CHAPTER 4: BONE GROWTH AND DEVELOPMENT

1. Which of the following components of bone provides it with flexibility?
   A. water
   B. calcium carbonate
   C. calcium phosphate
   D. collagen

2. Which of the following terms is used to describe bone with relatively high porosity?
   A. cortical
   B. trabecular
   C. soft
   D. all of the terms are used to describe bone with relatively high porosity.

3. Which of the following terms is defined as deformation divided by original length?
   A. stress
   B. strain
   C. strength
   D. elasticity

4. Cortical bone is strongest in resisting which type of stress?
   A. tensile stress
   B. shear stress
   C. compressive stress
   D. none of the choices is correct

5. Which of the following is true regarding Osgood-Schlatter’s disease?
   A. It occurs at the tibial tubercle where the patellar tendon attaches.
   B. It is more common in children than adults.
   C. It is an epiphyseal injury.
   D. It both occurs at the tibial tubercle where the patellar tendon attaches and is more common in children than adults
   E. all of the choices are correct

6. Which of the following is part of the appendicular skeleton?
   A. the skull
   B. the humerus
   C. the sternum
   D. all of the choices are correct
7. Which of the following is an example of a flat bone?
A. talus  
B. maxilla  
C. radius  
D. scapula  

8. Which of the following is an irregular bone?
A. radius  
B. rib  
C. femur  
D. vertebrae  

9. The tarsals are examples of what type of bones?
A. long bones  
B. short bones  
C. flat bones  
D. irregular bones  

10. Where is articular cartilage located?
A. It covers all bone surfaces.  
B. It covers all bone surfaces at articulations.  
C. It covers all long bone surfaces.  
D. It covers all long bone surfaces at articulations.  

11. Which of the following statements regarding bone growth is true?
A. Longitudinal growth continues only as long as the epiphyses exist.  
B. Circumferential growth continues throughout most of the lifespan.  
C. both of the choices are true  
D. neither of the choices is true  

12. Which of the following is known as the longitudinal "growth center" of a bone?
A. osteoclast  
B. periosteum  
C. osteoblast  
D. epiphysis  

13. How do bones typically respond to stress?
A. atrophy  
B. hypertrophy  
C. no change, as long as the epiphysis has sealed  
D. it is impossible to predict how a bone will respond to stress
14. Loss of bone mass has been found in which of the following?
   A. bed-ridden patients
   B. astronauts
   C. tennis players
   D. both bed-ridden patients and astronauts
   E. all of the choices are correct

15. Which of the following occurs in the absence of gravitational forces?
   A. bone hypertrophy
   B. bone atrophy
   C. bone modeling
   D. all of the choices occur in the absence of gravitational forces.

16. In a child, severe injury to an epiphysis may result in which of the following?
   A. premature closure of the epiphyseal junction
   B. termination of bone growth
   C. both premature closure of the epiphyseal junction and termination of bone growth
   D. none of the choices are correct

17. What is the most common symptom of osteoporosis?
   A. frequent headaches
   B. joint pain in the extremities
   C. back pain derived from vertebral fractures
   D. swelling of the distal extremities

18. Which of the following is a possible symptom of osteoporosis?
   A. vertebral crush fractures
   B. reduced body height
   C. dowager's hump
   D. all of the choices are possible symptoms of osteoporosis.

19. Appropriate strategies to lessen the likelihood of acquiring osteoporosis include which of the following?
   A. adequate dietary calcium intake
   B. regular weight-bearing exercise
   C. both adequate dietary calcium intake and regular weight-bearing exercise.
   D. none of the choices are appropriate strategies.

20. Which of the following is true regarding epiphyseal plate injuries?
   A. These injuries can terminate longitudinal bone growth.
   B. These injuries can result from acute trauma.
   C. These injuries can result from repetitive loading of a low magnitude.
   D. These injuries can both terminate longitudinal bone growth and result from acute trauma.
   E. all of the choices are correct
21. The water content of bone makes up approximately what percentage of the total bone weight?
A. 5% - 10%
B. 15% - 20%
C. 25% - 30%
D. 40% - 50%

22. Which of the following statements is/are true regarding the strength of bone?
A. Cortical bone can withstand more stress than trabecular bone.
B. Trabecular bone can withstand more strain than cortical bone.
C. both of the choices are correct.
D. neither of the choices is correct.

23. Specialized bone cells that build new bone tissue are called what?
A. periosteum
B. osteoblasts
C. osteoclasts
D. epiphysis

24. Which of the following statements is/are true regarding bone growth?
A. When bone remodeling occurs, bone mass may stay the same.
B. When bone remodeling occurs, bone mass may decrease.
C. When bone modeling occurs, bone mass increases.
D. When bone remodeling occurs, bone mass can only stay the same or decrease
E. When bone modeling occurs, bone mass stays the same, decreases and/or increases.

25. What happens when osteoclast activity exceeds osteoblast activity?
A. bone mass increases
B. bone modeling
C. bone mass decreases
D. none of the choices are correct

26. What happens when osteoblast activity exceeds osteoclast activity?
A. bone hypertrophy
B. bone modeling
C. increased bone mass
D. all of the choices are correct

27. Which of the following activities would likely produce the greatest bone mineral density?
A. swimming
B. cycling
C. walking
D. all of the choices would provide equal contribution to bone health
28. Reduced bone mass and density without the presence of a fracture defines what?
   A. osteoporosis
   B. osteopenia
   C. osteoblast
   D. osteoclast

29. Undesirably low body weight in young female athletes can lead to what?
   A. amenorrhea
   B. osteoporosis
   C. menopause
   D. both amenorrhea and osteoporosis
   E. all of the choices are correct

30. Which of the following is/are part of the “female athlete triad”?
   A. osteoporosis
   B. disordered eating
   C. cessation of menses
   D. both osteoporosis and disordered eating
   E. all of the choices are correct

31. The “female athlete triad” can result in which of the following?
   A. stress fractures
   B. irreversible bone loss
   C. death
   D. both stress fractures and irreversible bone loss
   E. all of the choices are correct

32. Which of the following could contribute the most in preventing or prolonging osteoporosis?
   A. girls jumping rope before puberty
   B. boys running after puberty
   C. middle-age women walking before menopause
   D. all of the choices are of equal importance

33. Which of the following is/are known risk factor(s) for developing osteoporosis?
   A. smoking
   B. calcium deficiency
   C. excessive caffeine consumption
   D. all of the choices are known risk factors for developing osteoporosis.
34. A fracture caused by a tendon or ligament pulling a small chip of bone away from the rest of the bone is called what?
   A. simple fracture
   B. compound fracture
   C. avulsion fracture
   D. spiral fracture

35. Which of the following is true regarding greenstick fractures?
   A. They are incomplete fractures.
   B. They are caused by bending or torsional loads.
   C. They are more common in adults than children.
   D. They are both incomplete fractures and are caused by bending or torsional loads.
   E. all of the choices are true.

36. When a skier’s body rotates in a direction opposite of the foot (held steady by the boot), what type of fracture is likely in the tibia?
   A. spiral
   B. impacted
   C. depressed
   D. stress

37. Which type of fracture results from repeated loading of relatively low magnitude?
   A. spiral
   B. impacted
   C. depressed
   D. stress

38. Which of the following factors can predispose runners to stress fractures?
   A. increased training duration or intensity without allowing time for bone remodeling
   B. abrupt changes in running surface
   C. both increased training duration or intensity without allowing time for bone remodeling and abrupt changes in running surface
   D. runners are not predisposed to stress fractures

39. Which of the following is part of the axial skeleton?
   A. the skull
   B. the vertebrae
   C. the sternum
   D. all of the choices are part of the axial skeleton.
40. After age 60, what percentage of fractures are osteoporosis related?
   A. 10%
   B. 30%
   C. 60%
   D. 90%