CHAPTER 9: THE BIOMECHANICS OF THE HUMAN SPINE

1. Movement of the spine occurs in which plane(s)?
   A. sagittal
   B. frontal
   C. transverse
   D. all of the choices are correct

2. Which of the following vertebral regions has the best range of motion?
   A. cervical
   B. thoracic
   C. lumbar
   D. sacral

3. Which part of the vertebrae bears the most weight?
   A. lamina
   B. superior articulating facet
   C. body
   D. inferior articulating facet

4. Which of the following helps the spine absorb shock?
   A. spinal curves
   B. intervertebral discs
   C. ligaments
   D. both spinal curves and intervertebral disks
   E. all of the choices help the spine absorb shock

5. Which statement is not true about the intervertebral discs?
   A. act as cushions between the vertebrae
   B. account for approximately 1/4 of the height of the spine
   C. are responsible for spinal movement due to compression
   D. all of the choices are true

6. Which of the following spinal curves are referred to as primary curves?
   A. the thoracic and cervical curves
   B. the cervical and lumbar curves
   C. the cervical and sacral curves
   D. the thoracic and sacral curves

7. Which of the following is not true about lordosis?
   A. often accompanied by anterior pelvic tilt
   B. can be caused by poor abdominal flexibility
   C. often accompanies weight gain and pregnancy
   D. all of the choices are true
8. The condition of exaggerated thoracic curvature is known as which of the following?
   A. lordosis
   B. kyphosis
   C. scoliosis
   D. none of the choices are correct

9. The articulations between adjacent vertebral bodies are which of the following types of joints?
   A. pivot joints
   B. hinge joints
   C. symphysis joints
   D. none of the choices are correct

10. The spinous processes of the thoracic vertebrae inhibit movement in which plane?
    A. sagittal
    B. frontal
    C. transverse
    D. all of the choices are correct

11. Which vertebrae are the largest?
    A. cervical
    B. thoracic
    C. lumbar
    D. sacral

12. What type of joint occurs between the superior and inferior articulating facets of adjacent vertebrae?
    A. cartilaginous
    B. non-axial gliding
    C. hinge
    D. condyloid

13. The sacral region of the spine is fused to which of the following bones?
    A. the ilium
    B. the ischium
    C. the pubis
    D. all of the choices are correct
14. Lack of flexibility in which of the following muscle groups can cause anterior pelvic tilt?
   A. hip flexors
   B. erector spinae
   C. abdominals
   D. both the hip flexors and the erector spinae
   E. all of the choices are correct

15. The rectus abdominis causes flexion when contracted ________.
   A. unilaterally
   B. bilaterally
   C. eccentrically
   D. all of the choices are correct

16. What is the result when part of the nucleus pulposus of the disc protrudes and presses on a nerve?
   A. stress fracture
   B. acute fracture
   C. herniated disc
   D. contusion

17. What joint is usually the culprit in low back pain?
   A. sacroiliac
   B. lumbosacral
   C. sacrococcygeal
   D. acetabulum

18. A typical geriatric disc has a fluid content that is reduced by approximately how much?
   A. 5%
   B. 35%
   C. 50%
   D. 85%

19. Transverse or spinous process fractures may result from which of the following?
   A. extremely forceful contraction of the attached muscles
   B. the sustenance of a hard blow to the back of the spine
   C. both an extremely forceful contraction of the attached muscles and the sustenance of a hard blow to the back of the spine
   D. none of the choices are correct
20. Which of the following are potential consequences of spinal fractures?
A. paralysis  
B. death  
C. both paralysis and death  
D. none of the choices are correct

21. What is the most common type of vertebral fracture?
A. fracture to the coccyx  
B. stress fracture of the pars interarticularis  
C. cervical fracture  
D. none of the choices are common types of vertebral fractures

22. Unusually high incidences of pars interarticularis fractures have been documented in which of the following groups of athletes?
A. female gymnasts  
B. interior football linemen  
C. weight lifters  
D. all of the are correct

23. The most superior cervical vertebrae is called what?
A. atlas  
B. axis  
C. atlanto-axial  
D. none of the choices are correct

24. What is the most common type of spinal loading during daily activities?
A. compression  
B. tension  
C. shear  
D. torsion

25. What causes the pumping action (influx and outflux of water containing nutrients and waste) of the intervertebral discs in adults?
A. blood supply  
B. body motion  
C. neural activity  
D. both blood supply and body motion  
E. all of the choices are correct

26. What is the enlarged cervical portion of the supraspinous ligament called?
A. anterior longitudinal ligament  
B. posterior longitudinal ligament  
C. ligamentum flavum  
D. ligamentum nuchae
27. Lateral deviations in spinal curvature are called what?
   A. lordosis
   B. kyphosis
   C. scoliosis
   D. all of the choices are correct

28. Which type of exaggerated curve is often caused by osteoporosis?
   A. lordosis
   B. kyphosis
   C. scoliosis
   D. all of the choices are correct

29. Anterior pelvic tilt facilitates what type of spinal motion?
   A. flexion
   B. extension
   C. lateral flexion
   D. rotation

30. Which abdominal muscles cause rotation to the left?
   A. left internal oblique
   B. right external oblique
   C. left rectus abdominis
   D. both the left internal oblique and the right external oblique
   E. all of the choices are true

31. What action(s) do posterior trunk muscles cause when they contract unilaterally?
   A. extension
   B. hyperextension
   C. lateral flexion
   D. both extension and hyperextension
   E. all of the choices are correct

32. In anatomical position, where is the center of gravity located relative to the spine?
   A. posterior
   B. anterior
   C. lateral
   D. inferior

33. Attachment to the ribs limits range of motion in which vertebrae?
   A. cervical
   B. thoracic
   C. lumbar
   D. sacral
34. What type of articulation occurs between the bodies of adjacent vertebrae?
A. cartilaginous  
B. non-axial gliding  
C. hinge  
D. condyloid

35. What is the dominant force on the spine during activities requiring backward leaning of the trunk, such as rappelling?
A. compression  
B. tension  
C. shear  
D. torsion

36. Spinal relaxation phenomenon explains what?
A. inactivity of spinal extensors during full flexion  
B. inactivity of spinal flexors during full flexion  
C. sit and reach flexibility test  
D. yoga

37. Which of the following contributes to increased spinal loading?
A. rotation (as compared to flexion)  
B. asymmetrical frontal loads  
C. increased lifting speeds  
D. both rotation and asymmetrical frontal loads  
E. all of the choices are correct

38. What musculoskeletal problem causes the most absences from work?
A. ankle sprain  
B. carpal tunnel syndrome  
C. low back pain  
D. herniated disc

39. Sprains occur in what type of tissue?
A. muscles  
B. tendons  
C. ligaments  
D. all of the choices are correct

40. What injury can occur when the neck undergoes sudden acceleration and deceleration (such as in a car accident)?
A. herniated disc  
B. whiplash  
C. spondylolisthesis  
D. spondylolysis