused coccygeal vertebrae, the functionally insignificant coccyx represents the vestigial tail of our forebears.



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

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

"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. Eventually these soft spots are replaced by immovable joints called (4).

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.

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
- B. Intervertebral foramina
- C. Spinous process
- D. Superior articular process
- E. Transverse 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

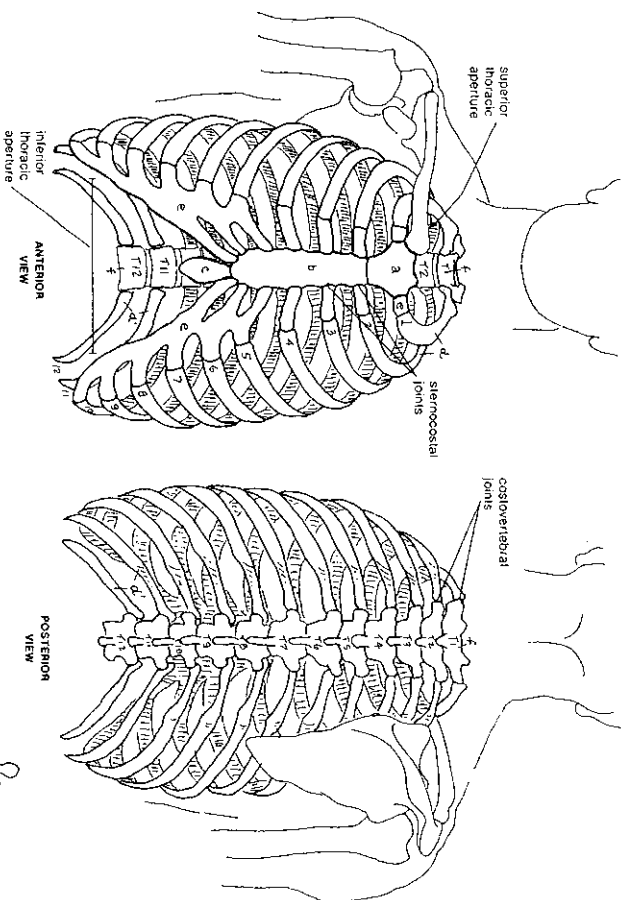
12. The following statements provide distinguishing characteristics of the vertebrae composing the vertebral column. Using key choices, identify each described structure or region by inserting the appropriate term(s) or letter(s) in the spaces provided.

Key Choices

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

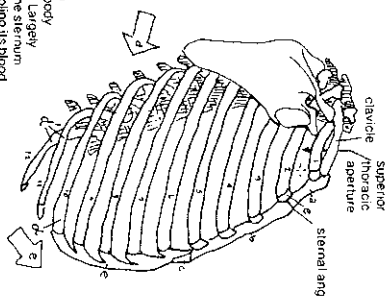
1. Type of vertebra(e) containing foramina in the transverse processes, through which the vertebral arteries ascend to reach the brain
2. Its dens provides a pivot for rotation of the first cervical vertebra
3. Transverse processes have facets for articulation with ribs; spinous process points sharply 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

SKELETAL SYSTEM / THORAX.
STERNUM: * 12 RIBS: 4
MANUBRIUM: 7 TRUE, 5 FALSE, 2 FLOATING.
BODY,
XIPHOID PROCESS.
12 COSTAL
CARTILLAGES. 12 THORACIC
VERTEBRAE.

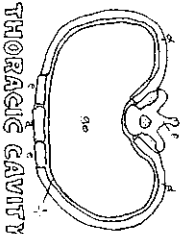


- CN 7
1. Color in the 3 parts of the sternum in front and side views.
 2. Color costal cartilages in the same views as above. Color the arrow that shows their upward direction.
 3. Then 2, and note shading downward direction, including the 12th rib.
 4. Color the 12 thoracic vertebrae as viewed from front view in the same color as Plate 13. DO NOT color them in the side view.
 5. Color in the 2 diagrams in the right lower corner of the plate.

The thorax is a fairly mobile set of structures essential to the function of respiration and harboring such delicate viscera as the lungs and heart. The sternum consists of fused bones except between the manubrium and the body (sternal angle), and the body and the xiphoid, where the joints are fibrocartilaginous. Largely cancellous bone covered with a thin compact layer, the sternum contains red marrow and is a convenient site for sampling its blood cells producing tissue. The costal cartilages, joining most ribs to the sternum, add measurable elasticity to the thorax. The upper seven (true) ribs join directly with individual cartilages, of the next five (false) ribs join with the 7th costal cartilage, and the last two (floating) ribs end in the muscular abdominal wall.

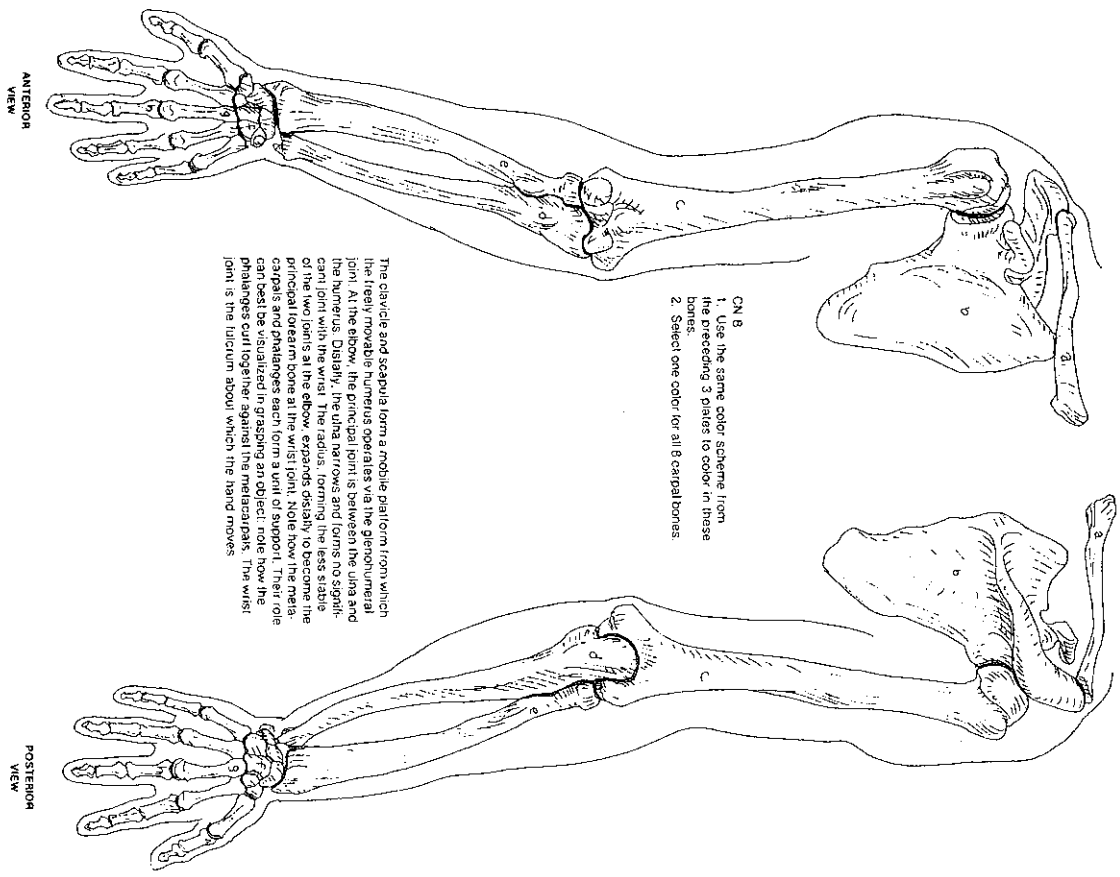


Each typical rib forms a hinge joint with 2 adjacent thoracic vertebrae and their discs, the body and transverse process of one vertebra (shown here), and the body of the upper vertebra.



THORACIC CAVITY
 The thoracic cavity is largely surrounded by a discontinuous set of bone and cartilage. The floor of the cavity is the muscular thoracic diaphragm, above, the cavity is continuous with the neck. Note the extent to which the thoracic vertebra project into the thoracic cavity.

SKELETAL SYSTEM
BONES OF THE UPPER LIMB: *
CLAVICLE, SCAPULA, HUMERUS, ULNA,
RADIUS, CARPALS, METACARPALS, PHALANXES,



- CN B**
1. Use the same color scheme from the preceding 3 plates to color in these bones.
 2. Select one color for all 8 carpal bones.

The clavicle and scapula form a mobile platform from which the freely movable humerus operates via the glenohumeral joint. At the elbow, the principal joint is between the ulna and the humerus. Distally, the ulna narrows and forms no significant joint with the wrist. The radius, forming the less stable of the two joints at the elbow, expands distally to become the principal forearm bone at the wrist joint. Note how the metacarpals and phalanges each form a unit of support. Their role can best be visualized in grasping an object; note how the phalanges curl together against the metacarpals. The wrist joint is the fulcrum about which the hand moves.

ANTERIOR VIEW

POSTERIOR VIEW

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 for the corresponding structures in the diagram. Then, label the angles indicated by leader lines.
- Spine Glenoid cavity Coracoid process Acromion

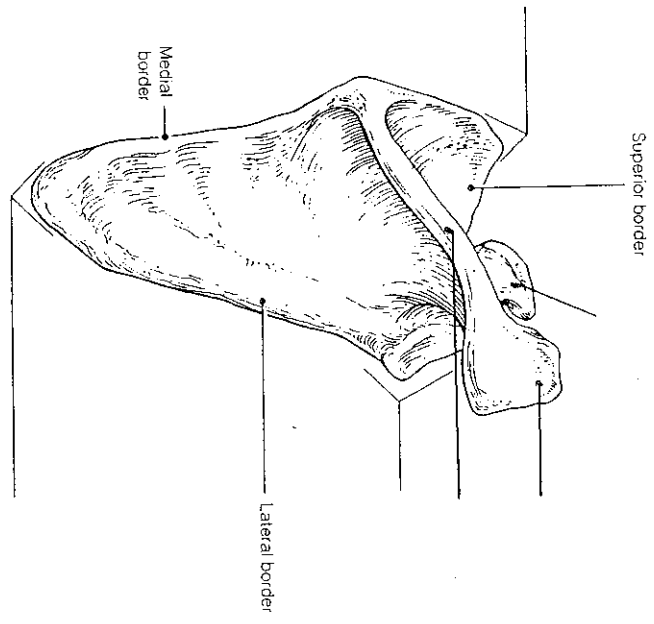


Figure 5-8

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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 |
| | Stryloid process | Lesser tubercle |

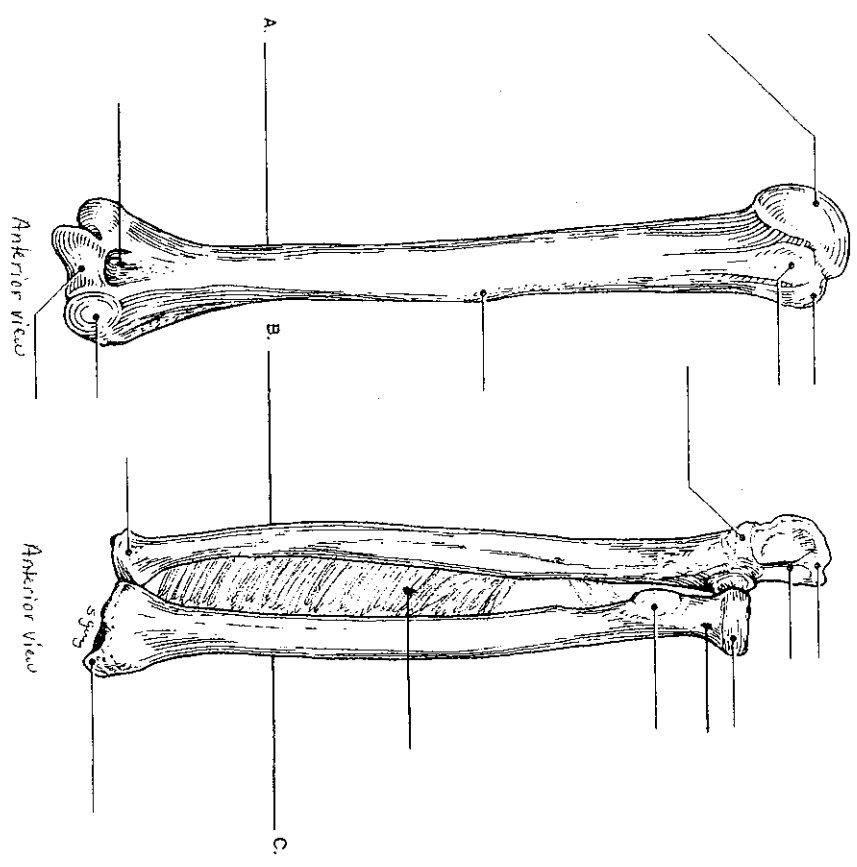


Figure 5-9

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

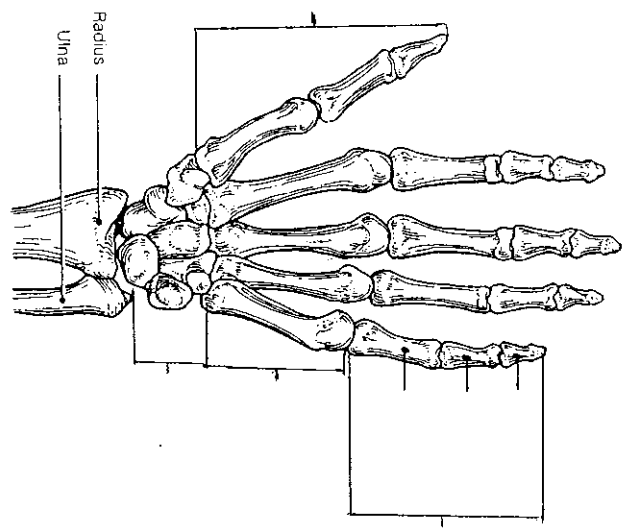


Figure 5-10

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
 - B. Massive
 - C. Lightweight
 - D. Shallow socket for limb attachment
 - E. Deep, secure socket for limb attachment
 - F. Weight-bearing
- Pectoral: _____ Pelvic: _____

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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

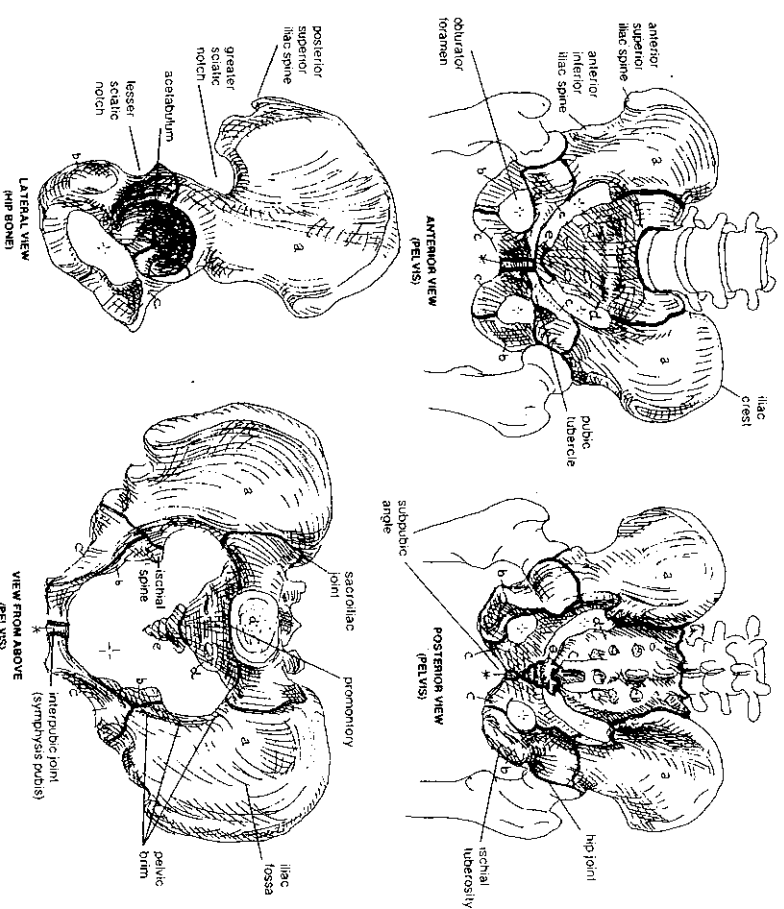
- | | | | |
|---------------------|-----------------------|----------------------|--------------------|
| A. Acromion | F. Coronoid fossa | K. Olecranon fossa | P. Scapula |
| B. Capitulum | G. Deltoid tuberosity | L. Olecranon process | Q. Sternum |
| C. Carpals | H. Glenoid cavity | M. Plianges | R. 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

**SKELTAL SYSTEM / LOWER LIMBS
PELVIS & PELVIC GIRDLE***

2 ILLIUM, 2 ISCHIUM, 2 PUBIS, SACRUM, & COCCYX

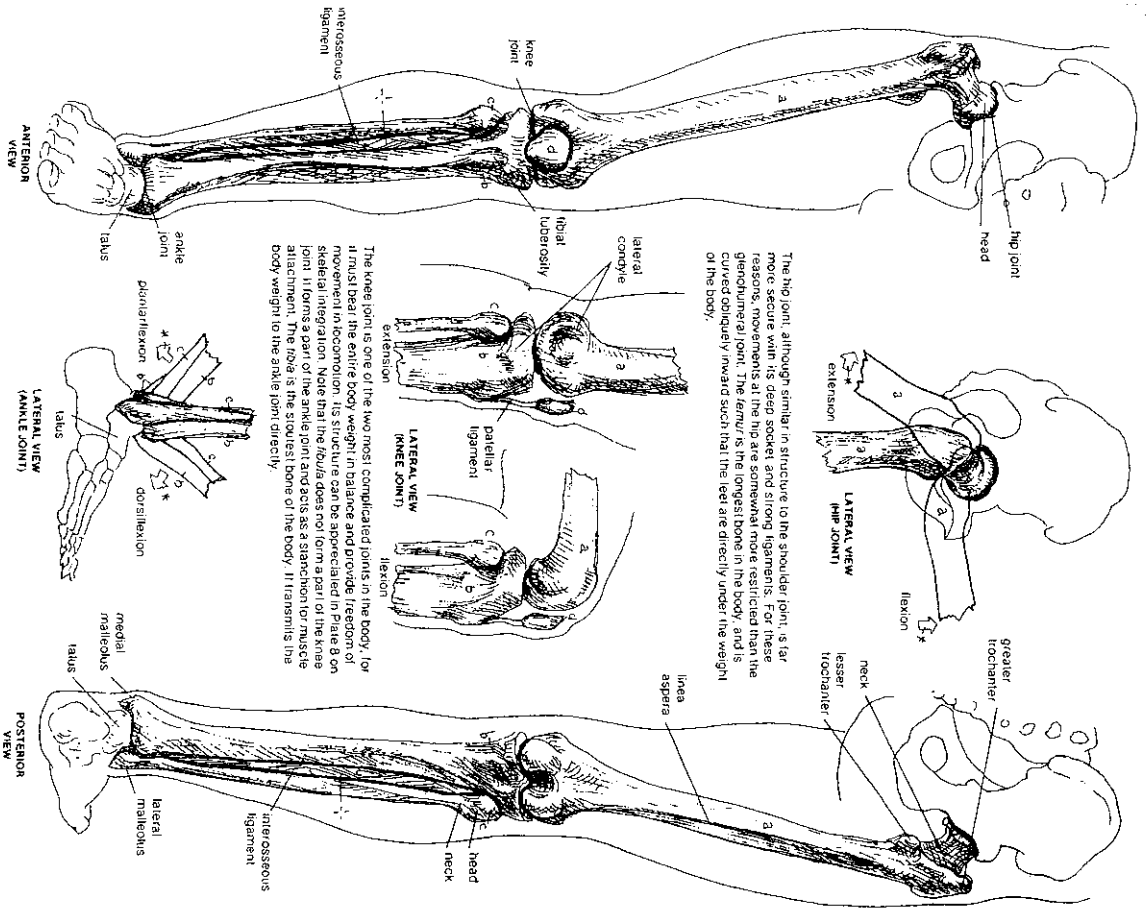
ON 6
1. Color the various lettered bones, avoiding the spaces marked open (O), use same colors for sacrum and coccyx as were used on Plate 13.
2. Select a new color for the lower right diagram, and color the male pelvis, drawn in light lines. To do this, color along the reds of each border line, following them around completely. Then fill in the area between the borders. Leave the female pelvis blank.



The pelvic girdle consists of the two hip bones that join with one another at the interpubic joint. The pelvis is that bowl created from the two hip bones, the sacrum, and the coccyx. It has an inlet above and an outlet below. The two hip bones, each with its proper shape, together form a weight-bearing arch with the sacrum, directing the body weight to the thigh bones while giving consideration to the pelvic girdle. Unlike the arm bones which respect the pelvic girdle, the thigh bones find solid security with respect to the hip bones within which they balance the weight of the body. The pelvis retains the pelvic viscera in its cavity, which is continuous with the abdominal cavity. The male and female pelvis differ considerably, principally, the female cavity is rounder and wider in all dimensions. This larger pelvis can more easily accommodate a developing fetus, especially as it traverses the birth canal in the pelvic outlet.

SKELETAL SYSTEM / LOWER LIMB
TRIGH: FEMUR. LEG: TIBIA, FIBULA. PATELLA.

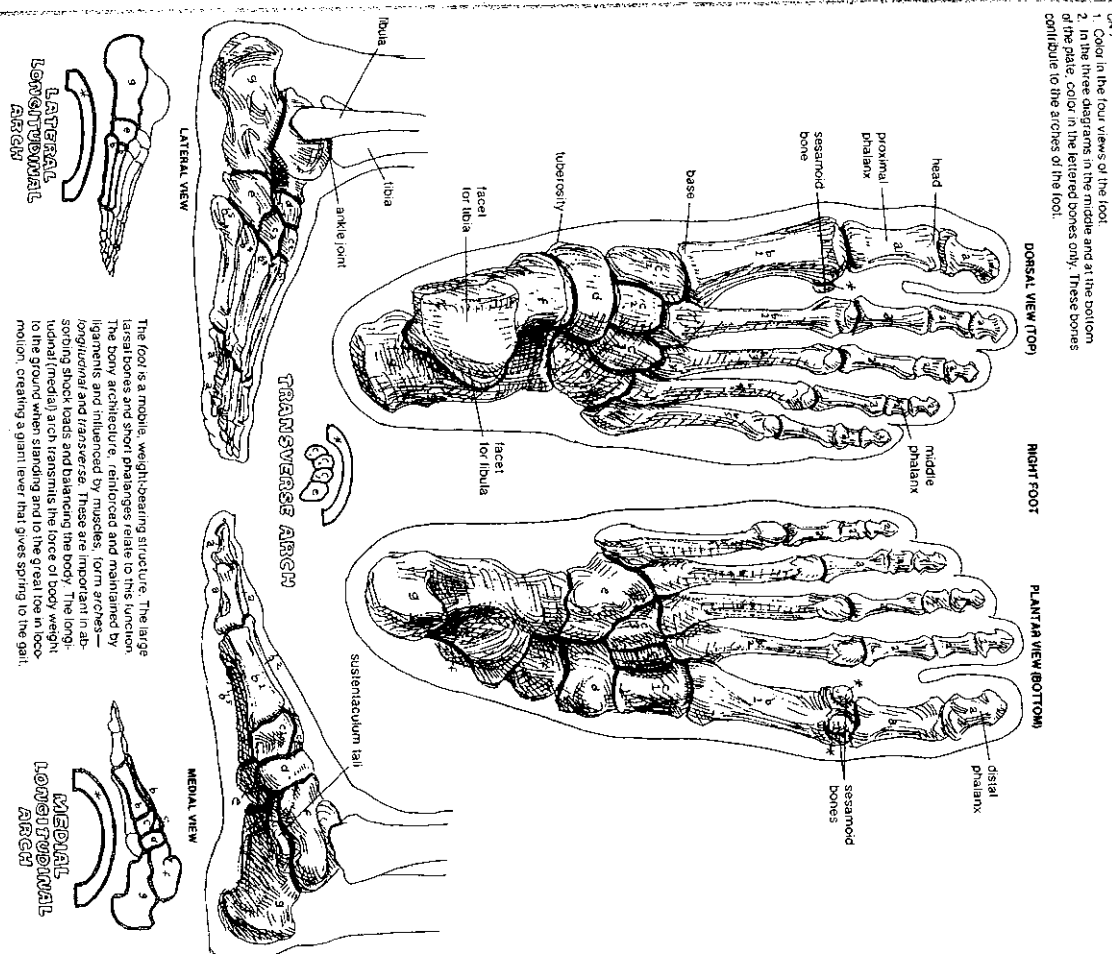
PLATE 20
 see also 15, 19, 21



Color these three bones and the patella.
 1. In the two diagrams demonstrating hip and ankle joint movements, the normal position of the bone or bones is straight, upright. In those bones where a movement has taken place (arrow), color them a little lighter than those in anatomical (normal) position.

SKELETAL SYSTEM / LOWER LIMB
BONES OF THE FOOT*
 14 PHALANXES. 5 METATARSALS.
 3 CUNEIFORMS. NAVICULAR.
 3 CUBOID. TALUS, CALCANEUS,

PLATE 21
 see also 20, 17



Color in the four views of the foot.
 1. Color in the three diagrams in the middle and at the bottom of the plate. Color in the lateral bones only. These bones contribute to the arches of the foot.

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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

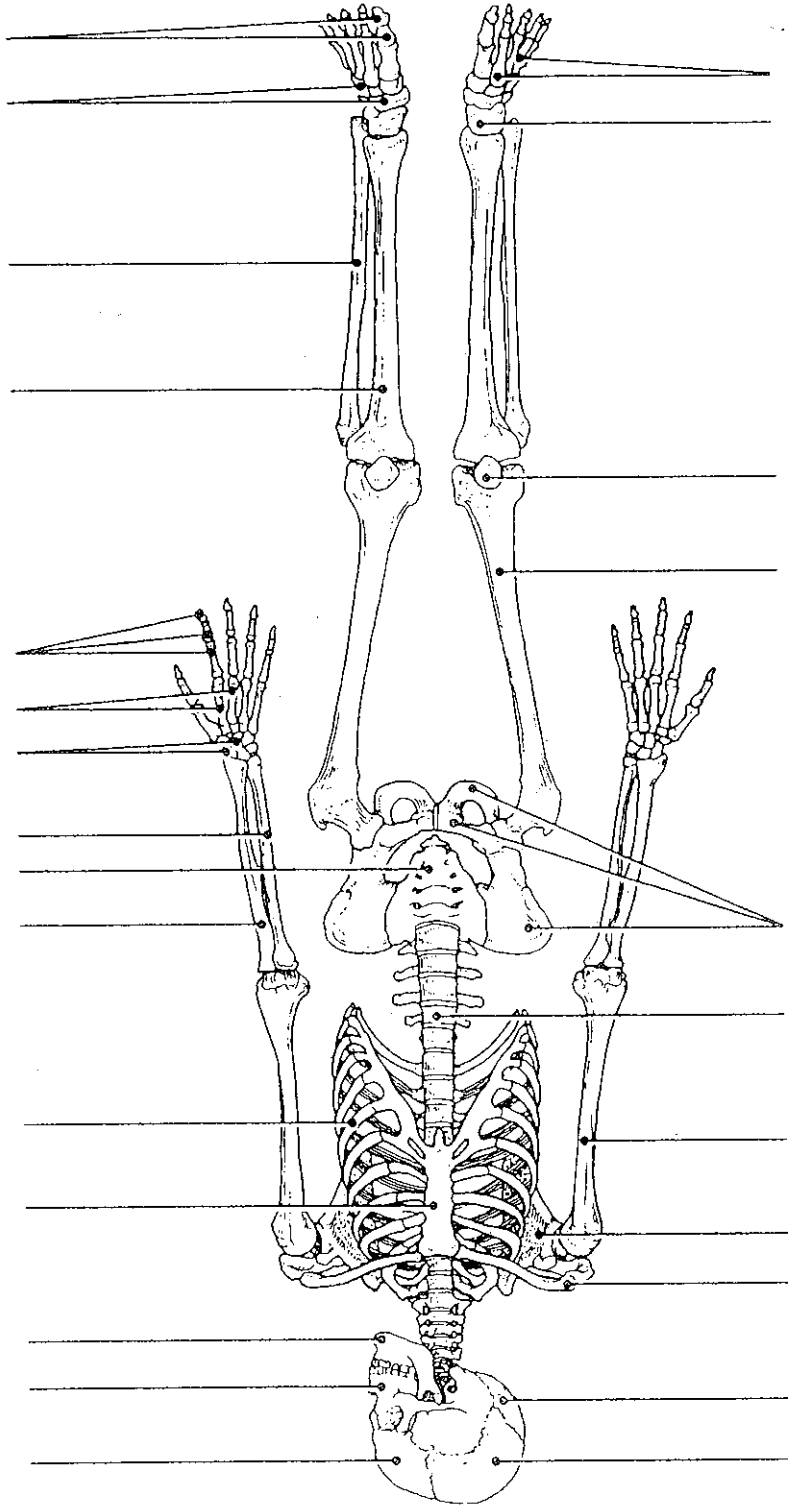


Figure 5-13

5

5. 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. Sacrotibial 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

SKELTAL SYSTEM CLASSIFICATION OF JOINTS*

- ON 2
1. Color all listed structures on the plate.
 2. Use a dark color for the synovial cavity (I).
- Bones are connected at joints (articulations). Joint movements are determined by joint structure. Joint structure is classified as fibrous, cartilage, or synovial.

FIBROUS JOINT*

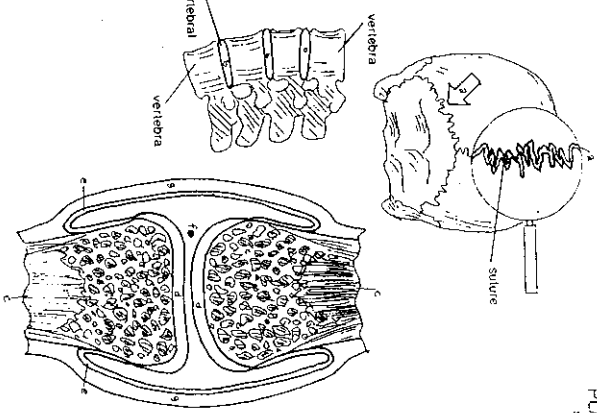
The bones are attached by fibrous connective tissue providing little or no movement. Examples: sutures between flat bones of the skull (immovable); interosseous ligaments between bones of the leg and between bones of the forearm (partly movable).

CAFTILLAGINOUS JOINT*

The bones are connected by cartilage connective tissue reinforced by fibrous tissue, permitting little or no movement. Example: fibrocartilage discs between vertebral bodies (partly movable); cartilage between epiphysis and diaphysis of developing bone (immovable).

**SYNOVIAL JOINT (TYPICAL) *
ARTICULATING BONES -
ARTICULAR CARTILAGE &
SYNOVIAL MEMBRANE -
SYNOVIAL CAVITY (FLUID) -
JOINT CAPSULE (LIGAMENT) ***

The bones, capped with cartilage, articulate within a cavity lined by a membrane secreting a viscous fluid that absorbs the heat of friction during movement. The synovial joint is surrounded by a fibrous capsule interlaced with ligaments and tendons.



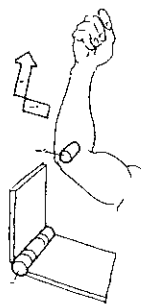
TYPES OF SYNOVIAL JOINTS *

BALL & SOCKET*



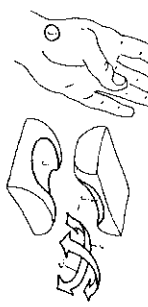
The balllike head of one bone fits into the socket, the head of another, permitting all movements. Examples: shoulder and hip joints.

HINGE*



The C-shaped surface of one bone swings about the rounded surface of another. Movement is limited to flexion/extension. Examples: elbow, ankle, interphalangeal joints.

SADDLE*



The concave surfaces of two bones articulate with one another. All movements are possible, but rotation is hindered. Example: carpal-carpal joint of thumb.

ELLIPSOID*



This is a reduced ball and socket configuration in which rotation is not permitted. Example: radiocarpal (wrist) joint.

PIVOT*



A ring of bone rotates about a process of bone. Movement is limited to rotation. Example: skull on its axis (in cervical vertebra) and atlas about the odontoid process of the 2nd cervical vertebra.

GLIDING*



Two opposed flat surfaces of bone glide across one another. Movement is limited to gliding. Examples: intercarpal joints.

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

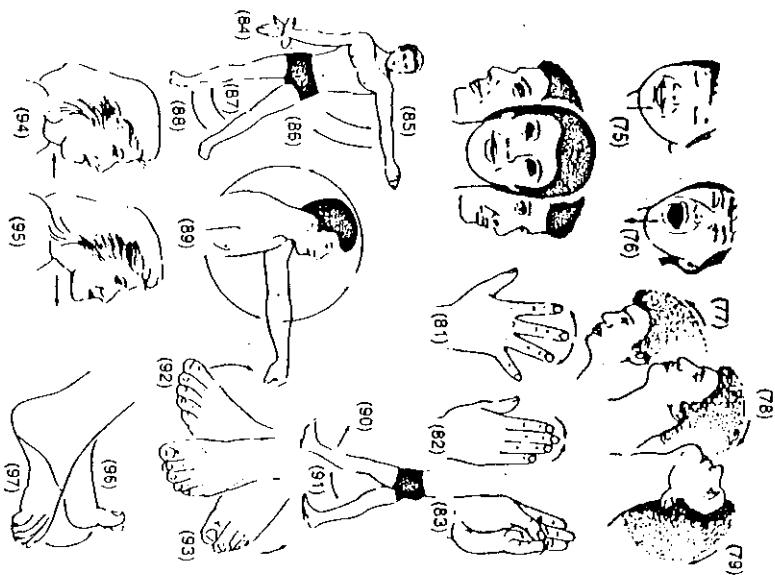
Key A: A. Cartilaginous
B. Fibrous
C. Synovial

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?

OBJ 3 FIGURE 9.3 Movements of the Skeleton
Identify each skeletal movement.



75	_____	83	_____	91	_____
76	_____	84	_____	92	_____
77	_____	85	_____	93	_____
78	_____	86	_____	94	_____
79	_____	87	_____	95	_____
80	_____	88	_____	96	_____
81	_____	89	_____	97	_____