

Name: \_\_\_\_\_ Lab Time: \_\_\_\_\_

## Skeletal System

### Study Guide, Chapter 6 – 9

#### Part I. Clinical Applications

1. 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 the orbit.
2. Mrs. Brusso, 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?
3. 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. An X ray of his head reveals a fracture. What part of which bone was fractured to cause his loss of smell?
4. 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. For what condition will she be tested?
5. Jerry is giving cardiopulmonary resuscitation to Ms. Jackson, an elderly woman who has just been rescued from the waters of Fort Bragg. What bone is he compressing?
6. How does the process of calcification differ from ossification?

7. The conditions of gigantism and pituitary dwarfism are extreme opposites. What effect does hormonal regulation of bone growth have on each condition?
8. A clinical diagnosis has been made that substantiates the presence of a herniated disc and a severe case of sciatica. What is the relationship between the two conditions?
9. Good nutrition and exercise are extremely important in bone development, growth, and maintenance. If you were an astronaut, what vitamin supplements and what type of exercise would you need to be sure that the skeletal system retained its integrity while in a weightless environment in space?
10. What is the association between the metabolic disorder known as gout, which affects the joints, and damage to the kidney?
11. How might a decision to wear pointed shoes contribute the formation of a bunion?

12. A high school football player notices swelling in the knee joint. He decides he'd better tell the coach who responds by telling him, "You have water on the knee". As a student of anatomy, explain what the coach is talking about.
  
13. Greg is a pitcher on the high school baseball team. He spends many hours practicing to improve his pitching skills. Recently, he has been complaining about persistent pain beneath his right shoulder blade (scapula). What do you think is causing the pain? (Hint – it is not due to a torn rotator cuff).
  
14. Steve injured his right knee during a basketball game when he jumped to rebound the ball and landed off-balance on the right leg. He has been experiencing pain and limited mobility of the knee joint. What type of injury do you think Steve has? What techniques would be used to explore the extent of the damage?
  
15. Garrett was bodysurfing when he had a bad wipeout and felt his shoulder "pop". When Garrett finally made it back to towel he was out of breath, in pain and his arm was hanging at an odd angle. What do you think happened?

## Part II

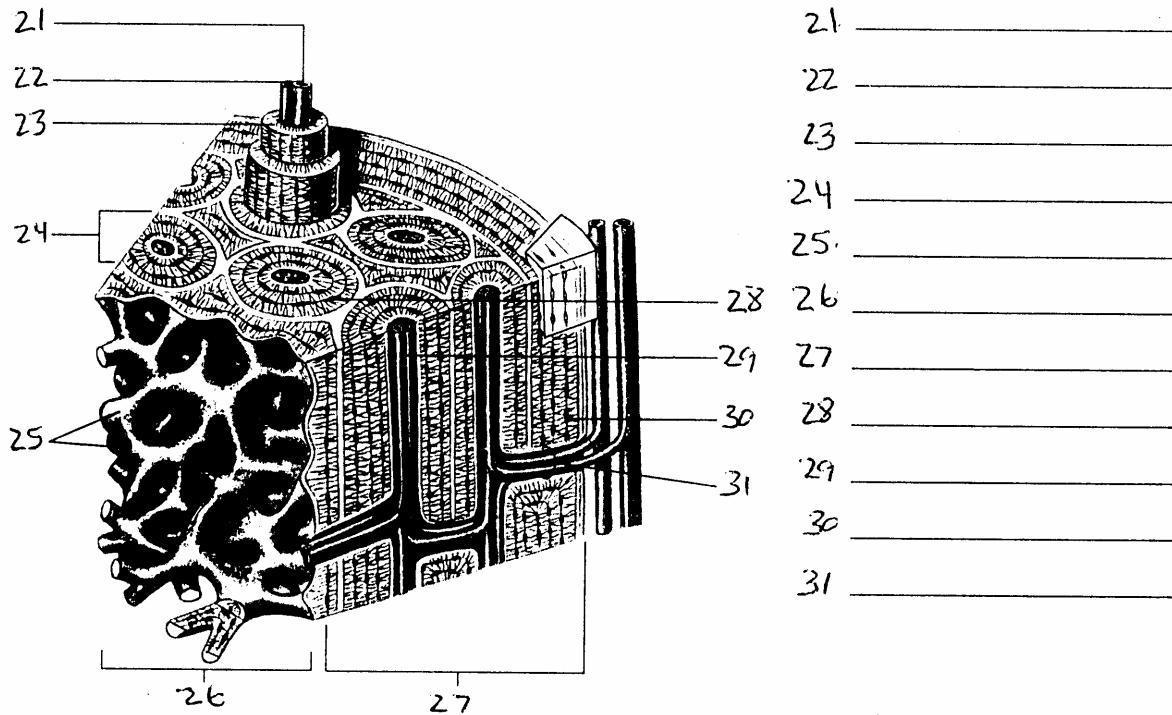
Using the terms below, complete the following statements.

osteoclasts	bone markings	condyle
compound	osteocytes	osteon
minerals	remodeling	calcitriol
ossification	support	epiphysis
calcium	irregular	communitied
intramembranous	Wormian	endochondral
osteoblasts	yellow marrow	

1. The storage of lipids in bones occurs in the \_\_\_\_\_.
2. Of the six major functions of the skeleton, the two that depend on the dynamic nature of bone are storage and \_\_\_\_\_.
3. Cuboidal cells that synthesize the organic components of the bone matrix are \_\_\_\_\_.
4. In adults, the cells responsible for maintaining the matrix in osseous tissue are the \_\_\_\_\_.
5. The basic functional unit of compact bone is the \_\_\_\_\_.
6. The expanded region of a long bone consisting of spongy bone is called the \_\_\_\_\_.
7. When osteoblasts differentiate within a mesenchymal or fibrous connective tissue, the process is called \_\_\_\_\_ ossification.
8. The type of ossification that begins with the formation of a hyaline cartilage model is \_\_\_\_\_.
9. The process which refers specifically to the formation of bone is \_\_\_\_\_.
10. The major mineral associated with the development and mineralization of bone is \_\_\_\_\_.
11. The organic and mineral components of the bone matrix are continually being recycled and renewed through the process of \_\_\_\_\_.
12. During bone renewal, as one osteon forms through the activity of osteoblasts, another is destroyed by \_\_\_\_\_.
13. The ability of bone to adapt to new stresses results from the turnover and recycling of \_\_\_\_\_.
14. The hormone synthesized in the kidneys which is essential for normal calcium and phosphate ion absorption in the digestive tract is \_\_\_\_\_.
15. Fractures which shatter the affected area into a multitude of bony fragments are called \_\_\_\_\_ fractures.
16. Fractures which project through the skin are called \_\_\_\_\_ fractures.
17. Bones which have complex shapes with short, flat, notched, or ridged surfaces are termed \_\_\_\_\_.
18. Sutural bones, which are small, flat, odd-shaped bones found between the flat bones of the skull, are referred to as \_\_\_\_\_ bones.
19. The surface features of the skeletal system which yield an abundance of anatomical information are referred to as \_\_\_\_\_.
20. A smooth, rounded articular process that articulates with an adjacent bone is a \_\_\_\_\_.

**FIGURE 6.1** Structural Organization of Bone

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\_\_\_\_\_ 32. When cartilage is produced at the epiphyseal side of the metaphysis at the same rate as bone is deposited on the opposite side, bones:

- a. grow wider
- b. become shorter
- c. grow longer
- d. become thicker

\_\_\_\_\_ 33. The major advantage(s) for bones to undergo continual remodeling is (are):

- a. it may change the shape of a bone
- b. it may change the internal structure of a bone
- c. it may change the total amount of minerals deposited in the bones
- d. a, b, and c are correct

\_\_\_\_\_ 34. The fibers of *tendons* intermingle with those of the periosteum, attaching:

- a. skeletal muscles to bones
- b. the end of one bone to another bone
- c. the trabecular framework to the periosteum
- d. articulations with the trabeculae

\_\_\_\_\_ 35. Giant cells, called *osteoclasts*, with 50 or more nuclei serve to:

- a. synthesize the organic components of the bone matrix
- b. form the trabecular framework which protects cells of the bone marrow
- c. line the inner surfaces of the central canals
- d. secrete acids which dissolve the bony matrix and release the stored minerals

## Part III

Using the terms below, complete the following statements.

osteomalacia	osteopenia	epiphyseal plates	depressed
diaphysis	endochondral	rickets	canaliculi
osteoblasts	intramembranous		

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1. The communication pathways from the lacunae, which connect the osteocytes with one another and with the blood vessels of the Haversian canal, are \_\_\_\_\_.
2. The condition in which an individual develops a bowlegged appearance as the leg bones bend under the weight of the body is \_\_\_\_\_.
3. The type of cells responsible for the production of new bone are \_\_\_\_\_.
4. Dermal bones, such as several bones of the skull, the lower jaw, and the collarbone, are a result of \_\_\_\_\_ ossification.
5. Limb bone development is a good example of the process of \_\_\_\_\_ ossification.
- 6 Long bone growth during childhood and adolescence is provided by persistence of the \_\_\_\_\_.
7. The condition that can occur in \_\_\_\_\_ adults whose diet contains inadequate levels of calcium or vitamin D is \_\_\_\_\_.
8. Fragile limbs, a reduction in height, and the loss of teeth are a part of the aging process referred to as \_\_\_\_\_.

**BODY TREK:**

Using the terms below, fill in the blanks to complete the trek through a long bone in the upper arm, the humerus.

Red marrow	Endosteum	Lacuna
Trabeculae	Canaliculi	Volkman's canal
Osteoclasts	Blood vessels	Compact bone
Compound	Osteon	Osteocytes
Lamella	Yellow marrow	Haversian canal
Periosteum	Red blood cells	Cancellous or spongy

For this trek Robo will enter the interior of the humerus, the long bone in the upper part of the arm. The entry point is accessible due to a (9) \_\_\_\_\_ fracture in which the bone has projected through the skin at the distal end of the shaft. The robot proceeds to an area of the bone that is undisturbed by the trauma occurring in the damaged region. The micro-robot enters the medullary cavity which contains (10) \_\_\_\_\_, and moves proximally through a "sea" of fat to a region where it contacts the lining of the cavity, the (11) \_\_\_\_\_. After passing through the lining, Robo senses an area that projects images of an interlocking network of long plates or beams riddled with holes or spaces, which are characteristic of (12) \_\_\_\_\_ bone. The structural forms of this network are called (13) \_\_\_\_\_, which consist of a bony matrix, the (14) \_\_\_\_\_, with bone cells, the (15) \_\_\_\_\_, located between the layers. The bone cells communicate with other bone cells through small channels called (16) \_\_\_\_\_. The "holes" or spaces have a reddish glow and appear to be actively involved in producing disk-shaped cells or (17) \_\_\_\_\_, which establish the robot's position in a cavity containing (18) \_\_\_\_\_. Robo's extended arm grabs onto one of the "bony beams" and, after moving along the beam for a short distance, contact is made with a large canal located at a right angle to the bone's shaft. This canal, called (19) \_\_\_\_\_, is the major communicating pathway between the bone's interior and exterior surface, the (20) \_\_\_\_\_. Advancing through the canal, the robot's sensors are signaling dense tissue surrounding the canal indicating that this is the region of (21) \_\_\_\_\_. Suddenly, Robo arrives at an intersection where the canal dead-ends; however, another large tube-like canal runs parallel to the long axis of the bone. This tube, the (22) \_\_\_\_\_, contains nerves, (23) \_\_\_\_\_, and lymphatic vessels. This canal, with its contents and associated concentric lamellae and osteocytes, is referred to as a(n) (24) \_\_\_\_\_. The robot's visit to an osteocyte located in a(n) (25) \_\_\_\_\_ is accomplished by trekking from the large canal into smaller canaliculi which form a dense transportation network connecting all the living cells of the bony tissue to the nutrient supply. The giant osteocytes with dark nuclei completely fill the lumen at the bone cell sites located throughout the lamella. Around the bone sites specialized bone digesting cells, the (26) \_\_\_\_\_, are liquefying the matrix, making the area insensitive to the robot's electronic devices, terminating the effectiveness of the signals transmitted to Mission Control. The exit program is relayed to the robot and the "reverse" trek begins through the bone's canal "system" and a return to the fracture site for removal and preparation for the next trek.

- \_\_\_\_\_ 27. *Foramina*, located on the bones of the skull, serve primarily as passage-ways for:
- airways and ducts for secretions
  - sound and sight
  - nerves and blood vessels
  - muscle fibers and nerve tissue
- \_\_\_\_\_ 28. The lines, tubercles, crests, ridges, and other processes on the bones represent areas which are used primarily for:
- attachment of muscles to bones
  - attachment of bone to bone
  - joint articulation
  - increasing the surface area of the bone
- \_\_\_\_\_ 29. The *sinuses* or internal chambers in the skull are found in:
- sphenoid, ethmoid, vomer, lacrimal bones
  - sphenoid, frontal, ethmoid, maxillary bones
  - ethmoid, frontal, lacrimal, maxillary bones
  - lacrimal, vomer, ethmoid, frontal bones

Using the terms below, complete the following statements.

centrum	muscles	floating
axial	costal	capitulum
fontanelas	cranium	microcephaly
mucus	cervical	foramen magnum
compensation (secondary)	paranasal	inferior concha

30. The part of the skeletal system that forms the longitudinal axis of the body is the \_\_\_\_\_ division.
31. The bones of the skeleton provide an extensive surface area for the attachment of \_\_\_\_\_.
32. The part of the skull that provides protection for the brain is the \_\_\_\_\_.
33. The opening that connects the cranial cavity with the canal enclosed by the spinal column is the \_\_\_\_\_.
34. The paired scroll-like bones located on each side of the nasal septum are the \_\_\_\_\_.
35. The airspaces connected to the nasal cavities are the \_\_\_\_\_ sinuses.
36. Irritants are flushed off the walls of the nasal cavities because of the presence of \_\_\_\_\_.
37. At birth, the cranial bones are connected by areas of fibrous connective tissues called \_\_\_\_\_.
38. An undersized head caused by a cessation of brain enlargement and skull growth is called \_\_\_\_\_.
39. The spinal curves that assist in allowing a child to walk and run are called \_\_\_\_\_ curves.
40. The last two pairs of ribs that do not articulate with the sternum are called \_\_\_\_\_ ribs.

## Part IV

## MATCHING:

Match the terms in column B with the terms in column A. Use letters for answers in the spaces provided.

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## PART I

- COLUMN A**
- H 1. hyoid bone  
 \_\_\_\_\_ 2. respiratory movement  
 \_\_\_\_\_ 3. skullcap  
 \_\_\_\_\_ 4. sphenoid bone  
 \_\_\_\_\_ 5. nasal septum  
 \_\_\_\_\_ 6. air-filled chambers  
 \_\_\_\_\_ 7. fontanel  
B 8. craniostenosis

- COLUMN B**
- A. calvaria  
 B. premature closure of fontanel  
 C. infant skull  
 D. vomer  
 E. paranasal sinuses  
 F. sella turcica  
 G. elevation of rib cage  
 H. stylohyoid ligaments

## PART II

- COLUMN A**
- N 9. primary curves  
 \_\_\_\_\_ 10. cervical vertebrae  
 \_\_\_\_\_ 11. lumbar vertebrae  
 \_\_\_\_\_ 12. atlas  
 \_\_\_\_\_ 13. axis  
 \_\_\_\_\_ 14. vertebrosteral ribs  
 \_\_\_\_\_ 15. vertebrochondral ribs

- COLUMN B**
- I. lower back  
 J. ribs 8-10  
 K. C<sub>1</sub>  
 L. C<sub>2</sub>  
 M. ribs 1-7  
 N. accommodation  
 O. neck

Using the terms below, complete the following statements.

kyphosis

mental foramina

pharyngotympanic (Eustachian Tube)

auditory ossicles

lordosis

alveolar processes

metopic

tears

scoliosis

compensation (Secondary)

16. The structure that ends inside the mass of the temporal bone which connects the airspace of the middle ear with the pharynx is the \_\_\_\_\_ tube.
17. At birth the two frontal bones which have not completely fused are connected at the \_\_\_\_\_ suture.
18. The lacrimal bones house the structures that are associated with the production and release of \_\_\_\_\_.
19. The associated skull bones of the middle ear that conduct sound vibrations from the tympanum to the inner ear are the \_\_\_\_\_.
20. The oral margins of the maxillae that provide the sockets for the teeth are the \_\_\_\_\_.
21. Small openings which serve as nerve passageways on each side of the body of the mandible are the \_\_\_\_\_.
22. The lumbar and cervical curves which appear several months after birth and help to position the body weight over the legs are known as \_\_\_\_\_ curves.
23. A normal thoracic curvature which becomes exaggerated, producing a "roundback" appearance, is a \_\_\_\_\_.
24. An exaggerated lumbar curvature or "swayback" appearance is a \_\_\_\_\_.
25. An abnormal lateral curvature which usually appears in adolescence during periods of rapid growth is \_\_\_\_\_.

\_\_\_\_\_ 26. Part of the loss in height that accompanies aging results from:

- degeneration of osseous tissue in the diaphysis of long bones
- degeneration of skeletal muscles attached to bones
- the decreasing size and resiliency of the intervertebral discs
- the reduction in the number of vertebrae due to aging



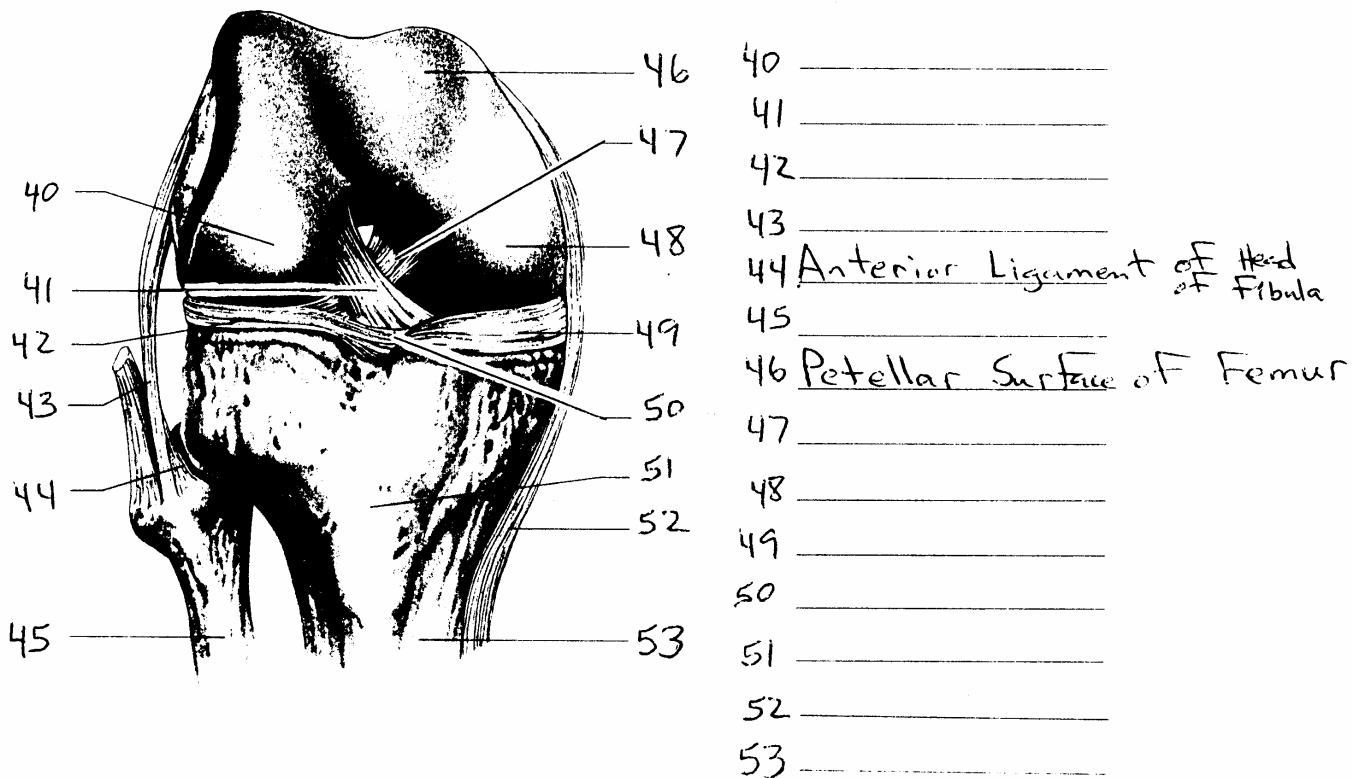
Using the terms below, complete the following statements.

9

- |                |                 |                     |
|----------------|-----------------|---------------------|
| synovial       | osteoarthritis  | hip                 |
| bursae         | elbow           | synostosis          |
| scapulohumeral | anulus fibrosus | knee                |
| supination     | suture          | accessory ligaments |
| ellipsoidal    | flexion         | gliding             |

27. A synarthrotic joint found only between the bones of the skull is a \_\_\_\_\_.
28. A totally rigid immovable joint resulting from fusion of bones is a \_\_\_\_\_.
29. Localized thickenings of joint capsule are called \_\_\_\_\_.
30. Small, synovial-filled pockets that form where a tendon or ligament rubs against other tissues are called \_\_\_\_\_.
31. A movement that reduces the angle between the articulating elements is \_\_\_\_\_.
32. Movement in the wrist and hand in which the palm is turned forward is \_\_\_\_\_.
33. Diarthrotic joints that permit a wide range of motion are called \_\_\_\_\_ joints.
34. The type of joint that connects the fingers and toes with the metacarpals and metatarsals is an \_\_\_\_\_.
35. The joints between the superior and inferior articulations of adjacent vertebrae are \_\_\_\_\_.
36. The tough outer layer of fibrocartilage on intervertebral discs is the \_\_\_\_\_.
37. The joint that permits the greatest range of motion of any joint in the body is the \_\_\_\_\_ joint.
38. The extremely stable joint that is almost completely enclosed in a bony socket is the \_\_\_\_\_ joint.
39. The condition resulting from cumulative wear and tear at joint surfaces or from genetic factors affecting collagen formation is \_\_\_\_\_.

Anterior View of a Flexed Knee



Part IV

COMPLETION:

10

Using the terms below, complete the following statements.

- |                |               |                     |
|----------------|---------------|---------------------|
| gomphosis      | synchondrosis | arthritis           |
| hyperextension | fat pads      | articular cartilage |
| menisci        | ankylosis     | syndesmosis         |
| tendons        | luxation      | rheumatism          |

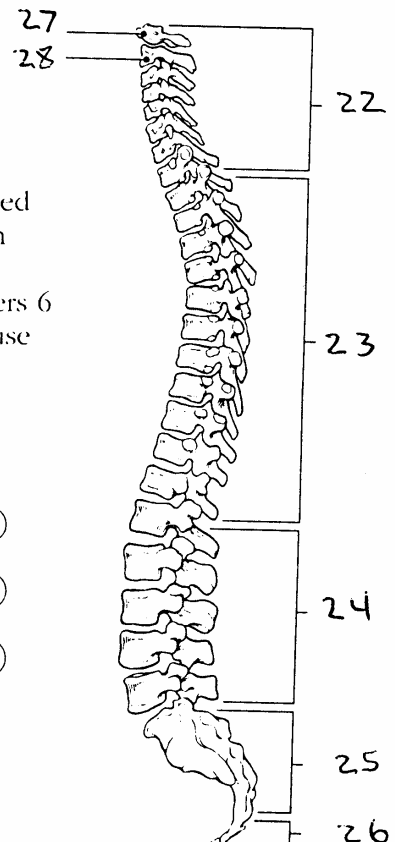
1. An abnormal fusion between articulating bones in response to trauma and friction is referred to as an ankylosis.
2. Rheumatic diseases that affect synovial joints result in the development of \_\_\_\_\_.
3. The synarthrosis that binds each tooth to the surrounding bony socket is a \_\_\_\_\_.
4. A rigid cartilaginous connection such as an epiphyseal plate is called a \_\_\_\_\_.
5. The amphiarthrotic distal articulation between the tibia and fibula is a \_\_\_\_\_.
6. The joint accessory structures which may subdivide a synovial cavity are \_\_\_\_\_.
7. The accessory structures which provide protection for the articular cartilages are the \_\_\_\_\_.
8. Arthritis always involves damage to the \_\_\_\_\_.
9. A movement that allows you to gaze at the ceiling is \_\_\_\_\_.
10. A general term that indicates pain and stiffness affecting the skeletal and/or muscular systems is \_\_\_\_\_.
11. The structures that pass across or around a joint that may limit the range of motion and provide mechanical support are \_\_\_\_\_.
12. When articulating surfaces are forced out of position, the displacement is called a \_\_\_\_\_.

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.

- |                  |                   |                 |
|------------------|-------------------|-----------------|
| ___ 13 Calcaneus | ___ 16 Humerus    | ___ 19 Radius   |
| ___ 14 Frontal   | ___ 17 Mandible   | ___ 20 Sternum  |
| ___ 15 Femur     | ___ 18 Metacarpal | ___ 21 Vertebra |

Figure \_\_\_\_\_ 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.

- |            |            |
|------------|------------|
| 22 _____ ○ | 26 _____ ○ |
| 23 _____ ○ | 27 _____ ○ |
| 24 _____ ○ | 28 _____ ○ |
| 25 _____ ○ |            |



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

- \_\_\_\_\_ <sup>29</sup> "Soft spots," or membranous joints called \_\_\_\_\_ in the fetal skull, allow the skull to be \_\_\_\_\_ slightly during birth passage. They also allow for continued brain \_\_\_\_\_ during the later months of fetal development and early infancy. Eventually these soft spots are replaced by immovable joints called \_\_\_\_\_.
- \_\_\_\_\_ <sup>32</sup> The two spinal curvatures well developed at birth are the \_\_\_\_\_ and \_\_\_\_\_ curvatures. Because they are present at birth, they are called \_\_\_\_\_ curvatures. The secondary curvatures develop as the baby matures. The \_\_\_\_\_ curvature develops as the baby begins to lift his or her head. The \_\_\_\_\_ curvature matures when the baby begins to walk or assume the upright posture.
- \_\_\_\_\_ <sup>37</sup>

- 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**

- |                      |                     |                 |
|----------------------|---------------------|-----------------|
| Closed reduction     | Depressed fracture  | Simple fracture |
| Compression fracture | Greenstick fracture | Spiral fracture |
| Compound fracture    | Open reduction      |                 |

- \_\_\_\_\_ <sup>38</sup> Bone is broken cleanly; the ends do not penetrate the skin
- \_\_\_\_\_ <sup>39</sup> Nonsurgical realignment of broken bone ends and splinting of bone
- \_\_\_\_\_ <sup>40</sup> A break common in children; bone splinters, but break is incomplete
- \_\_\_\_\_ <sup>41</sup> A fracture in which the bone is crushed; common in the vertebral column
- \_\_\_\_\_ <sup>42</sup> A fracture in which the bone ends penetrate through the skin surface
- \_\_\_\_\_ <sup>43</sup> Surgical realignment of broken bone ends
- \_\_\_\_\_ <sup>44</sup> A result of twisting forces

45. Which of the following are part of the sphenoid?
- |                    |                      |
|--------------------|----------------------|
| A. Crista galli    | D. Pterygoid process |
| B. Sella turcica   | E. Lesser wings      |
| C. Petrous portion |                      |

- 46 Women suffering from osteoporosis are frequent victims of \_\_\_\_\_ fractures of the vertebrae.
- |               |                |
|---------------|----------------|
| A. compound   | D. compression |
| B. spiral     | E. depression  |
| C. comminuted |                |

## Part VI

For each of the following statements that is true, enter *T* in the answer blank.  
For each false statement, correct the underlined words by writing the correct words in the answer blank.

(12)

- \_\_\_\_\_ 1. In a sprain, the ligaments reinforcing a joint are excessively stretched or torn.
- \_\_\_\_\_ 2. Age-related erosion of articular cartilages and formation of painful bony spurs are characteristic of gouty arthritis.
- Acute \_\_\_\_\_ 3. Chronic arthritis usually results from bacterial invasion.
- \_\_\_\_\_ 4. Healing of a partially torn ligament is slow because its hundreds of fibrous strands are poorly aligned.
- \_\_\_\_\_ 5. Rheumatoid arthritis is an autoimmune disease.
- \_\_\_\_\_ 6. High levels of uric acid in the blood may lead to rheumatoid arthritis.
- \_\_\_\_\_ 7. A "soft" bone condition in children, usually caused by a lack of calcium or vitamin D in the diet, is called osteomyelitis.
- \_\_\_\_\_ 8. Atrophy and thinning of bone owing to hormonal changes or inactivity (generally in the elderly) is called osteoporosis.

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.

- \_\_\_\_\_ 9. The pectoral girdle is formed by the articulation of the hip bones and the sacrum.
- \_\_\_\_\_ 10. Bones present in both the hand and the foot are carpals.
- \_\_\_\_\_ 11. The tough, fibrous connective tissue covering of a bone is the periosteum.
- \_\_\_\_\_ 12. The point of fusion of the three bones forming a coxal bone is the glenoid cavity.
- \_\_\_\_\_ 13. The large nerve that must be avoided when giving injections into the buttock muscles is the femoral nerve.
- \_\_\_\_\_ 14. The long bones of a fetus are constructed of hyaline cartilage.
- \_\_\_\_\_ 15. Bones that provide the most protection to the abdominal viscera are the ribs.
- \_\_\_\_\_ 16. The largest foramen in the skull is the foramen magnum.
- \_\_\_\_\_ 17. The intercondylar fossa, greater trochanter, and tibial tuberosity are all bone markings of the humerus.
- \_\_\_\_\_ 18. The first major event of fracture healing is hematoma formation.

13

List the six functions of bone.

- 19. \_\_\_\_\_
- 20. \_\_\_\_\_
- 21. \_\_\_\_\_
- 22. \_\_\_\_\_
- 23. \_\_\_\_\_
- 24. \_\_\_\_\_

Answer the questions below using the terms in the box.

calcified matrix	proliferating cartilage
epiphyseal line	resting cartilage
hypertrophic cartilage	

- 25 The appearance of the \_\_\_\_\_ indicates that bone growth in length has stopped.
- 26 The zone of \_\_\_\_\_ consists of slightly larger chondrocytes arranged like stacks of coins.
- 27 The lengthwise expansion of the epiphyseal plate is the result of cell divisions at the zone of proliferating cartilage and maturation of cells in the zone of \_\_\_\_\_.
- 28 The zone of \_\_\_\_\_ is only a few cells thick and consists mostly of dead cells.
- 29 The cells that act to anchor the epiphyseal plate to the bone of the epiphysis are in the zone of \_\_\_\_\_.

Using the six terms below, match the description to the bone type (you may use an answer more than once).

flat bones	sesamoid bones
irregular bones	short bones
long bones	sutural bones

(wormian)

- 30. Small bones located between the joints of certain cranial bones.
- 31. Have a greater length than width, and consist of a diaphysis and a variable number of extremities.
- 32. Composed of two nearly parallel plates of compact bone enclosing a layer of spongy bone.
- 33. Somewhat cube-shaped and nearly equal in length and width.
- 34. Have complex shapes; include the vertebrae and certain facial bones.
- 35. These are small bones in tendons where considerable pressure develops.
- 36. Bones of the thighs, legs, toes, arms, forearms, and fingers are examples of this type of bone.
- 37. Cranial bones, sternum, ribs, and scapulae are classified as this type of bone.
- 38. The patella (kneecap) would be classified this way.

## Part VIII

14

## Divisions of the Skeletal System

- 1 There are \_\_\_\_\_ bones in the axial division and \_\_\_\_\_ bones in the appendicular division.
- 2 The bones called \_\_\_\_\_ connect the limbs to the axial skeleton.

Fill in the blanks.

- 3 Blood cell formation, known as \_\_\_\_\_, occurs in the red bone marrow.
- 4 Yellow bone marrow is composed primarily of \_\_\_\_\_ cells.
- 5 Mineral salts compose about \_\_\_\_\_% of the weight of bone.
- 6 \_\_\_\_\_ bone tissue makes up most of the bone tissue of short, flat, and irregularly shaped bones and most of the epiphyses of long bones.

Match the cranial bone to the feature associated with it (you may use the answers more than once).

E ethmoid bone	P parietal bone
F frontal bone	S sphenoid bone
O occipital bone	T temporal bone

- |                                   |                               |
|-----------------------------------|-------------------------------|
| 7 _____ sella turcica             | 20 _____ zygomatic process    |
| 8 _____ foramen magnum            | 21 _____ cribriform plate     |
| 9 _____ foramen ovale             | 22 _____ superior nuchal line |
| 10 _____ petrous portion          | 23 _____ lateral masses       |
| 11 _____ supraorbital foramen     | 24 _____ carotid foramen      |
| 12 _____ mastoid process          | 25 _____ metopic suture       |
| 13 _____ greater wings            | 26 _____ perpendicular plate  |
| 14 _____ hypoglossal arch         | 27 _____ lesser wing          |
| 15 _____ jugular foramen          | 28 _____ pterygoid processes  |
| 16 _____ superior nasal conchae   | 29 _____ olfactory foramina   |
| 17 _____ external auditory meatus | 30 _____ crista galli         |
| 18 _____ optic foramen            | 31 _____ styloid process      |
| 19 _____ mandibular fossa         |                               |

Classify the joints listed below (you may use the answers more than once).

G gomphosis	SUT sutures	SYN syndesmoses
-------------	-------------	-----------------

- 32 \_\_\_\_\_ Joint in which a cone-shaped peg fits into a socket.
- 33 \_\_\_\_\_ Found between the bones of the skull.
- 34 \_\_\_\_\_ An example is the distal articulation of the tibia and fibula.
- 35 \_\_\_\_\_ The articulations of the roots of the teeth with the alveoli of the maxillae and mandible.
- 36 \_\_\_\_\_ Has considerably more fibrous connective tissue than a suture.
- 37 \_\_\_\_\_ When completely fused, they are called synostoses.

(15)

Answer the following questions relating to Lyme disease, bursitis, dislocations, sprains, and strains.

38. Lyme disease is caused by a bacterium, \_\_\_\_\_, transmitted to humans by \_\_\_\_\_. Within a few weeks of the bite, a typical rash resembling a "\_\_\_\_\_ " develops.
- 39 A \_\_\_\_\_ is the forcible wrenching or twisting of a joint with stretching or tearing of a ligament without dislocation, while a \_\_\_\_\_ is a stretched or partially torn muscle.
- 40 A partial or incomplete dislocation is called a \_\_\_\_\_.
- 41 A dislocation or \_\_\_\_\_ is the displacement of a bone from a \_\_\_\_\_, with tearing of ligaments, tendons, and \_\_\_\_\_ capsules.
- 42 Bursitis may be caused by \_\_\_\_\_, by an acute or \_\_\_\_\_ infection, or by \_\_\_\_\_.
- \_\_\_\_\_ are often associated with friction bursitis over the head of the first metatarsal.

Check your knowledge of the skull by filling in the blanks for the questions below.

- 43 The skull contains \_\_\_\_\_ bones.
- 44 The \_\_\_\_\_ bones enclose and \_\_\_\_\_ the brain.
- 45 There are \_\_\_\_\_ facial bones in the skull.
- 46 A \_\_\_\_\_ is an immovable joint found only between skull bones.
- At birth, membrane-filled spaces called \_\_\_\_\_ are found between cranial bones.
47. The primary organic constituent of bone tissue is
- |                         |                      |
|-------------------------|----------------------|
| A. tricalcium phosphate | D. calcium phosphate |
| B. collagen             | E. sodium phosphate  |
| C. keratin              |                      |
48. The zone of \_\_\_\_\_ consists of slightly larger chondrocytes arranged like stacks of coins.
- |                            |   |
|----------------------------|---|
| A. calcified matrix        | 49 Ossification begins around the _____ week of embryonic life. |
| B. hypertrophic cartilage  | A. fifth to sixth week  |
| C. proliferating cartilage | B. sixth to seventh week  |
| D. resting cartilage       | C. seventh to eighth week                                       |
| E. epiphyseal plate        | D. eighth to ninth week   |
|                            | E. tenth to eleventh week                                       |
- 50 Osteomyelitis is
- |   |
|---|
| A. an inflammation of a bone                    |
| B. a type of bone cancer                        |
| C. a malignant tumor composed of bone tissue    |
| D. often caused by <i>Staphylococcus aureus</i> |
| E. both A and D                                 |

## Part VIII

anterior	posterior
anterolateral	posterolateral
coronal	sagittal
lambdoid	squamous

(16)

- \_\_\_\_\_ 1. These fontanels are located on each side of the skull at the junction of the frontal, parietal, temporal, and sphenoid bones.
- \_\_\_\_\_ 2. The suture between the parietal bones and occipital bone.
- \_\_\_\_\_ 3. This fontanel is situated between the two parietal bones and the occipital bones.
- \_\_\_\_\_ 4. The suture located between the frontal bone and the parietal bones.
- \_\_\_\_\_ 5. This suture is located between the two parietal bones.
- \_\_\_\_\_ 6. The fontanel located between the angles of the two parietal bones and the two segments of the frontal bones.
- \_\_\_\_\_ 7. The suture between the parietal bones and temporal bones.
- \_\_\_\_\_ 8. These fontanels are situated at the junction of the parietal, occipital, and temporal bones.

Match the special movement with the correct definition.

- |                           |   |
|---------------------------|---|
| 9. _____ inversion        | 1. a downward (inferior) movement of a part of the body   |
| 10. _____ eversion        | 2. movement of the forearm in which the palm is turned posteriorly or inferiorly                                |
| 11. _____ dorsiflexion    | 3. an example is pulling the lower jaw back in line with the upper jaw (a movement back to anatomical position) |
| 12. _____ plantar flexion | 4. bending the foot at the ankle joint in the direction of the plantar surface                                  |
| 13. _____ protraction     | 5. movement of the sole of the foot medially  |
| 14. _____ retraction      | 6. an upward (superior) movement of a part of the body  |
| 15. _____ supination      | 7. movement of the forearm in which the palm is turned anteriorly or superiorly                                 |
| 16. _____ pronation       | 8. an example is moving the shoulder girdle anteriorly  |
| 17. _____ elevation       | 9. bending the foot at the ankle joint in the direction of the dorsum   |
| 18. _____ depression      | 10. movement of the sole of the foot laterally  |
19. Which of the following is/are true regarding synovial fluid?
- A. It is secreted by the synovial membrane.  
 B. It functions to lubricate and nourish the articular cartilage.  
 C. It has the consistency of uncooked egg whites.  
 D. All of the above statements are correct.  
 E. None of the above statements are correct.
20. The intervertebral joints in the spinal column are known as
- A. sutures  
 B. diarthroses  
 C. symphyses  
 D. synchondroses  
 E. gomphoses
21. Slightly movable joints are referred to as
- A. amphiarthritic  
 B. diarthritic  
 C. synovial  
 D. gliding  
 E. none of the above are correct
22. The special movement that turns the sole of the foot medially is called
- A. pronation  
 B. eversion  
 C. supination  
 D. inversion  
 E. rotation
23. Lifting your arm laterally away from your body is
- A. adduction  
 B. circumduction  
 C. flexion  
 D. extension  
 E. abduction