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Question: 1

The rectus femoris has what type of muscle fiber arrangement?

A. Unipennate
B. Multipennate
C. Bipennate

Answer: C

Explanation:
The muscles in the human body exhibit various types of arrangements of the muscle fiber bundles (fasciculi). The arrangement refers to how the fasciculi align with the tendon. In a pennate muscle, the fibers run at an oblique angle to the tendon, similar to a feather.
Multipennate muscles have more than one tendon. The deltoid is a multipennate muscle and has three insertions. A unipennate muscle is a muscle that has all the fibers on one side of the tendon.
A bipennate muscle has fibers insert along both sides of a central tendon. The rectus femoris is a bipennate muscle.

Question: 2

What is the recommended minimum ceiling height in a facility where athletes will perform plyometric training and Olympic lifting?

A. 12 feet
B. 11 feet
C. 10 feet

Answer: A

Explanation:
The height of the ceiling in a strength and conditioning facility needs to be high enough to allow athletes to jump and to perform overhead lifting movements safely. It is important to account for an athlete's height, plus enough room for that athlete to perform movements like box jumps and overhead lifts, such as the push press.
A 9- to 10-foot ceiling could be high enough for some athletes, but a taller athlete might have some difficulty at that height. Higher ceilings are certainly acceptable (including a 15- to 20-foot ceiling), but a 12- to 14-foot ceiling should be sufficient for these movements and is, therefore, the recommended height for a strength and conditioning facility.

Question: 3

If a weightlifter grips the bar using his index and middle fingers to squeeze down on his thumb, he is using what type of grip?

A. Pinch grip
B. Hook grip
C. Support grip

Answer: B

Explanation:
Most lifters use a technique called the hook grip, where the thumb is wrapped around the bar, and then the index and middle fingers squeeze down on the thumb.
The hook grip is similar to the pronated grip, except for the thumb placement. The hook grip, in general, is used for exercises that require a stronger grip, including the Olympic lifts such as the snatch.

Question: 4

What grip should be used to spot the bench press?

A. Supinated grip
B. Alternated grip
C. Pronated grip

Answer: B

Explanation:
An alternated grip involves grabbing the bar with one hand in a pronated (palm down) grip and the other hand in a supinated (palm up grip). This grip provides an additional measure of safety as it can increase the spotter's control of the bar when necessary.
The spotter should stand at the end of the bench near the athlete's head throughout the movement, providing a lift-off for the athlete to start the movement and then helping to guide the bar back to the rack after the last rep is completed. While repetitions are being performed, the spotter should keep their hands near the bar, but not touch the bar unless the lifter needs assistance.

Question: 5

Which of the following is not typically considered to be an example of an active stretch?

A. Partner stretching
B. Ballistic stretching
C. Proprioceptive neuromuscular facilitation stretching

Answer: A

Explanation:
Ballistic stretching involves using a bouncing motion. Proprioceptive neuromuscular facilitation (PNF) stretching involves active contraction of agonist and antagonist muscles. Partner stretching typically involves a passive stretch in which a joint is taken through to the point of stretch due to the force of a partner.

Question: 6

How does stimulation of the sympathetic system affect the conduction system of the heart?

A. Accelerates SA node depolarization
B. Increases the discharge rate at the SA node
C. Decreases the discharge rate at the SA node

Answer: A

Explanation:
The autonomic nervous system includes both the sympathetic and parasympathetic nervous systems. The sympathetic nervous system is sometimes referred to as "fight-or-flight." The parasympathetic system is referred to as "rest-and-digest."
One of the physiological responses that occurs in the body when the sympathetic system is stimulated is an increased heart rate. The sinoatrial (SA) node is the pacemaker of the heart, which determines how fast the heart beats. When the sympathetic system is stimulated, the SA node speeds up depolarization (contraction), speeding up the heart rate.
Parasympathetic stimulation has the opposite effect, which results in slowing the heart rate down.

Question: 7

What grip should be used to perform the barbell wrist extension exercise?

A. Closed, supinated grip
B. Closed, hook grip
C. Closed, pronated grip

Answer: C

Explanation:
The barbell wrist extension is performed in a seated position with the forearms resting on the thighs. The hands and wrists should extend beyond the knees. To perform the lift, grab the barbell between hip and shoulder-width distance apart with a closed, pronated grip. The thumbs should be around the bar, and the palms should face the floor. Allow the wrists to flex to find the correct starting position. Then, lift the knuckles toward the ceiling to extend the wrists and raise the bar. The forearms should not move throughout the exercise.
This movement is the opposite of the wrist curl, which is performed in the same position except it uses a closed, supinated grip.
The hook grip is traditionally used on the Olympic lifts, including the clean and the snatch.

Question: 8

Which of the following is the best example of a carbohydrate loading schedule prior to an event?

A. Day 1: Load / Day 2: Load / Day 3: Load / Day 4: Event
B. Day 1: Decrease / Day 2: Load / Day 3: Decrease / Day 4: Event
C. Day 1: Decrease / Day 2: Load / Day 3: Load / Day 4: Event

Answer: A

Explanation:
Carbohydrate loading can help increase an athlete's glycogen stores prior to an event, which may help delay fatigue as glycogen is depleted during endurance exercise. There are different methods of carbohydrate loading, but all include increasing carbohydrate intake for multiple days leading up to the event.
It is not recommended to decrease carbohydrate intake prior to a carbohydrate loading phase.
Carbohydrate loading can be beneficial for aerobic endurance athletes such as long-distance runners and cyclists, cross-country skiers, and any other athletes who risk depleting their glycogen stores.

Question: 9

In what manner should a strength and conditioning facility be organized in order to achieve the most functionality and the best appearance?

A. By areas of the body emphasized
B. By visibility
C. By equipment type

Answer: C

Explanation:
When designing the floor plan for a strength and conditioning facility, it is important to consider traffic flow patterns, how equipment will be used, and how much space is necessary surrounding each piece of equipment in order to maximize space and function. Placing equipment into groups can help create specific training areas within the facility. This might include specific areas such as:
• Stretching area
• Free weight area with DBs, benches, etc.
• Agility and plyometric area
• Cardio machines
• Resistance machines
Visibility is also an important consideration, and therefore, equipment should be laid out in a way that does not prevent the strength and conditioning coach from safely monitoring athlete training sessions.

Question: 10

Which of the following is not a method to find your grip distance for the power snatch?

A. Fist to opposite elbow
B. Fist to opposite shoulder
C. Elbow to elbow

Answer: A

Explanation:
There are two methods for finding proper grip distance for the power snatch:
1. Reach both arms out to the sides, and measure the distance between your elbows
2. Reach one arm out to the side and make a fist. Measure the distance between your outstretched fist and your opposite shoulder.

Question: 11

When curling a dumbbell, the most muscular torque occurs when the elbow is flexed to which angle?

A. 45 degrees
B. 105 degrees
C. 90 degrees

Answer: C

Explanation:
When the horizontal distance of the moment arm that the force acts through gets longer, the resistive torque (force x moment arm) also increases. The 90-degree angle of the elbow (the fulcrum) creates the longest moment arm throughout the biceps curl, making the 90-degree angle the angle with the highest muscular torque.
Torque is what creates biomechanical movement. It is what creates the movement of the lever system (bones). Being able to maximize the amount of torque a muscle can generate will allow for the optimal strengthening of that muscle. The greater the torque a muscle can produce, the greater the movement it will produce on the body's levers. If your goal of treatment is to increase movement, you can manipulate the torque variables to maximize the efficiency of the muscles to move the body part. The barbell biceps curl exercise provides another great example of this. It's much harder to move the bar when your elbows are fully extended compared to when they're at 90 degrees. This is because of the angle-torque relationship. In this relationship, the greatest amount of torque is always when the force is applied at a 90-degree angle to its lever.

Question: 12

If an athlete performs multiple attempts of a maximum effort test, what is the minimum amount of time that should be provided between attempts for sufficient rest?

A. 5 minutes

B. 3 minutes
C. 2 minutes

Answer: B

Explanation:
When conducting athletic performance testing, athletes will often perform multiple attempts of the same test. When a test requires a maximum effort and substantially taxes the athlete, the athlete should be provided with at least a three-minute rest before performing their next attempt.
If the test does not require a maximum effort and the athlete is not significantly taxed by their attempt, then there should be a minimum of two minutes of rest between attempts.
When the athlete is performing a test battery (multiple different tests in a row), there should be a minimum of five minutes of rest provided between tests.

Question: 13

What is the second phase of developing and launching a new strength and conditioning facility?

A. Preoperation phase
B. Design phase
C. Predesign phase

Answer: B

Explanation:
1. Predesign phase: development of a master plan (budget, design, operation plan, etc.) based on the needs analysis and feasibility study
2. Design phase: committee's ideas come together for structure and design
3. Construction phase: period from beginning to end of construction
4. Preoperation phase: finish of interior design, hiring staff, establishing policies & procedures, or any other last steps that need to be completed before opening

Question: 14

You are guiding a client through an exercise where the biceps brachii is performing elbow flexion. How many muscle heads are acting as the antagonist?

A. Three
B. One
C. Two

Answer: A

Explanation:

The antagonist directly acts to oppose the agonist, or prime mover. The triceps brachii is the antagonist of the biceps brachii during elbow flexion and is located on the posterior side of the humerus. The triceps brachii has three heads: long, lateral, and medial. Each head is responsible for various movements of the elbow.

Question: 15

According to the US Army protocol, when performing the push-up local endurance test, how is the test scored?

A. Counting the number of repetitions performed before muscle failure
B. Counting the number of repetitions that are performed with the chest hitting the floor
C. Counting the number of repetitions performed in two minutes

Answer: C

Explanation:
The US Army guidelines for performing the push-up local endurance test require the individual to perform as many push-ups as possible in two minutes. Both the starting and low positions are the same for both men and women. Start position is on the feet and hands, with the hands shoulder-width apart. For repetitions to count, individuals must be low enough that the upper arm is parallel to the ground.
The ACSM provides separate protocols for performing this test, which require the individual to perform as many push-ups as possible in a row until failure.

Question: 16

Your client is performing a leg curl. If you were to talk to your client about each of the muscle groups and their responsibilities within the leg curl, which category would you place the gastrocnemius?

A. Synergist
B. Agonist
C. Antagonist

Answer: A

Explanation:
A synergist is responsible for indirectly helping the agonist to create a movement. The agonist in the leg curl is the hamstring, and the gastrocnemius acts as a synergist.

Question: 17

Which muscle of the back assists the primary mover during a lat pull-down exercise?

A. Erector spinae
B. Teres major

C. Teres minor

Answer: B

Explanation:
The latissimus dorsi is the prime mover of a lat pull-down and is assisted by the teres major along with the middle trapezius, rhomboids, and posterior deltoid.
The teres major is located just above (superior to) the latissimus dorsi, and it assists in several movements, such as adduction of the shoulder.

Question: 18

You are planning to measure your athlete's low-speed force production. Which of the following tests are you most likely going to use to do this?

A. 1RM bench press
B. 100-yard sprint
C. Sit-and-reach

Answer: A

Explanation:
Maximal strength tests typically quantify strength levels using a one-repetition maximum (1RM). These tests measure the force that a muscle or muscle group can exert in a single maximal effort while maintaining good form. The high resistance used in these tests results in a relatively lower-speed movement. Movements often used for maximal strength testing are the squat and bench press.
Tests of anaerobic or maximal muscular power (high-speed strength) test strength and speed together using movements such as a clean, snatch or vertical jump. These movements are much faster than movements used for max strength testing, but are also quantified using a single repetition.

Question: 19

A 130-pound Division I collegiate female volleyball player has the following test results:
• 1RM bench press: 155 pounds
• 1RM back squat: 225 pounds
• Vertical jump: 15 inches
• 1-minute partial curl-up test: 65
Based on these results, which of the following types of exercises should be added to her training program?

A. Plyometric training
B. SAQ training
C. Power training

Answer: A

Explanation:
This athlete has demonstrated high strength levels in both the upper and lower body strength tests (1RM bench press and back squat) in comparison to other Division I female volleyball players. She also scored well on the partial curl-up test, which is a test of muscular endurance.
However, the average vertical jump height for a female Division I volleyball player is around 20 inches. Therefore, this athlete should work on improving her jumping ability. Because she already has sufficient lower body strength, the best way to improve her jumping ability is to focus on incorporating plyometric training into her program.

Question: 20

Which of the following symptoms of somatic anxiety is cardiovascular based?

A. Functional dyspepsia
B. Tachycardia
C. Tense muscles

Answer: B

Explanation:
Somatic anxiety is the physical representation of anxiety or how your body responds to it. Tachycardia, better known as a fast heart rate, is one cardiovascular symptom of somatic anxiety.
Other non-cardiovascular symptoms include tense muscles and functional dyspepsia (upset stomach).

Question: 21

A client is performing a back squat. Which of the following words best describes the part of the movement where they lower themselves down into the deepest portion of their range of motion?

A. Concentric contraction
B. Eccentric contraction
C. Amortization phase

Answer: B

Explanation:
Eccentric contractions involve lengthening the muscle under tension, concentric contractions involve shortening the muscles under tension, and the amtorization phase is the point at which the lifter transitions between eccentric and concentric contractions.

Question: 22

When compared to carbohydrates, fatty acid chains contain a higher ratio of which two molecules relative to oxygen?

A. Nitrogen and hydrogen
B. Carbon and hydrogen
C. Carbon and nitrogen

Answer: B

Explanation:
Carbohydrates and fatty acids both contain carbon, oxygen, and hydrogen molecules, but fatty acid chains have a greater proportion of carbon and hydrogen compared to oxygen and thus provide more energy per gram. Fats provide approximately 9 kcal/g while carbohydrates and protein supply roughly 4 kcal/g.

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