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.

   Seven bones contribute to the orbit: frontal, sphenoid, zygomatic, maxillae, palatine, lacrimal, and ethmoid bones.

2. Mrs. Bruso, 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 are the condition, cause, and treatment?

   Mrs. Bruso has severe osteoporosis in which her bones have become increasingly fragile. The postmenopausal deficit of estrogen had placed her bones at risk. Weight-bearing exercise and supplemental calcium will probably be prescribed.

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?

   The cribriform plates of the ethmoid bone, which surround the olfactory nerves. These plates are quite fragile and are often crushed by a blow to the front of the skull. This severs the olfactory nerve fibers, which do not usually grow back.

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. Fro what condition will she be tested?

   Rheumatoid arthritis, fairly common in middle-aged women, causes this type of deformity.

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?

   The sternum is compressed during CPR.

6. How does the process of calcification differ from ossification?

   Calcification refers to the deposition of calcium salts within a tissue.
   Ossification refers specifically to the formation of bone.

7. The conditions of gigantism and pituitary dwarfism are extreme opposites. What effect does hormonal regulation of bone growth have on each condition?

   Excessive or inadequate hormone production has a pronounced effect on activity at epiphyseal plates. Gigantism results from an overproduction of growth hormone before puberty. Pituitary dwarfism results from inadequate growth hormone production which leads to reduced epiphyseal activity and abnormally short bones.

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?

   When the nucleus pulposus (gelatinous interior) of the disc leaks through the annulus fibrosis (fibrous outer portion) of the disc, the affected disc balloons out from between the bony parts of the vertebrae. If the bulging or herniated area is large enough, it may press on a nerve, causing severe or incapacitating pain. Usually, the sciatic nerve is affected. Sciatica is generally located in the lumbar region and can radiate over the buttock, rear thigh, and calf, and can extend into the foot.

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?

   Foods or supplements containing vitamins A, C, and D are necessary to maintain the integrity of bone. Vitamin D plays an important role in calcium metabolism by stimulating the absorption and transport of calcium and phosphate ions. Vitamin A and C are essential for normal bone growth and remodeling. Any exercise that is weight-bearing or that exerts a pressure on the bones is necessary to retain the mineral in the bones, especially calcium salts. As the mineral content of a bone decreases, the bone softens and skeletal support decreases.

10. What is the association between the metabolic disorder known as gout, which affects the joints, and damage to the kidney?

    Gout is a metabolic disorder in which there is an increase in uric acid in the body with precipitation of sodium urate crystals in the kidneys and joint capsules. The presence of uric acid crystals in the joints can lead to an inflammatory response in the joints. Usually the great toe and other foot and leg joints are affected, and kidney damage from crystal formation occurs in more advanced cases.

11. How might a decision to wear pointed shoes contribute the formation of a bunion?

    A bunion is a common pressure-related bursitis. Bunions form over the base of the great toe as a result of friction and distortion of the joint caused frequently by tight shoes, especially those with pointed toes. There is chronic inflammation of the region, and as the wall of the bursa thickens, fluid builds up in the surrounding tissues. The result is a firm, tender nodule.

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.

    Diarthroses, or synovial joints such as the knee joint, contain small pockets of synovial fluid which are called bursae. The "water on the knee" is the synovial fluid that has been released from the bursae due to ligament damage in or around the joint capsule. The synovial fluid leaks out of the bursa and fills the cavities in and around the region of the knee.

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).

    Greg's pain is probably caused by bursitis, an inflammation of the bursa. Bursitis can result from repetitive motion, infection, trauma, chemical irritation, and pressure over the joint. Given the location of the pain, his case probably results from the repetitive motion of practicing pitching.

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?

    Steve probable tore the medial meniscus. This is the most common knee injury and is caused by the lateral surface of the lower leg being forced medially. The torn cartilage is painful, usually restricts joint mobility, and may lead to chronic problems. It is possible to examine the interior of a joint without major surgery, by using an arthroscope. An arthroscope uses fiber optics – thin threads of glass or plastic that conducts light – to investigate inside a joint, and if necessary perform surgical modification at that time (arthroscopic surgery). A totally non-invasive method of examination is MRI (magnetic resonance imaging).

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?

    Garrett dislocated his shoulder. The head of the humerus was displaced from the glenoid cavity causing tearing of the supporting ligaments and tendons (rotator cuff) of the shoulder joint.

Part II

1. Yellow marrow
2. support
3. osteoblasts
4. osteocytes
5. osteon
6. epiphysis
7. intramembraneous
8. endochondral
9. ossification
10. calcium
11. remodeling
12. osteoclasts
13. minerals
14. calcitriol
15. comminuted
16. compound
17. irregular
18. wormian
19. bone markings
20. condyle
21. vein
22. capillary
23. lamellae
24. osteon
25. trabeculae
26. spongy bone
27. compact bone
28. lacunae
29. Harversian (central) canal
30. canaliculi
31. perforating (Volkmann's) canal
32. C
33. D
34. A
35. D

Part III

1. canaliculi
2. rickets
3. octeoblasts
4. intramembranous
5. endochondral
6. epiphyseal plates
7. osteomalacia
8. osteopenia
9. compound
10. yellow marrow
11. endosteum
12. spongy or cancellous
13. trabeculae
14. lamella
15. osteocytes
16. canaliculi
17. red blood cells
18. red marrow
19. perforating (Volkmann's) canal
20. periosteum
21. compact bone
22. Haversian (central) canal
23. Blood vessels
24. osteon
25. lacunae
26. osteoclasts
27. C
28. A
29. B
30. axial
31. muscles
32. cranium
33. foramen magnum
34. inferior nasal concha
35. paranasal
36. mucus
37. fontanels
38. microcephaly
39. compensation or secondary
40. floating

Part IV

1. H
2. G
3. A
4. F
5. D
6. E
7. C
8. B
9. N
10. O
11. I
12. K
13. L
14. M
15. J
16. pharyngotympanic or Eustachian tube
17. metopic
18. tears
19. auditory ossicles
20. alveolar processes
21. mental foramina
22. compensation or secondary
23. kyphosis
24. lordosis
25. scoliosis
26. C
27. suture
28. synostosis
29. accessory ligaments
30. bursae
31. flexion
32. supination
33. synovial
34. ellipsoidal
35. gliding
36. annulus fibrosus
37. scapulohumeral
38. hip
39. osteoarthritis
40. lateral condyle of femur
41. anterior cruciate ligament
42. lateral meniscus
43. fibular collateral ligament
44. anterior ligament of head of fibula
45. fibula
46. patellar surface of femur
47. posterior cruciate ligament
48. medial condyle of femur
49. medial meniscus
50. transverse ligament
51. tibial tuberosity
52. tibial collateral ligament
53. tibia

Part V

1. ankylosis
2. arthritis
3. gomphosis
4. synchondrosis
5. syndesmosis
6. menisci
7. fat pad
8. articular cartilage
9. hyperextension
10. rheumatism
11. tendons
12. luxation
13. S (can also be I)
14. F
15. L
16. L
17. F
18. L
19. L
20. F
21. I
22. cervical, C1 – C7
23. thoracic, T1 – T12
24. Lumbar, L1 – L5
25. Sacrum, 5 fused
26. Coccyx, 4 fused
27. Atlas, C1
28. Axis, C2
29. fontanels
30. compressed
31. growth
32. sutures
33. thoracic
34. sacral
35. primary
36. cervical
37. lumbar
38. simple fracture
39. closed reduction
40. greenstick fracture
41. compression fracture
42. compound fracture
43. open reduction
44. spiral fracture
45. B, D, E
46. D

Part VI

1. T
2. osteoarthritis
3. acute
4. vascularized
5. T
6. gouty arthritis or gout
7. rickets
8. T
9. pelvic
10. phalanges
11. T
12. acetabulum
13. sciatic
14. T
15. hip bones
16. T
17. femur
18. T
19. support (19 – 24 can be in any order)
20. protection
21. movement
22. mineral storage and release
23. blood cell production
24. energy storage
25. epiphyseal line
26. proliferating cartilage
27. hypertrophic cartilage
28. calcified matrix
29. resting cartilage
30. sutural bones (Wormian)
31. long bones
32. flat bones
33. short bones
34. irregular bones
35. sesamoid bones
36. long bones
37. flat bones
38. sesamoid bones

Part VII

1. 80; 126
2. girdles
3. homopoiesis
4. adipose
5. 50%
6. spongy
7. S
8. O
9. S
10. T
11. F
12. T
13. S
14. O
15. T
16. E
17. T
18. S
19. T
20. T
21. E
22. O
23. E
24. T
25. F
26. E
27. S
28. S
29. E
30. E
31. T
32. G
33. SUT
34. SYN
35. G
36. SYN
37. SUT
38. *Borrelia burgdorfera;* deer ticks; bull's eye
39. sprain; strain
40. subluxation
41. luxation; joint; articular
42. trauma; acute; chronic; rheumatoid arthritis; bunions
43. 22
44. cranial; protect
45. 14
46. suture; fontanels
47. B
48. C
49. B
50. E

Part VII

1. Anterolateral
2. lambdoid
3. posterior
4. coronal
5. sagittal
6. anterior
7. squamous
8. posterolateral
9. 5
10. 10
11. 9
12. 4
13. 8
14. 3
15. 7
16. 2
17. 6
18. 1
19. D
20. C
21. A
22. D
23. E