1. Due to their anatomic intimacy, labral tears may commonly present in swimmers with lesions of what tendon crossing the shoulder?
   a. biceps.
   b. infraspinatus.
   c. subscapularis.
   d. trapezius.

2. Which of the following peak forces typically has the greatest magnitude and corresponds to the peak joint moments during stance?
   a. peak braking force.
   b. peak propulsive force.
   c. vertical active peak.
   d. vertical impact peak.

3. Which of the following running mechanics produces increased loading to the knee joint and is associated with patellofemoral pain?
   a. dynamic knee valgus alignment at midstance.
   b. excessive stride length.
   c. forefoot strike at initial contact.
   d. both a and b.

4. When is the greatest amount of cervical spine extension required? When the rider’s hands are:
   a. in the drops of the bars.
   b. on the hoods.
   c. on the tops of the bars.
   d. the amount of cervical extension is the same regardless of where the hands are placed on the handlebar.

5. Which of the following situations will most likely result in a decrease in swimming velocity during the butterfly stroke?
   a. achievement of an increase in stroke length while maintaining a given stroke rate.
   b. adoption of an increased stroke rate while maintaining a given stroke length.
   c. drop of the hips, thereby increasing the athlete’s frontal surface area.
   d. orientation of the hand and forearm in such a way that they pull in the same plane.

6. What is the primary etiologic factor responsible for low back pain in cyclists?
   a. a prolonged forward flexed posture.
   b. injury to the intervertebral disk.
   c. repeated vibrations transferred from the road to the rider.
   d. weak abdominal musculature.
7. Which of the following are potential reasons for using gait retraining as part of the management of an injured runner?
   a. reduce external forces applied to the body.
   b. reduce muscular work performed.
   c. unload injured or painful tissues.
   d. all of the above.

8. Secondary impingement occurs due to:
   a. cervical radiculopathy.
   b. glenohumeral instability.
   c. poor internal to external shoulder rotator ratios.
   d. tight latissimus dorsi.

9. Each of the following statements accurately describes how the leg muscles control energy generation and delivery to the bicycle cranks during pedaling, except:
   a. in the flat-back, aerodynamic cycling position, the rectus femoris muscle’s force capability can be compromised, due to muscle-tendon-unit shortening associated with excessive hip flexion.
   b. muscular power during pedaling is dominantly developed by the quadriceps muscle group and gastrocnemius muscle, and to a lesser extent the gluteal and hamstring muscles.
   c. single-joint lower extremity muscles appear to be more active in generating cycling power during standing climbing than seated climbing, while two-joint muscles appear to be more active in providing weight support during standing pedaling, when appropriate.
   d. the single-joint gluteal muscles, vasti muscles, and soleus muscle act as relatively invariant power producers during pedaling, while the biarticular hamstring muscles, rectus femoris muscle, and gastrocnemius muscle demonstrate more variable recruitment, at times actively involved in transferring energy between joints at critical times in the pedaling cycle.

10. During the loading response, which of the following internal joint moments are present?
   a. ankle plantar flexion.
   b. hip abduction.
   c. knee extension.
   d. all of the above.

11. All of the following are contributors to shoulder pain in swimmers except:
   a. excessive joint laxity contributing to shoulder instability.
   b. high training volumes.
   c. strength and stability in the scapular stabilizers.
   d. swimming technique that emphasizes early development of force in the catch.
12. Which one of the statements below accurately characterizes pedaling mechanics and the associated interactions between the lower extremities and pedals during cycling?
   a. differences in peak torque observed between the right and left pedal downstrokes expose definitive asymmetries in downstroke force application.
   b. elite cyclists riding under steady state conditions generate upward forces on the pedals as they rise in their respective upstrokes, demonstrating effective and preferred circular pedaling.
   c. energy is delivered to the bicycle cranks in a smooth, yet oscillating manner, with minimal energy delivery occurring as the cranks pass through their respective horizontal positions of the pedal cycle.
   d. peak crank torque on each crank occurs just after half way through its downstroke, due to the combined effect of large joint extensor actions of the lower extremity muscles and gravity acting downward on the leg (and pedal).

13. The theory that ligament laxity may be beneficial in swimmers comes from:
   a. a high prevalence of Marfan syndrome in swimmers.
   b. high prevalence of generalized ligament laxity in elite swimmers.
   c. high rates of joint dislocation in elite swimmers.
   d. low hamstring flexibility scores in sub-elite swimmers.

14. Compression of the ulnar nerve within the Guyon canal in cyclists is most often associated with:
   a. both motor and sensory involvement.
   b. motor weakness only.
   c. sensory loss to the dorsal aspect of the fifth digit.
   d. severe pain at the site of compression.

15. The general guidelines behind generating upper body propulsion in freestyle, butterfly, and backstroke include all of the following EXCEPT:
   a. accelerating the hand through the pull.
   b. creating an S-shaped stroke pattern.
   c. establishing a catch early in the stroke cycle.
   d. maximizing the area being used to generate the propulsion.

16. When running at the same speed, which of the following do older runners not display compared to younger runners?
   a. greater ankle plantar flexion moment.
   b. greater impact force.
   c. greater impact loading rate.
   d. greater peak vertical ground reaction force.

17. A saddle positioned too low on a bicycle can lead to which one of the following performance and musculoskeletal influences?
   a. improved ability to generate torque on the bicycle cranks through the top of the pedal cycle.
   b. enhanced ability to achieve a flat-back, aerodynamic position.
   c. excessive pelvic rocking atop the saddle.
   d. reduced patellofemoral joint loading.

18. Which of the following genitourinary disorders is most common in cyclists?
   a. erectile dysfunction and hematuria.
   b. genital numbness and erectile dysfunction.
   c. hematuria and testicular torsion.
   d. testicular torsion and genital numbness.
19. Which of the following may contribute to an increased risk of injury during downhill running?
   a. increased braking impulse.
   b. increased loading rate.
   c. increased peak impact.
   d. all of the above.

20. For runners with plantar fasciitis, custom foot orthoses have been clearly shown to produce better clinical outcomes than off-the-shelf foot orthoses.
   a. true.
   b. false.

21. One of the primary stroke flaws seen in backstroke is:
   a. kicking with an amount of knee flexion and extension such that the water ‘boils’ just above the feet at the water’s surface.
   b. maintaining a neutral head position, looking at the ceiling or slightly rearwards.
   c. maintaining a relatively shallow pull, with the hand approximately 4 to 12 inches under the water.
   d. poor timing of the body roll such that it is not completed as the catch is initiated.

22. Which of the following statements is true concerning frontal plane kinematics during cycling?
   a. a cyclist’s tibia internally rotates during the downstroke of pedaling, coupled with pronation at the subtalar joint in that leg’s hindfoot. Conversely, the tibia externally rotates during the upstroke, with an associated supination action in the hindfoot.
   b. every attempt should be made to reduce the magnitude of any frontal plane knee movement observed during pedaling. Adjustments in pedal and cleat cant, pedal spacing, and in-shoe orthotics represent viable options for reducing frontal plane knee joint motion and the predictable, deleterious musculoskeletal effects.
   c. frontal plane knee joint movements during pedaling, described as linear (up and down), long-oval (mostly up and down), and figure-eight in nature, generally increase in magnitude when the height of the saddle is increased.
   d. the knee joint moves laterally beginning near top dead center, reaching a maximum lateral position shortly after 90° crank rotation. This movement typically involves up to 3 cm of lateral knee joint movement.

23. What types of exercises require maintenance of trunk control through coordinated abdominal wall co-contraction, creating a challenge to the training of proximal stability for distal joint mobility?
   a. deadlift and squatting variations.
   b. proprioceptive neuromuscular facilitation patterning.
   c. pull-up.
   d. swimming with paddles.

24. Which of the following is/are recommended as part of the management of runners with a tibial stress fracture?
   a. deep water running with a flotation belt or other limited weight-bearing endurance training.
   b. gait analysis at time of return to running.
   c. running cessation ranging from 4 to 8 weeks.
   d. all of the above.