

# NSCA CSCS® - Quiz Questions with Answers

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## P/A1: Exercise Technique

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1.

During the eccentric phase of the stiff-legged deadlift, which of the following describes the movement that should occur at the knee?

Flexion

Isometric hold

Extension

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*Correct answer: Flexion*

*In the starting position for the stiff-legged deadlift, the knees should be slightly bent (flexed) and should stay slightly bent throughout the entire movement, including the downward and the upward movement phases.*

*It is a common movement mistake to allow the knees to bend more as the bar is lowered (downward phase). This should happen in a standard deadlift, but this should not happen in the stiff-legged deadlift. The lifter should prevent the knees from straightening out or bending more while performing this movement.*

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**2.**

During the **downward** movement phase of the lying barbell triceps extension, which grip should be used by the lifter and which grip should be used by the spotter, respectively?

**Pronated / Supinated**

Supinated / Pronated

Pronated / Alternated

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*Correct answer: Pronated / Supinated*

*The lying barbell triceps extension involves lying supine on a bench and reaching the arms up toward the ceiling. The lifter then bends and straightens their elbows to bring the bar toward their forehead and back up toward the ceiling. The lifter should use a pronated grip.*

*The spotter should stand close to the athlete's head, facing the athlete. The spotter should first use an alternated grip to hand the barbell to the lifter. Then, throughout the movement (including the downward movement phase), the spotter should keep their hands in a supinated position with their palms close to and underneath the barbell.*

*When all reps have been completed, the spotter will take the barbell from the lifter using an alternated grip.*

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**3.**

What is the recommended box height for depth jumps for athletes over 220 pounds?

**18"**

12"

24"

*Correct answer: 18"*

*Depth jumps place significant stress on the body on landing, and therefore, it is extremely important to pay attention to the quality of the jump. Athletes performing depth jumps should be very well-trained and thoroughly understand how to absorb force safely and appropriately upon landing and be able to land using proper landing position.*

*The larger the athlete, the more stress the body undergoes on landings from depth jumps. Therefore, it is recommended that heavier athletes (over 220 pounds) use no more than an 18" box for depth jumps.*

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**4.**

During maximal velocity (top-speed) sprinting, what is the action that occurs in the ankle in the early support phase to absorb force?

**Eccentric plantarflexion**

Concentric dorsiflexion

Eccentric dorsiflexion

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*Correct answer: Eccentric plantarflexion*

*As an athlete strikes the ground in the stance (support) phase of sprinting, part of the force applied to the ground is absorbed through an eccentric plantarflexion movement of the ankle. The ankle gets pushed into a more dorsiflexed position during this landing, but the action involved is actually a lowering of the heel, and the calf is active during this movement.*

*This landing represents the eccentric phase of the stretch-shortening cycle (SSC), where the agonist muscle becomes stretched. The agonist action in the ankle during the subsequent push-off becomes concentric plantarflexion. The flight phase should include active dorsiflexion, but the stance phase involves active plantarflexion.*

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5.

Traditionally, where would the dumbbell be placed for the set-up phase of the one-arm dumbbell snatch?

**On the ground, between the feet**

On the outside of the foot of the side you are working during the exercise

On an elevated platform, such as a bench

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*Correct answer: On the ground, between the feet*

*In the starting position for a one-arm dumbbell snatch, the dumbbell should be placed on the ground between the feet. This is the same starting position, whether performing the lift with the right or left arm.*

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**6.**

Donna is at the bottom of the downward movement phase of a front squat. This is her position:

- Her torso is neutral and almost vertical, with her chest up and out
- Her feet are flat on the ground
- The bar is across her shoulders and clavicles
- Her forearms are vertical, with her elbows pointed toward the ground
- Her knees are slightly medial to her toes
- The tops of her thighs are parallel to the ground

What should Donna change about her form and execution?

**Her elbows need to be higher, and her knees need to be more in line with her toes.**

Her thighs are not low enough with regard to the ground, and her knees need to be lateral to her toes.

The bar should be on her biceps, and her knees should be lateral to her toes.

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*Correct answer: Her elbows need to be higher, and her knees need to be more in line with her toes.*

*Donna's torso position and depth are correct for this portion of the front squat. However, her elbows should be higher throughout the entire movement. Raising her elbows so that her forearms are as close to parallel to the floor as possible will help Donna keep the bar more securely on her shoulders and provide better control of the bar. It will also ensure that the load is distributed onto her hips and legs instead of holding the weight in her arms.*

*Plus, she is demonstrating valgus collapse at the knees. Therefore, she must line her knees up with her ankles and toes to correct this.*

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7.

To what depth should the dip be performed during the dip phase of the log clean and press?

**No more than a quarter squat**

No more than a half squat

Deep/full squat

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*Correct answer: No more than a quarter squat*

*The log clean and press is a nontraditional training method typically used in strongman training but starting to be incorporated into the training of regular athletes. For best results, the dip shouldn't exceed a quarter squat.*

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**8.**

The hold-relax with agonist contraction is the most effective proprioceptive neuromuscular facilitation stretching technique because it allows facilitation of what functions?

**Reciprocal and autogenic inhibition**

Reciprocal inhibition and the stretch reflex

Autogenic inhibition and the stretch reflex

*Correct answer: Reciprocal and autogenic inhibition*

*There are various types of PNF stretching, all of which involve alternating between a passive stretch performed by a partner and some type of muscle action, either isometric or concentric.*

*The following steps describe how to perform the hold-relax with agonist contraction PNF stretch for the hamstring:*

- 1. The person being stretched lies supine*
- 2. The partner lifts their leg into hip flexion to provide a passive 10-second pre-stretch of the hamstring*
- 3. The partner applies pressure by gently pushing the leg toward the head of the person being stretched, while the person being stretched isometrically contracts the hamstring to prevent the leg from moving*
- 4. The person being stretched actively contracts their hip flexors, increasing the ROM*
- 5. The person being stretched relaxes while the partner provides another passive stretch*

*The active contraction of the hamstring results in autogenic inhibition, which describes the relaxation of the hamstring as a result of the tension in (activation of) the hamstring immediately before the passive stretch.*

*The active contraction of the hip flexors results in reciprocal inhibition, which describes the relaxation of the hamstring as a result of the tension in (activation of) the hamstring.*

*The stretch reflex should be avoided during stretching activities. When a stretch is applied too quickly, the muscle spindles are activated and can cause the muscle to contract, preventing any increased ROM.*

**9.**

As a strength coach, you are teaching the "second pull" execution phase of the snatch lift to a client. Which of the following is **not** involved in explosive extension during this phase?

**Shoulders**

Hips

Ankles

*Correct answer: Shoulders*

*During the second pull phase of the snatch, there is an explosive extension of the hips, knees, and ankles. This helps to drive the bar upward and slightly forward.*

*At the same time, the athlete must keep the bar close to the body, with a neutral spine and elbows pointing to the sides. After full extension of the hips, knees, and ankles, the athlete will rapidly shrug, and this is when the body will begin going under the bar for the catch phase.*

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**10.**

Which of the following is **not** a test for assessing maximal muscular power?

**40-yard sprint**

Margaria-Kalamen test

Vertical jump

1RM power clean

*Correct answer: 40-yard sprint*

*The 40-yard sprint is not a test used to assess maximal muscular power. Instead, it is commonly used to evaluate an athlete's speed and acceleration over a short distance, which is particularly relevant in sports like American football. The 40-yard sprint measures an athlete's ability to quickly cover ground, relying on both anaerobic energy systems and neuromuscular coordination, but it does not directly assess the maximal power output of muscle groups in the same way that specific power tests do.*

*Tests commonly used to assess maximal muscular power include:*

- **Margaria-Kalamen Test:** *This test measures power in the legs by having the participant run up a staircase as fast as possible. Power is calculated based on the time it takes to cover a certain number of steps and the height of those steps, providing a direct measure of leg power.*
- **Vertical Jump:** *The vertical jump test is a simple and effective way to measure lower body power. It involves the athlete jumping as high as possible from a standing position, and the height of the jump is used to estimate the power output of the leg muscles.*
- **1RM Power Clean:** *The one-Repetition Maximum (1RM) in the power clean exercise assesses the maximal power of an athlete, particularly in the lower body and posterior chain muscles. The power clean is a dynamic lift that involves moving a weight from the floor to a racked position on the shoulders in one fluid motion, requiring significant power to execute successfully.*

*While the 40-yard sprint is a valuable test for assessing speed and agility, it does not provide a direct measure of muscular power in the way that the Margaria-Kalamen test, vertical jump, and 1RM power clean do. These tests are designed to specifically quantify the ability of muscle groups to generate power, making them more suitable for assessing maximal muscular power.*

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**11.**

How does the torso angle during a snatch-grip Romanian deadlift (RDL) compare to the torso angle during a standard (clean-grip) RDL?

**The torso angle is closer to horizontal in the snatch-grip RDL**

The torso angle is closer to horizontal in the clean-grip RDL

The torso angles are the same in both lifts

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*Correct answer: The torso angle is closer to horizontal in the snatch-grip RDL*

*The RDL movement pattern is the same in both lifts. The lifter lowers the bar until it is in line with the patellar tendon at the bottom of the downward movement phase. Because the snatch grip is significantly wider than the clean grip, this brings the torso lower and closer to horizontal during the snatch-grip deadlift.*

*In both versions of this lift, it is important to maintain a neutral torso and create the movement by pushing the hips backward. The knees should stay slightly bent, and the arms should stay straight.*

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**12.**

You have a client who is moving through a series of active movements focusing on achieving a full range of motion (ROM). You notice that she is also moving faster as time goes on. Which of the following does this describe?

**Dynamic stretching**

Ballistic stretching

PNF stretching

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*Correct answer: Dynamic stretching*

*Dynamic stretching involves actively moving the body through specific ranges of motion (ROMs) using functional and sport-specific movement patterns. This type of stretching may also be called mobility drills. Dynamic stretching is a great way to prepare for sports training or competition, as athletes can use similar movements during this part of their warm-up as they will in their sport.*

*This is sometimes confused with ballistic stretching, which also uses active muscular effort, but also uses bouncing and momentum to move through a range of motion.*

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**13.**

Which of the following is an example of a dynamic stretch for the hip abductors?

**Walking over and under**

Forward lunge with elbow to instep

Straddle

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*Correct answer: Walking over and under*

*The walk over and under involves stepping over a hurdle laterally and then squatting down to duck under a hurdle laterally. This drill opens up the hips and dynamically stretches each muscle group involved.*

*The straddle is a static stretch that targets the hip adductors (along with other muscle groups). This stretch is considered a static stretch because of the 15-30 second hold at the end position.*

*The forward lunge with elbow to instep is a dynamic stretch but does not target the hip abductors.*

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**14.**

Which of the following can create rigid compartments of fluid in the lower torso and air in the upper torso?

**Valsalva maneuver**

Structural exercise

Five-point body contact position

Forced repetitions

*Correct answer: Valsalva maneuver*

*The Valsalva maneuver can create rigid compartments of fluid in the lower torso and air in the upper torso. This method entails inhaling deeply and maintaining breath hold during forceful exertions, like executing a heavy lift. By doing so, intra-abdominal pressure increases, stabilizing the spine and creating a solid core to support heavy loads. This rigid compartment effect can enhance performance in certain exercises by providing additional trunk stability but should be used cautiously due to potential increases in blood pressure and other risks associated with breath-holding under strain.*

*Other options mentioned do not create this specific physiological effect:*

- **Structural Exercise:** *These are exercises that load the spine directly or indirectly and typically involve multiple large muscle groups. While structural exercises, such as squats and deadlifts, can benefit from the increased stability provided by the Valsalva maneuver, the exercises themselves do not create rigid compartments of fluid and air in the torso.*
- **Five-Point Body Contact Position:** *This refers to the recommended contact points with a bench or machine during certain exercises to ensure stability and proper alignment (head, shoulders/upper back, buttocks, and both feet). While this concept is crucial for exercise safety and effectiveness, it does not involve the physiological process of creating rigid compartments in the torso.*
- **Forced Repetitions:** *Forced repetitions are additional repetitions performed at the end of a set with the assistance of a spotter, pushing beyond normal fatigue. This technique is used to increase workout intensity but does not involve creating rigid compartments of fluid and air in the torso.*

*The Valsalva maneuver is unique among these options for its ability to alter internal pressures, contributing to stability during high-intensity exercises. However, due to its*

*potential risks, especially for individuals with cardiovascular concerns, it should be used judiciously and under appropriate circumstances.*

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**15.**

An athlete is performing a kettlebell swing. The following describes the athlete's position during the backward movement phase:

- The torso is neutral and just above parallel to the floor
- The kettlebell is behind the athlete
- The knees are bent to 90 degrees
- The arms are straight

What should change about this posture and form?

**The knees should be bent at 20 degrees**

The elbows should be bent

The kettlebell should not be so far back

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*Correct answer: The knees should be bent at 20 degrees*

*The backward movement phase of a kettlebell swing involves bringing the kettlebell between the legs and behind the body. This athlete is making a common error, bending the knees too much as the kettlebell swings down and back, performing the movement more like a squat. Instead, the body position should be similar to the end of the downward movement phase of an RDL, with the knees only slightly bent, usually around 20 degrees.*

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16.

What is the arm action involved in the power skip?

**Double arm action**

Alternating arm action

No arm action is used in the power skip

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*Correct answer: Double arm action*

*The arm action in a power skip is different from standard skipping. Skipping typically involves an alternating arm action, but when performing the power skip, both arms should be used during the upward action. The power skip is usually performed for either repetitions or distance.*

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**17.**

Where should the right hand reach when performing a behind-the-neck stretch for the right triceps and lat?

**Toward the left scapula**

Toward the center of the spine

Toward the right scapula

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*Correct answer: Toward the left scapula*

*The behind-the-neck triceps stretch is a static stretch and is also referred to as the chicken wing stretch. It can be performed seated or standing. To stretch the right arm, reach the right arm up toward the ceiling, and then bend the elbow. Reach the right hand toward the left scapula with the palm facing the body, and use your left hand to grab the right elbow.*

*Use the left arm to gently pull the elbow behind the head to the left to increase the stretch. The elbow should point toward the ceiling throughout the stretch. Be sure not to go past the point of mild discomfort.*

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**18.**

In general, during a traditional barbell squat, what is the **most** recommended measurement for determining squat depth?

**Until the tops of the thighs are parallel to the ground**

As low as necessary to maintain correct positioning

Until the hamstrings are parallel to the ground

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*Correct answer: Until the tops of the thighs are parallel to the ground*

*On the downward movement of the back squat, the knees and hips are flexed to descend into the squat until the tops of the thighs are parallel to the ground. This is a general recommendation that is most often focused on with the assumption that the heels are on the ground and the back is neutral.*

*If an athlete's heels begin to come off the ground or the back begins to round when lowering into a squat, the athlete should only lower to a point where they are able to control their positions and stop at a depth that allows them to maintain correct positions to help ensure safety.*

*The difference between this and the hamstrings being parallel to the ground is a few inches' difference in squat depth.*

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**19.**

During PNF stretching, the hold-relax technique begins with which of the following:

**Passive pre-stretch**

Active pre-stretch

Contraction of the agonist muscle

Contraction of the antagonist muscle

*Correct answer: Passive pre-stretch*

*During Proprioceptive Neuromuscular Facilitation (PNF) stretching, the hold-relax technique begins with a passive pre-stretch. This initial phase involves stretching the target muscle (antagonist) to a point of mild discomfort by an external force, such as a partner or the individual themselves, without any active contribution from the muscle being stretched. This passive stretch is typically held for about 10 seconds, preparing the muscle for the subsequent phases of the hold-relax technique.*

*Other components related to the hold-relax technique include:*

- **Active Pre-Stretch:** *This would involve the individual actively stretching the muscle using their own muscular force, which is not the initial step in the hold-relax technique of PNF stretching. The hold-relax technique specifically starts with a passive stretch to ensure that the muscle is lengthened without active resistance.*
- **Contraction of the Agonist Muscle:** *In the context of the hold-relax technique, the focus is initially on the antagonist muscle (the one being stretched), not the agonist muscle. While PNF can involve utilizing the agonist muscle, particularly in techniques like hold-relax with agonist contraction, the initial phase of hold-relax does not involve active contraction of the agonist muscle.*
- **Contraction of the Antagonist Muscle:** *After the passive pre-stretch, the individual is instructed to isometrically contract the antagonist muscle (the one being stretched) against resistance without changing the muscle length, typically for six-10 seconds. This phase follows the passive pre-stretch and is aimed at increasing muscle relaxation through autogenic inhibition, allowing for a deeper stretch in the subsequent passive stretch phase.*

*The hold-relax technique of PNF stretching is characterized by its initial passive pre-stretch phase, which sets the foundation for the isometric contraction and further*

*stretching phases, aiming to increase flexibility and range of motion in the targeted muscle.*

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**20.**

Which of the following does **not** happen during the catch movement phase of the push press exercise?

**Forcefully and quickly straighten the hips, knees, and ankles to reverse the movement**

Hips and knees are fully extended

The bar is overhead from the drive

Press the barbell up the rest of the way

*Correct answer: Forcefully and quickly straighten the hips, knees, and ankles to reverse the movement*

*During the catch movement phase of the push press exercise, it is not correct to forcefully and quickly straighten the hips, knees, and ankles to reverse the movement. This action actually describes part of the drive movement phase, where the athlete uses the lower body to initiate the upward drive of the barbell. The drive phase involves a powerful extension of the hips, knees, and ankles to generate momentum, helping to propel the barbell upward from the shoulders.*

*In the catch phase of the push press, the following actions occur:*

- **Hips and Knees are Fully Extended:** After the initial drive, the athlete extends their hips and knees fully to support the body and stabilize the barbell in the overhead position.
- **The Bar is Overhead From the Drive:** The momentum generated from the Drive phase brings the bar overhead. The athlete's task during the Catch phase is to stabilize the bar in this position.
- **Press the Barbell Up the Rest of the Way:** If necessary, the athlete may perform a final press to fully extend the arms and lock out the elbows, ensuring the barbell is stabilized in a straight-arm position overhead.

*The catch phase is characterized by stabilization and support of the barbell in the overhead position rather than the dynamic movement of extending the hips, knees, and ankles, which is a hallmark of the drive phase. Understanding the distinction between these phases is crucial for proper execution and maximizing the effectiveness of the push press exercise.*

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21.

Which of the following is the **best** definition of a structural exercise?

**A movement that places a load on the spine in a direct or indirect manner**

A movement that requires multi-joint strength

A movement that involves the abdominal muscles

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*Correct answer: A movement that places a load on the spine in a direct or indirect manner*

*When a movement loads the spine directly or indirectly and challenges postural stabilization, this is known as a structural exercise.*

*While many structural exercises involve multiple joints, this is not always the case. The abdominal muscles are involved in many structural exercises, but this is not a complete definition of the term.*

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**22.**

Which of the following is **not** a recommended verbal cue to use with your client during the concentric portion of a lateral raise?

**Hike your shoulder up toward your ears**

Bring the weights up to shoulder height

Point your thumbs up toward the ceiling

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*Correct answer: Hike your shoulders up toward your ears*

*The lateral shoulder raise works the deltoids of the shoulders, almost exclusively toward the lateral head and anterior head. Hiking the shoulders activates the traps, which is not desirable during this exercise.*

*During the upward phase of the movement, your elbows should be slightly flexed, and the arms should eventually reach a point where they are parallel with the ground, or about shoulder height. Your thumbs should generally be pointed toward the ceiling, or forward during a lateral raise. In some specific rehab plans, you may perform an "empty can" exercise, where the thumbs are pointed down during a shoulder abduction movement. However, the empty can exercise is distinct from a traditional lateral raise and is inappropriate for many clients due to potential shoulder impingement issues.*

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**23.**

When is the **best** time to incorporate instability exercises into core training?

**In trained athletes who are rehabilitating from an injury**

With untrained athletes who are relatively weak

With trained athletes who are trying to optimize strength and power

With untrained athletes who are new to the exercise

*Correct answer: In trained athletes who are rehabilitating from an injury*

*Incorporating instability exercises into core training is best applied with trained athletes who are rehabilitating from an injury.*

*Instability exercises, which often involve equipment like stability balls, balance boards, or wobble cushions, require the engagement of core muscles to maintain balance and posture. For athletes in rehabilitation, these exercises can help restore proprioception, balance, and core stability, which are crucial for a safe return to full athletic activity. The controlled environment of rehab, combined with the athlete's prior training experience, makes this an optimal time to focus on regaining and enhancing core stability through instability exercises.*

*Other scenarios include:*

- **With untrained athletes who are relatively weak:** *Untrained or weaker athletes may not have the foundational strength or neuromuscular control necessary to safely and effectively perform instability exercises. Starting with basic core stabilization and strength exercises on stable surfaces is generally recommended to build a base before introducing instability.*
- **With trained athletes who are trying to optimize strength and power:** *While instability exercises can be beneficial for core stabilization, they are not the most effective for maximizing strength and power output. Trained athletes looking to optimize these aspects should focus on traditional strength and power exercises that allow for the use of heavier loads and more explosive movements.*
- **With untrained athletes who are new to the exercise:** *Introducing instability exercises to untrained athletes who are new to exercise should be approached with caution. It's important to first establish core strength, coordination, and an understanding of proper form on stable surfaces before adding the complexity of instability to ensure safety and effectiveness.*

*For trained athletes in rehabilitation, incorporating instability exercises can be particularly beneficial for enhancing core stability and function, contributing to a comprehensive recovery and reducing the risk of future injuries.*

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**24.**

Which of the following has been proven to have a positive effect on performance, due to the relaxation of both agonist and antagonist muscles and improvements in the rate of force?

**Warm-ups**

Static stretching

Ballistic stretching

*Correct answer: Warm-ups*

*In addition to the benefits already mentioned, a well-designed warm-up can improve muscle strength and power, lower viscous resistance in muscles, improve oxygen delivery, increase blood flow to muscles, and enhance metabolic reactions.*

*All warm-ups should consist of general and sport-specific activities. General warm-ups include around 5 minutes of aerobic activities such as jogging, skipping, etc. Specific warm-ups incorporate movements similar to those used in the sport one participates in.*

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**25.**

When the thumb is positioned under the index and middle fingers during an overhand grip, this is referred to as which of the following?

**Hook grip**

Supinated grip

Alternated grip

Pronated grip

*Correct answer: Hook grip*

*When the thumb is positioned under the index and middle fingers during an overhand grip, this is referred to as a hook grip. In a hook grip, the thumb is wrapped around the bar first, and then the fingers are wrapped over the thumb, effectively hooking it into place. This grip technique is commonly used in Olympic weightlifting and other lifts where a secure grip on the bar is crucial for the lift's safety and effectiveness, such as deadlifts. The hook grip can enhance grip security and prevent the bar from rolling in the hands, potentially allowing for heavier lifts.*

*Other grip types mentioned, which are distinct from the hook grip, include:*

- **Supinated Grip:** Also known as an underhand grip, where the palms face up and the dorsum (back) of the hand faces down. This grip is commonly used in exercises like bicep curls and chin-ups.
- **Alternated Grip:** Also known as a mixed grip, where one hand uses a pronated (overhand) grip and the other uses a supinated (underhand) grip. This grip is often employed in heavy deadlifts to counteract the tendency of the bar to roll out of the hands.
- **Pronated Grip:** Known as an overhand grip, where the palms face down and the dorsum of the hand faces up. This grip is widely used in various exercises, including pull-ups, barbell rows, and some types of deadlifts, but does not specifically involve the thumb positioning characteristic of the hook grip.

*The hook grip is a specialized technique that provides a unique advantage in terms of grip security, especially useful in dynamic lifts and when handling heavy loads.*

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**26.**

In a football game, which of the following is an example of linear speed?

**A running back sprinting toward the endzone**

A linebacker quickly changing direction to catch the ball-carrier

A wide receiver running a route with cutbacks

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*Correct answer: A running back sprinting toward the endzone*

*Speed can be linear or multi-directional and requires the ability to accelerate and reach maximal velocity. Generating high speeds linearly is referred to as sprinting.*

*Multi-directional speed is defined as generating speed in more than one direction. The ability to change direction quickly is change-of-direction ability. Wide receivers running routes with cuts and linebackers changing direction are examples of multi-directional speed and change-of-direction ability.*

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**27.**

Which of the following is **not** a recommended grip to be used to perform a deadlift?

Hook grip

Pronated grip

Alternated grip

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*Correct answer: Hook grip*

*The recommended starting grip for the deadlift is a closed, pronated grip. In a pronated grip, both palms will face the lifter when they grab the bar. As the load gets heavy enough that the lifter can no longer maintain a solid grip, it may help to change to a closed, alternated grip. In this grip, the lifter will place one hand in a pronated position, and one hand in a supinated position. It is up to the individual which hand to change to a supinated grip. This alternated grip can feel more secure and provide the athlete with a stronger grip, especially as the weight gets heavier.*

*The hook grip is not typically recommended for use on the deadlift. Rather, the hook grip is traditionally used on the Olympic lifts, including the clean and the snatch.*

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**28.**

Your athlete is completing a power clean. If all other variables remained the same, which of the following variables could be manipulated in order to improve their power production during the lift?

**Decreased time spent during the lift**

Decreased displacement of the weight during the lift

Decreased force used during the lift

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*Correct answer: Decreased time spent during the lift*

*When the speed of the lift increases (the athlete moves faster), this decreases the time it takes to complete the lift, which would increase power, based on the equation:*

*Power = Work/Time*

*In this equation, a smaller denominator of time would increase overall power.*

*According to the formula Work = Force x Displacement, both a decreased displacement and decreased force would decrease overall work. This would in turn decrease overall power, according to the power formula.*

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**29.**

During a static vertical jump, how many seconds should the athlete hold the squat position before jumping vertically?

**2 to 3 seconds**

1 to 2 seconds

3 to 4 seconds

4 to 5 seconds

*Correct answer: 2 to 3 seconds*

*During a static vertical jump, the athlete should hold the squat position for two to three seconds before executing the vertical jump. This pause in the squat position ensures that the jump is performed without the benefit of the stretch-shortening cycle that occurs in a dynamic or countermovement jump, isolating the ability to generate explosive power from a static position. Holding the squat position for this duration allows the muscle fibers to be preloaded and ready for a powerful contraction but is short enough to prevent significant loss of elastic energy or excessive fatigue that could impair jump performance.*

*Other durations mentioned have different considerations:*

- **1 to 2 seconds:** *While this duration might be sufficient for some athletes, it may not provide enough time for all individuals to adequately stabilize and prepare for the maximal effort jump. The two to three second recommendation offers a slightly longer period to ensure readiness and optimal muscle preloading for the jump.*
- **3 to 4 seconds:** *Holding the squat position for longer than three seconds might start to introduce unnecessary fatigue, which could slightly diminish the explosive power the athlete can generate during the jump.*
- **4 to 5 seconds:** *This duration is likely too long for holding the squat position before a static vertical jump, as it could lead to a decrease in muscle activation and increased fatigue, negatively impacting the jump performance.*

*The two to three second hold in the squat position strikes a balance between ensuring the muscles are adequately preloaded for the jump and minimizing any potential fatigue that could detract from the athlete's ability to perform a maximal vertical leap.*

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**30.**

Your client is performing a traditional barbell bench press. Which of the following is **not** an example of one of the five points of contact?

**All cervical vertebrae are in contact with the bench**

Buttocks are placed evenly on the bench or pad

Shoulders and upper back are placed firmly and evenly on the bench or pad

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*Correct answer: Feet are placed evenly on the floor with the toes contracted*

*There are five points of contact for exercises when the athlete is lying supine on a bench:*

- 1. Head is placed firmly on the bench or pad*
- 2. Shoulders and upper back are placed firmly and evenly on the bench or pad*
- 3. Buttocks are placed evenly on the bench or pad*
- 4. Right foot is flat on the floor*
- 5. Left foot is flat on the floor*

*Maintaining these five points of contact increases stability and spinal support.*

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**31.**

Selective recruitment of motor units might occur with which of the following?

**Power clean**

1RM back squat

1.5-mile run

*Correct answer: Power clean*

*The size principle generally regulates motor unit recruitment and is based on force production requirements. The slow twitch motor units are recruited prior to the fast twitch fibers, and recruitment increases in both quantity and firing rate so that more motor units are recruited for the production of high force, speed or power. As force production increases, the number of activated motor units also increases.*

*Therefore, 1RM testing of a back squat would recruit a large number of motor units. On the opposite end of the spectrum, the lower speed and lower intensity involved in a 1.5-mile run would not recruit as many motor units. However, the motor units in both exercises would be recruited in the same order.*

*There are exceptions to the size principle that occur during exercises requiring extreme force development at very high firing frequencies. In these movements, the slow twitch fibers are inhibited while the fast twitch fibers are recruited. This is known as selective recruitment.*

*Movements in which selective recruitment might occur include the Olympic lifts (such as the power clean), in addition to other high speed, power, or agility movements.*

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**32.**

What is the recommended grip and grip width during the triceps pushdown exercise?

**Closed, pronated grip 6 to 12 inches wide**

Closed, supinated grip 4 to 8 inches wide

Closed, alternated grip 8 to 14 inches wide

Closed, hook grip 8 to 14 inches wide

*Correct answer: Closed, pronated grip 6 to 12 inches wide*

*During the triceps pushdown exercise, the recommended grip is a closed, pronated grip (palms facing down), with a grip width of 6 to 12 inches. This grip and width allow for effective engagement of the triceps muscles by providing a stable and comfortable hand position that aligns with the natural movement pattern of the exercise. The closed grip ensures a secure hold on the bar or handle while the pronated orientation aligns the arms and wrists in a position that maximally activates the triceps during the pushdown motion.*

*Other grip types and widths mentioned are less ideal for the triceps pushdown:*

- **Closed, Supinated Grip 4 to 8 Inches Wide:** *A supinated grip (palms facing up) is not typically recommended for triceps pushdowns because it can place unnecessary strain on the wrists and shift some of the focus away from the triceps to other muscles.*
- **Closed, Alternated Grip 8 to 14 Inches Wide:** *An alternated grip (one palm facing up, the other facing down) is not suitable for triceps pushdowns because it can lead to uneven muscle engagement and may compromise form and effectiveness.*
- **Closed, Hook Grip 8 to 14 Inches Wide:** *While a hook grip (wrapping the thumbs around the bar underneath the fingers) can provide a secure hold for certain exercises, it is not necessary for triceps pushdowns and may not be comfortable or effective for this particular exercise due to the nature of the grip and the width.*

*Adhering to a closed, pronated grip with a six to 12-inch width ensures that the triceps pushdown is performed effectively, targeting the triceps muscles optimally while minimizing the risk of discomfort or injury.*

---

**33.**

Which of the following correctly describes the sequence for a hold-relax partner stretch?

**For a hamstring stretch: The client lies on her back, raises her straight leg to 90 degrees, is passively stretched for 10 seconds, pushes back for 6 seconds, then relaxes and is passively stretched for 30 seconds**

For a biceps stretch: The client stands and extends her arm behind her, is passively stretched for 30 seconds, pushes back for 10 seconds, then relaxes and is passively stretched for 10 seconds

For an upper trap stretch: The client sits and side bends to the left, is passively stretched for 10 seconds, returns to the start position, then is passively stretched further for 10 seconds

---

*Correct answer: For a hamstring stretch: The client lies on her back, raises her straight leg to 90 degrees, is passively stretched for 10 seconds, pushes back for 6 seconds, then relaxes and is passively stretched for 30 seconds*

*PNF stretches were initially used to help decrease the tone of muscles that were overactive, encouraging them to relax. There are different versions of PNF stretching, but all of them involve alternating between a passive stretch and an active contraction of either the agonist or antagonist of the muscle being stretched in order to enhance ROM. These principles and techniques are now often used in the training environment to help increase flexibility.*

*This description of a hamstring stretch correctly describes a hold-relax for the hamstrings. The other options include incorrect sequencing and time periods for each portion of the movement.*

---

**34.**

The crouched starting position is used during the performance of many sprint drills, including sprinting on an incline. Where should the feet be placed when starting in the crouched position?

**The back foot should be 1-2 foot lengths behind the front foot with the dominant leg in front**

The back foot should be 3-4 foot lengths behind the front foot with the non-dominant leg in front

The feet should be placed parallel to each other

---

*Correct answer: The back foot should be 1-2 foot lengths behind the front foot with the dominant leg in front*

*The crouch position allows the athlete to preload the legs prior to starting to sprint. The optimal position involves placing the dominant leg in front and then placing the opposite foot about 1 to 2 foot lengths behind the front foot. Once the feet are placed in position, the athlete should lean forward and then sink down, bending both knees so that the back shin is close to parallel in relation to the ground. The back heel will not be touching the ground in this position.*

*No matter which leg is in front, the opposite arm should be forward, with the elbow bent and the hand about 6 to 8 inches from the forehead. The rear arm should be bent and behind the torso, with the hand near the hip. Finally, the athlete should shift their weight forward so that there is slightly more weight in the front leg than in the back leg.*

---

**35.**

Which exercise has the fastest upward overhead movement?

**Snatch**

Power clean

Push jerk

---

*Correct answer: Snatch*

*The snatch can be broken down into the first pull, transition, second pull, catch, and, finally, the downward movement phase, which involves returning the barbell to the floor. Despite the lift consisting of multiple phases, the upward movement of the bar occurs in one uninterrupted motion.*

*While the power clean and push jerk exercises are performed in one powerful movement, the clean ends with the bar landing on the shoulders, not overhead, and the push jerk starts on the shoulders, not on the floor.*

---

**36.**

Your client is performing an incline dumbbell bench press. Which of the following verbal cues would be **most** appropriate at the bottom of the downward movement phase?

**Keep the dumbbells in line with the upper chest**

Breathe out as you lower the dumbbells

Keep those feet engaged to steady the weight

---

*Correct answer: Keep the dumbbells in line with the upper chest*

*During the downward phase of the incline DB bench press, the lifter should lower the dumbbells down and slightly out from the starting position to finish with the dumbbells even with the upper chest, near the armpits.*

*In this position, the lifter should also maintain the five-point body contact position on the bench, keep the wrists stiff and prevent the lower back from arching.*

---

**37.**

Where should the hands be placed when spotting a seated barbell shoulder press?

**Near the bar, inside the athlete's hands**

Near the bar, outside the athlete's hands

Near the athlete's elbows

---

*Correct answer: Near the bar, inside the athlete's hands*

*When spotting a lifter performing a seated barbell shoulder press, the spotter should stand behind the athlete and place their hands near the bar in an alternated grip inside the athlete's hands. The spotter can grab the bar to help the athlete with a liftoff, and then simply keep their hands near the bar.*

*During the lift, the spotter should only touch the bar if the lifter begins to fail the lift or indicates to the spotter that they would like them to assist the lift. Finally, the spotter can help guide the bar back to the rack after the final repetition.*

---

**38.**

What is the recommended method for selecting a seat height when using a stationary bike?

**The seat should be set so that the bottom leg is bent to 25 to 30 degrees when pedaling**

The seat should be set so that the bottom leg is bent to 20 to 25 degrees when pedaling

The seat should be set so that the bottom leg is bent to 30 to 35 degrees when pedaling

---

*Correct answer: The seat should be set so that the bottom leg is bent to 25 to 30 degrees when pedaling*

*When using a stationary bike, the optimal seat height will allow the bottom knee to be bent about 25 to 30 degrees, while the top knee should be about even with the hip. When pedaling, the user should stay stable in the seat, and the hips should not shift side to side.*

---

**39.**

What is the combination of mechanical and neurophysiological mechanisms that is the basis for plyometric exercises?

**Stretch-shortening cycle**

Proprioceptive stretch reflex

Elastic component reflex

---

*Correct answer: Stretch-shortening cycle*

*The stretch-shortening cycle combines the elastic energy stored via the series elastic component with the potentiation resulting from the stretch reflex to produce a large amount of force very quickly.*

*There are three phases to the stretch-shortening cycle:*

- 1. Phase I - Eccentric phase, when the agonist is stretched and energy is stored*
  - 2. Phase II - Amortization phase, which is the pause between eccentric and concentric. This must be short because if the pause is too long, the stored energy will dissipate.*
  - 3. Phase III - Concentric phase, when energy is released and can increase force production*
-

**40.**

Which of the following is **not** a recommendation for the starting position of a power clean?

**The shoulders should be placed in a position that allows the torso to be upright**

The feet should be flat and the torso should be neutral or have a slight arch

The shoulders are higher than the hips, and the hips are typically higher than the knees

---

*Correct answer: The shoulders should be placed in a position that allows the torso to be upright*

*In the starting position for a power clean, the bar should be about the level of the mid-shin. When using bumper plates, this is the height of the bar when a loaded bar is sitting on the ground.*

*Some guidelines for the starting position:*

- *The feet should be hip to shoulder width apart*
- *The shoulders are higher than the hips, and the hips are typically higher than the knees*
- *The shoulders should be either directly over or slightly forward from the bar*
- *The bar should be about 1" away from the shins*
- *The feet should be flat and the torso should be neutral or have a slight arch*
- *The arms should be straight*

*The torso should not be upright in the starting position.*

---

**41.**

Where should a spotter place their hands during a step-up?

**Near the lifter's torso or hips**

Right at the lower back

Near the lifter's armpits

---

*Correct answer: Near the lifter's torso or hips*

*During the step-up, a spotter can assist the lifter in maintaining their balance throughout the movement. The spotter should stand behind and close to the lifter, moving forward and back as the athlete steps up and back down.*

*Placing the hands near the lifter's hips, torso, or waist enables the spotter to have the ability to assist quickly, and this position allows the spotter to have good control of the lifter.*

---

42.

What outcome might a strength and conditioning professional anticipate if a strong athlete exclusively integrates unilateral training into their program?

**A reduction in bilateral asymmetries will occur**

A bilateral deficit will occur

A bilateral facilitation will occur

Only unilateral strength will increase

*Correct answer: A reduction in bilateral asymmetries will occur*

*If a strong athlete exclusively integrates unilateral training into their program, a strength and conditioning professional might anticipate that a reduction in bilateral asymmetries will occur.*

*Unilateral training involves exercises that work one side of the body at a time, such as lunges, single-arm presses, or single-leg squats. This type of training can help address imbalances between the two sides of the body by allowing the weaker side to catch up, thereby reducing asymmetries. It ensures that both sides of the body work independently, preventing the dominant side from compensating for the weaker side, which can happen in bilateral exercises.*

*Other potential outcomes include:*

- **A bilateral facilitation will occur:** *This refers to an increase in bilateral performance as a result of unilateral training. While unilateral training primarily targets one side of the body at a time, improvements in neuromuscular coordination, strength, and balance can contribute to enhanced performance in bilateral movements. However, this facilitation is not as direct as the reduction in asymmetries and might not be the most immediate outcome.*
- **A bilateral deficit will occur:** *This is less likely with unilateral training. The bilateral deficit phenomenon refers to the observation that the combined force produced by both limbs in a bilateral lift is often less than the sum of the forces they can produce independently in unilateral lifts. Unilateral training tends to reduce this deficit by improving the neural drive and coordination of each limb individually.*
- **Only unilateral strength will increase:** *While unilateral training will indeed increase strength on a single-limb basis, it doesn't mean that only unilateral strength will improve. The benefits of unilateral training, such as increased balance, coordination, and reduced asymmetries, can contribute to overall athletic performance, including in bilateral movements.*

*By focusing on unilateral training, the athlete can expect to see a more balanced development of strength, which can enhance overall performance and reduce the risk of injury associated with imbalances. However, for comprehensive athletic development, it's generally recommended to include both unilateral and bilateral training in a well-rounded program.*

---

**43.**

During the straight-arms-behind-back stretch, which position should the athlete keep the elbows in?

**Straight**

Slightly bent

Bent at 45 degrees

Bent at 90 degrees

*Correct answer: Straight*

*During the straight-arms-behind-back stretch, which is aimed at improving the flexibility of the shoulders and the chest, the athlete should keep their elbows straight. Maintaining straight elbows ensures that the stretch effectively targets the intended muscles, including the pectorals and shoulder girdle. This position allows for a more intense and focused stretch across the chest and shoulders, enhancing the stretch's effectiveness.*

*Other elbow positions mentioned do not align with the objectives of this stretch:*

- **Slightly Bent:** Keeping the elbows slightly bent may reduce the intensity of the stretch on the chest and shoulders, making it less effective for increasing flexibility in these areas.
- **Bent at 45 Degrees:** Bending the elbows at a 45-degree angle would shift the focus of the stretch and could potentially reduce the emphasis on the shoulder girdle and pectoral muscles, which are the primary targets of the straight-arms-behind-back stretch.
- **Bent at 90 Degrees:** Holding the elbows bent at 90 degrees would significantly alter the mechanics of the stretch, likely focusing the stretch on different muscle groups and diminishing the intended effect on the shoulders and chest.

*Keeping the elbows straight during the straight-arms-behind-back stretch is crucial for maximizing the stretch's benefits and effectively improving flexibility in the shoulders and chest area.*

---

**44.**

When using PNF stretching with a client, you should perform a pre-stretch. How long should you hold this pre-stretch?

**10 seconds**

30 seconds

1 minute

---

*Correct answer: 10 seconds*

*Every type of PNF stretch requires a pre-stretch, and this is to be held for 10 seconds. This pre-stretch should be a stretch of mild discomfort.*

---

**45.**

Where should the spotter place their hands during a flat dumbbell fly?

**Near the lifter's forearms**

Near the dumbbells

Near the lifter's elbows

---

*Correct answer: Near the lifter's forearms*

*The optimal spotting position during the flat dumbbell fly is near the lifter's forearms. The spotter can grab the forearms to help the lifter get the dumbbells into the starting position. Once the lifter is ready to begin the movement, the spotter should let go of the lifter's forearms but keep their hands near the forearms to be able to assist quickly if necessary.*

*During the movement, the spotter should follow the lifter's movement with their hands and only assist when the lifter begins to fail or signal's for the spotter to provide assistance.*

---

**46.**

Which of the following statements about exercises designed to increase tissue length is **false**?

**When the point of resistance is reached, force should be decreased**

Can be either active or passive

Appropriate for all athletes who compete in a variety of sports

---

*Correct answer: When the point of resistance is reached, force should be decreased*

*Stretching is defined as movement that increases tissue length and can be active or passive. Passive stretching requires a partner or stretching machine that allows the individual being stretched to completely relax while the partner or machine provides the stretch.*

*Active stretching describes any type of stretch during which the individual being stretched provides the force to induce a stretch. Both static stretching, as well as dynamic, are examples of active stretching.*

*In order to create a stretch, the body part should be moved through the ROM until the point of resistance is reached. At that point, gentle force should be applied to encourage an increase in ROM.*

*Stretching exercises are appropriate for all athletes and for any sport.*

---

**47.**

What is the recommended stance for upper body plyometric throws with a medicine ball, including exercises such as the chest pass, two-hand overhead throw, and the two-hand side-to-side throw?

**Feet parallel and shoulder-width apart**

Feet parallel and hip-width apart

Feet in a split stance and hip-width apart

---

*Correct answer: Feet parallel and shoulder-width apart*

*Placing the feet shoulder-width apart and parallel to each other provides a solid and stable base to provide the support for the upper body throw. When the feet are shoulder-width apart, this provides more stability and control than when they are hip-width apart.*

*The chest pass, the two-hand overhead throw, and the two-hand side-to-side throw are all low-intensity upper-body plyometric drills using a medicine ball. The ball should weight between 2 and 8 pounds.*

*The chest pass involves throwing the ball straight out from chest level to a rebounder or a partner.*

*The overhead throw involves throwing the ball from an overhead position with straight arms, either bouncing the ball on the floor or throwing directly forward from an overhead position.*

*The side-to-side throw involves throwing the ball forward with two hands from over one shoulder, alternating sides.*

---

**48.**

What corrective advice should be given to an athlete whose hips rise faster than their shoulders when initiating the push in a tire flip?

**Keep the hips slightly below the shoulders in this position**

Start with a higher hip position

Lift the tire upward instead of driving it forward

Push with the arms first

*Correct answer: Keep the hips slightly below the shoulders in this position*

*When an athlete's hips rise faster than their shoulders during the initial pushing motion of a tire flip, the effective corrective advice is to keep the hips slightly below the shoulders in this position. This advice ensures that the athlete maintains a proper alignment, optimizing the transfer of power from the legs and hips through the upper body and into the tire. Keeping the hips slightly below the shoulders helps engage the posterior chain muscles more effectively, allowing for a more powerful and biomechanically advantageous push. This position also reduces the risk of lower back strain by ensuring that the lift is driven more by the legs and hips than by the back.*

*Other suggestions that might seem intuitive but are less effective include:*

- **Start with a higher hip position:** *While this might seem like a way to initiate the lift with more leg drive, starting with the hips too high can actually lead to a less effective transfer of force and increase the reliance on the lower back rather than allowing the legs and hips to do the majority of the work.*
- **Lift the tire upward instead of driving it forward:** *Lifting the tire straight up can increase the strain on the back and does not take advantage of the forward momentum that helps in flipping the tire. The most effective tire flip involves a combination of lifting and pushing, where the tire is driven up and forward in a smooth motion.*
- **Push with the arms first:** *While the arms do play a role in flipping the tire, initiating the movement with an arm push can lead to less power being generated. The initial push should come from the power generated by the legs and hips with the arms guiding the direction and assisting in the lift.*

*By focusing on keeping the hips slightly below the shoulders, the athlete can ensure a more powerful and safer tire flip by using the strength of their lower body effectively while minimizing the risk of injury.*

**49.**

Your athlete is performing a hammer curl exercise. Which type of grip is she using during this exercise?

**Neutral grip**

Pronated grip

Supinated grip

Alternated grip

*Correct answer: Neutral grip*

*During a hammer curl exercise, your athlete is using a neutral grip. In a neutral grip, the palms face toward each other with the thumbs pointing upward, similar to the position of holding a hammer, hence the name of the exercise. This grip targets the biceps brachii but with a greater emphasis on the brachialis and brachioradialis muscles, providing a variation from the traditional bicep curl, which typically uses a supinated grip.*

*Other grip types, which are not used in hammer curls, include:*

- **Pronated Grip:** Also known as an overhand grip, where the palms face down and the dorsum (back) of the hand faces up. This grip is not used in hammer curls, as it does not align with the exercise's mechanics.
- **Supinated Grip:** This is known as an underhand grip, where the palms face up. While commonly used in standard bicep curls to target the biceps brachii, it is not the grip used in hammer curls.
- **Alternated Grip:** A mixed grip with one hand in a pronated position and the other in a supinated position. This grip is often used in exercises like deadlifts to prevent the bar from rolling but is not applicable to hammer curls, which typically involve both hands holding the weights in a neutral grip.

*The neutral grip used in hammer curls offers a unique stimulus to the arm muscles, particularly targeting the muscle areas slightly differently than the more common supinated grip used in traditional bicep curls.*

---

**50.**

Which of the following steps would maximize both strength gains and safety in the gym?

**Using a spotter for risky lifts and performing a variety of different types of exercise**

Working out only on machines

Never performing max lifts

---

*Correct answer: Using a spotter for risky lifts and performing a variety of different types of exercise*

*Although spotters can assist the athlete both in the area of motivation and with the completion of partner-assisted repetitions, their primary and most important responsibility is for the athlete's safety. In fact, failure to competently execute this role can result in injury not only to the athlete but also to the spotter.*

*Exercises that require a spotter:*

- *Overhead exercises*
- *Exercises with the bar on the back or front of the shoulders*
- *Over-the-face exercises*

*Spotters aren't necessary for every exercise. In fact, they may be an impediment on some more basic lifts. However, when in doubt, it's always a good idea to have a spotter ready to assist.*

*Machine work can lead to improved strength, and virtually guarantees safety, but it is not the best way to maximize strength gains. Max lifts are a great way to improve strength and realize progress, but they often require a spotter.*

---

**51.**

What is the safest maximum height recommended for performing depth jumps?

**42"**

48"

24"

Correct answer: 42"

*Depth jumps are very taxing and exert significant amounts of stress and load on the body upon landing. It is extremely important to ensure that athletes are adequately prepared to perform depth jumps as they are a very high-intensity plyometric exercise. Athletes must have mastered the proper landing position and have a significant amount of training before adding depth jumps to their program.*

*The recommended box height for depth jumps is between 16 and 42". When starting depth jumps for the first time, it is important to be cautious and conservative. Start with the lowest box height and slowly increase the box height over time, ensuring that the athlete can maintain proper form, especially on landing. It is also important to be sure not to overload the volume on the depth jump because they are much more taxing to the system than most other plyometric exercises.*

*A box height of 30 to 32" is a typical range used with athletes.*

---

**52.**

What is the appropriate grip width for a power exercise that will be pulled from the floor and caught at the anterior deltoids and clavicle?

**Slightly wider than shoulder width**

Slightly narrower than shoulder width

Much wider than shoulder width

---

*Correct answer: Slightly wider than shoulder width*

*The power movement pulled from the floor and caught at the clavicle level is the power clean. Appropriate grip width is slightly wider than shoulder width, unlike the power snatch, which has a much wider grip.*

*The elbow to elbow measurement is one that can be used to determine grip width for the snatch.*

---

**53.**

Todd is performing a power snatch. Which phase of the exercise is he performing when he is in the position described below?

- The barbell is moving from his knees up toward his hips
- Todd has started to flex his knees to bring them forward and under the bar
- His back is slightly arched
- His torso is changing from an angled position to a more vertical position
- His arms are straight and his elbows point to the sides

**Transition**

First pull

Second pull

*Correct answer: Transition*

*There are four distinct movements that occur during the upward movement phase of the power snatch:*

- 1. First pull: Todd pushes the floor away to move the bar from the floor up to the knees.*
- 2. Transition: Todd bends his knees and brings the torso to a more vertical position while bringing the bar upward from the knees toward the hips.*
- 3. Second pull: Todd explodes through the hips, knees, and ankles to propel the bar overhead.*
- 4. Catch: Once the bar is overhead, Todd rotates his hands around the bar while pulling his body under the bar in order to catch the bar at arm's length overhead while in about a quarter squat position.*

*The power snatch is a power exercise that can be used to develop the rate of force development (the speed at which an individual can generate force).*

---

**54.**

Which of the following is a common error seen during tire flipping when using the shoulders-against-the-tire technique?

**Placing the feet too close to the tire**

Placing the feet too far away from the tire

The shoulders rise too quickly

---

*Correct answer: Placing the feet too close to the tire*

*When the feet are too close to the tire, this often causes the back to round excessively while lifting the tire. The best way to set up in order to find the right distance, kneel down in front of the tire and place the chin and shoulders against the tire while gripping the underside of the tire with the palms up.*

*Once in this position, you can lift the knees off the ground. This should put the feet and the body in the correct position to start the tire flip. To initiate that movement, drive forward into the tire using the legs instead of attempting to lift the tire up.*

---

**55.**

What can be done to increase the intensity of a depth jump to second box?

**Move the boxes farther apart**

Incorporate lateral jumps

Incorporate resistance bands

---

*Correct answer: Move the boxes farther apart*

*A depth jump to second box is a high-level plyometric exercise that uses boxes from 12 to 42 inches tall. To start, the boxes should be about 24 inches apart, but to increase the level of intensity, the distance between the boxes can increase, making the second jump more challenging.*

---

**56.**

Where should the elbows be in relation to the bar during the preparation phase (the dip) of the push jerk?

**The elbows should be directly underneath or slightly in front of the bar**

The elbows should be at chest height, pointed slightly outward

The elbows should be aligned with the middle of the lifter's side

---

*Correct answer: The elbows should be directly underneath or slightly in front of the bar*

*In the push jerk, the lifter holds the barbell with a closed, pronated grip and places the barbell across their anterior deltoids and clavicles. As the lifter begins the preparation phase and starts the dip, the elbows should be directly underneath or slightly in front of the bar.*

*This position helps keep the bar from sliding down the shoulders, while also placing the arms in an advantageous position to extend the arms overhead in order to catch the bar.*

---

**57.**

What type of flexibility refers to the available range of motion during voluntary active movements?

**Dynamic flexibility**

Static flexibility

General flexibility

---

*Correct answer: Dynamic flexibility*

*Flexibility measures the amount of ROM around a joint and can be measured two ways.*

*Dynamic flexibility refers to the available range of motion (ROM) achieved through actively moving a joint through a range of motion.*

*Static flexibility refers to the available passive range of motion (ROM) around a joint, with an external force moving the joint to determine passive ROM.*

---

**58.**

How wide should the lifter place the hands when performing a seated barbell shoulder press?

**Slightly wider than shoulder width, with forearms pronated**

Slightly narrower than shoulder width, with forearms pronated

Central / Inline with shoulder-width, with one forearm pronated and one forearm supinated

---

*Correct answer: Slightly wider than shoulder width, with forearms pronated*

*The grip for a seated barbell shoulder press should be a pronated, closed grip. Both palms should face forward, and the thumb should wrap around the bar. The hands should be placed slightly wider than shoulder-width apart.*

*This movement targets and strengthens the anterior and medial deltoids and the triceps brachii. Because this barbell movement is performed above the head, it is recommended that a spotter is used for safety.*

---

**59.**

An athlete is attempting to improve aerobic endurance using the rowing machine. Where should the athlete pull the cable handle during the **concentric** phase?

**The athlete should row by pulling the handle toward just below the rib cage**

The athlete should row by pulling the handle toward just above the rib cage

The athlete should row by pulling the handle directly toward the rib cage

---

*Correct answer: The athlete should row by pulling the handle toward just below the rib cage*

*Proper technique calls for the athlete to row by pulling the handle toward the abdomen just below the rib cage. In addition, at the finish, the legs should be fully extended and the torso leaning slightly backward.*

*The rowing machine is an excellent tool for improving aerobic endurance.*

---

60.

Elasticity refers to which of the following?

**Tissue's ability to return to its original resting length after a passive stretch**

Ability of a muscle to remain in the new lengthened state after being stretched

Ability of the muscle spindles to contract after being stretched

---

*Correct answer: Tissue's ability to return to its original resting length after a passive stretch*

*The elasticity of connective tissue is one of the factors that determine ROM in tendons, ligaments, fascial sheaths, joint capsules, and skin. Elasticity is the ability of soft tissue to return to its original resting length after a passive stretch.*

*Plasticity is the ability of a muscle to remain in the new lengthened state after being stretched.*

*A stretch reflex occurs when a muscle is stretched rapidly. When a stretch happens too quickly, the muscle spindles are stimulated, and the body responds by contracting that muscle, preventing access to greater range of motion.*

---

**61.**

Which of the following is **not** a recommended foot position when performing a side plank on the right side?

**Place the right foot in front of the left foot**

Place the left foot in front of the right foot

Place the feet together with the left foot on top

---

*Correct answer: Place the right foot in front of the left foot*

*There are two recommended positions for the feet during a side plank. When performed on the right side:*

- 1. Place the feet together, with the left foot on top*
- 2. Place both feet on the floor, with the left foot (top leg) in front of the right foot (bottom leg)*

*When performing a side plank on the right side, the right side is facing the floor. It is important to maintain a straight line from the feet to the head for the duration of the exercise.*

---

**62.**

Where should the arms be during an abdominal crunch?

**Folded across the chest or abdomen**

Reaching toward the feet

Clasped behind the head

---

*Correct answer: Folded across the chest or abdomen*

*Placing the arms across the chest or abdomen helps prevent an individual from pulling on the head and neck to complete the movement. To perform the crunch, place the heels on an elevated surface such as a bench and bend the knees to about 90 degrees.*

*Curl up until the upper back comes off the ground without moving the feet, hips, legs or arms. Perform the movement slowly and with control.*

---

**63.**

How large of a landing surface is recommended for boxes used in plyometric training?

**18" x 24"**

18" x 18"

12" x 18"

*Correct answer: 18" x 24"*

*Boxes used for plyometric training should be sturdy and also have a non-slip landing surface of at least 18" x 24". This helps allow room for error and loss of balance that might occur.*

*Generally, box heights should range between 6" up to 42" and can be based on the needs and abilities of the individuals using the facility.*

---

**64.**

Megan is about to start the downward phase of a back squat. This is her position:

- The bar is above her posterior deltoids and across her upper trapezius
- Her torso is neutral
- Her elbows are reaching back and up
- Her feet are hip-width apart, with her toes slightly turned out
- Her feet are flat on the ground
- Her head is slightly up

Is this the correct position to begin the downward phase? If not, what should change?

**Megan's feet should be wider; at least shoulder-width apart if not wider**

This is the correct position for this phase of the movement

Megan's elbows should be under the bar, instead of reaching back and up

*Correct answer: Megan's feet should be wider; at least shoulder-width apart if not wider*

*The recommended foot width distance for the back squat is at least shoulder-width apart. Hip-width is too narrow and may affect the technique or depth of the lift.*

*The rest of Megan's position is correct to begin the downward movement phase of the back squat, flexing the hips and knees to begin descending into the squat position. Keeping the elbows reaching back and up helps secure the bar on her back and shoulders throughout the lift.*

---

**65.**

During which of the following exercises would you need to spot a client?

**Overhead press**

The snatch

1RM deadlifts

---

*Correct answer: Overhead press*

*Spotters are valuable to help increase safety when lifting, especially on:*

- *Overhead lifts (shoulder presses)*
- *Lifts with the bar on the back or shoulders (back and front squats)*
- *Lifts with the bar over the face (bench press)*

*Power exercises should never use a spotter, even for overhead exercises like the snatch. Instead of spotting, the strength coach should teach the athlete how to safely miss a lift when necessary. Deadlifts do not require a spotter, regardless of the weight used.*

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**66.**

Which of the following is **not** one of the most common technical flaws during a tire flip?

**Raising the chest while contracting the musculature of the lower back**

Placing the feet too close to the tire when initiating the movement

Hips rise before the shoulders

Using a lifting motion instead of a pushing motion

*Correct answer: Raising the chest while contracting the musculature of the lower back*

*In the context of performing a tire flip, a common exercise in strongman training, raising the chest while contracting the musculature of the lower back is not considered a technical flaw; in fact, it represents correct posture. This action helps maintain a neutral spine and engages the core, providing stability and reducing the risk of injury, especially to the lower back, during the lift.*

*Common technical flaws during a tire flip include:*

- **Placing the feet too close to the tire when initiating the movement:** *This positioning can compromise balance and leverage, making the initial lift more difficult and potentially straining the lower back. Proper foot placement should provide a stable base and allow for efficient force transfer from the legs through the upper body to the tire.*
- **Hips rise before the shoulders:** *This flaw indicates that the legs are straightening too early in the lift, which can shift the load disproportionately to the lower back and hamstrings, increasing the risk of strain or injury. The hips and shoulders should rise at the same rate, maintaining a flat back to keep the force distribution even throughout the body.*
- **Using a lifting motion instead of a pushing motion:** *While the initial phase of a tire flip involves lifting the tire off the ground, the movement should transition into a push to complete the flip. Relying solely on a lifting motion can place undue stress on the back and arms and is less efficient than using a pushing motion, which engages the chest, shoulders, and triceps more effectively.*

*Understanding and avoiding these common technical flaws can help athletes perform tire flips more effectively and safely, maximizing the benefits of this dynamic and challenging exercise.*

**67.**

When initiating the flight phase of the alternating bound, what is the recommended angle of the front knee?

**90 degrees**

45 degrees

120 degrees

*Correct answer: 90 degrees*

*In both versions of the alternating bound (double arm and single arm), the flight phase is initiated by pushing the ground away using the stance leg while driving the opposite leg forward and up until the thigh is parallel to the ground. The knee of the front leg should be about 90 degrees so that the foot is directly under the knee.*

*The back leg will go through an extension phase and then cycle through during the next stance phase. The goal of alternate leg bounding is to make each stride as long as possible while maintaining proper mechanics.*

*When the knee angle is more open (for example, 120 degrees), this may cover a greater distance, but causes the landing to become a braking step, slowing the forward movement. A knee angle less than 90 degrees (45 degrees) is also not optimal and may result in a shorter stride length and improper direction of force upon landing.*

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**68.**

You have a client who is new to compound movements. Today, you'll be focusing on the barbell bench press.

Which of the following is a benefit of using a barbell setup rather than a machine?

**It is easier to spot the client**

The movement is more controlled throughout the range of motion

The barbell bench press emphasizes different muscles than the machine bench press does

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*Correct answer: It is easier to spot the client*

*Barbells and dumbbells are appropriate and sensible for performing the bench press, primarily because this makes it easy for the spotters. In a bench press, the spotter stands above the client and helps pull the bar up when necessary.*

*During a machine press, this is not possible and it can make it difficult to properly spot the client, which can be problematic for someone who is new to exercise.*

*Machines ensure that the movement is completely controlled throughout the range of motion. Both barbell bench presses and machine bench presses emphasize the pecs, triceps, and anterior deltoids as the prime movers.*

---

**69.**

In the starting position for the deadlift, where should the bar be in relation to the shins?

**1" in front of the shins**

Gently touching the shins

2" in front of the shins

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*Correct answer: 1" in front of the shins*

*The correct starting position for the deadlift is important to ensure good technique on the rest of the lift. Some of the key points for the starting position include:*

- *Feet between hip and shoulder distance apart and feet flat (heels on the ground)*
- *Hips lower than the shoulders but above the knees*
- *Shoulders above or slightly in front of the bar*
- *Arms straight and outside the knees*
- *Bar 1" away from the shins*

*As the lift begins, the lifter should attempt to keep the bar as close to the shins as possible throughout the initial pull.*

---

**70.**

During the lunge walk dynamic stretch, where should the front knee be in relation to the foot during the eccentric phase?

**Over the foot**

Slightly behind the foot

Slightly in front of the foot

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*Correct answer: Over the foot*

*The lunge walk is performed by stepping forward with the hands behind the head and lowering into a lunge position until the back knee is almost to the floor. At the bottom of this position, the front knee should be directly over the foot. Keep the torso upright throughout the entire movement. Return to a stand by stepping forward and repeat on the opposite leg.*

*This dynamic stretch targets the gluteus maximus, hamstrings, iliopsoas, and quadriceps.*

---

**71.**

Which of the following is **not** one of the recommended steps of the cycled split squat jump?

**Reach both hands overhead**

Explosively jump up

Switch the position of the legs midair

Maintain the lunge position when landing

*Correct answer: Reach both hands overhead*

*The step reach both hands overhead is not one of the recommended steps of the cycled split squat jump. While arm movements can be incorporated into various jump exercises to aid in momentum and balance, reaching both hands overhead is not a specified part of the traditional cycled split squat jump technique. Instead, arm actions in plyometric exercises typically involve counter-movements that help to generate additional force for the jump (such as swinging the arms) or to maintain balance and coordination rather than a static overhead reach.*

*In the cycled split squat jump, a dynamic plyometric exercise that targets the lower body, the recommended steps involve starting in a lunge or split stance, explosively jumping up, switching the position of the legs midair, and then landing back in a lunge position with the opposite leg forward. The key components of this exercise are designed to improve power, coordination, and balance by utilizing the stretch-shortening cycle of the leg muscles.*

*The correct steps for the cycled split squat jump include:*

- **Explosively Jump Up:** *From the split squat or lunge position, the athlete uses the power of both the front and back legs to launch themselves upward into a jump. This action requires significant force production from the lower body muscles.*
- **Switch the Position of the Legs Midair:** *While airborne, the athlete quickly switches the position of their legs, so the front leg moves to the back and the back leg comes forward. This midair switch challenges coordination and agility.*
- **Maintain the Lunge Position When Landing:** *The athlete lands softly back into a lunge position but with the opposite leg in front compared to the starting position. It's crucial to maintain good form upon landing to absorb the impact*

*effectively and prepare for the subsequent jump, ensuring the exercise's safety and effectiveness.*

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**72.**

Which of the following exercises may require the assistance of two spotters when the lifter is using very heavy resistance?

**Barbell back squats**

Romanian deadlifts with hex bar

Machine quad extensions

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*Correct answer: Barbell back squats*

*Both back squats and front squats, as well as overhead presses, may require two spotters, depending on the amount of weight being lifted and the fitness experience of both the lifter and the spotter(s). When multiple spotters are used to assist on a lift, communication between both spotters, as well as with the athlete, is vital to everyone's safety.*

*Spotters stand at opposite ends of the bar, assisting the athlete by lifting and balancing the bar in the initial phase as the athlete gets into the starting position. The spotters keep their hands close to but not touching the bar throughout the entire movement and then finally grab the bar at the same time to assist with balancing as the athlete returns the bar to the rack.*

*Most machine exercises do not require a spotter, let alone two spotters.*

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**73.**

Which of the following statements about dynamic stretches is **false**?

**Ballistic stretching is used interchangeably with dynamic stretching**

Mobility drills is used interchangeably with dynamic stretching

Active stretching is used interchangeably with dynamic stretching

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*Correct answer: Ballistic stretching is used interchangeably with dynamic stretching*

*The terms dynamic stretching and ballistic stretching are both forms of stretching that require moving a body part through a range of motion. However, there are important differences that distinguish these types of stretching from one another.*

*Dynamic stretching, which can also be referred to as mobility drills, involves actively moving a joint through a ROM to enhance dynamic flexibility and control through that ROM. The important distinction between this and ballistic stretching is that dynamic stretching avoids any bouncing but, instead, requires the athlete to control the movement.*

*When performing ballistic stretches, the end position isn't held but, instead, relies on a bouncing movement to move through the range of motion. An example of a ballistic stretch is a toe touch, where the fingers bounce off the toes rather than being held there. Ballistic stretching can be beneficial, but extra care must be taken to ensure preparation is adequate and the athlete is ready for this type of movement.*

---

**74.**

How high should the foot of the swing leg be when performing the fast feet speed drill?

**No higher than mid-shin**

No higher than knee height

No higher than ankle height

---

*Correct answer: No higher than mid-shin*

*The fast feet drill is a speed drill that is designed to help with stride frequency. It is important to note that increases in stride frequency require shorter ground contact times and higher force production. Learning to move the feet faster can enhance the application of these components of speed.*

*To perform this movement, the athlete should maintain a tall posture with the torso, hips, knees, and ankles all in alignment. The drill uses a running motion while focusing on ensuring that the foot of the swing leg (the recovery leg) is no higher than mid-shin level as it is brought forward. Once the swing leg comes through, the athlete should immediately and aggressively drive the leg down into the ground. This movement should bring the opposite leg through, allowing the athlete to repeat the previous steps in order to keep taking these "fast feet" steps in an alternating fashion.*

*This drill is often performed for a specified distance.*

---

**75.**

What is another name for an open grip?

**False grip**

Hook grip

Supinated grip

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*Correct answer: False grip*

*An open grip, also known as a false grip, involves grabbing the bar without wrapping the thumb around the bar. Instead, the thumb is placed next to the index finger on the bar. This grip is not as secure as a closed grip (when the thumb does wrap around the bar).*

*A false grip could be used in any of these positions:*

- *pronated (palms down)*
- *supinated (palms up)*
- *alternated (one palm up and one palm down)*
- *neutral (palms facing each other)*

*The hook grip is a closed grip in which the thumb is placed around the bar and with the fingers on top of the thumb.*

---

**76.**

Your athlete is using the pec deck machine. Where should the handles be in relation to her body?

**In line with the midchest**

In line with the midshoulder

In line with the top of the shoulders

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*Correct answer: In line with the midchest*

*When setting up the pec deck machine, the seat must be raised or lowered according to individual torso length in order for the handles to line up with the midchest.*

*To perform the movement:*

- *Grab the handles with a closed neutral grip*
  - *Pull the handles toward each other out in front of the chest*
  - *Keep the elbows slightly bent throughout the movement*
  - *Maintain the five-point body contact position*
-

**77.**

Andrew is performing a power clean. When he catches the barbell on his shoulders, this is his position:

- The bar is across his clavicles and anterior deltoids
- His feet are flat on the ground, about shoulder-width apart
- His upper arms are parallel to the floor
- His knees and hips are bent to about a quarter squat position
- His hips are slightly in front of his shoulders

What should Andrew change in his positioning and form?

**His hips should be slightly behind his shoulders**

His upper arms need to be higher so that he can elevate his elbows properly

His feet should be hip-width apart

*Correct answer: His hips should be slightly behind his shoulders*

*The catch is the last portion of the upward movement phase in the power clean. At this stage of the lift, Andrew has already pulled the bar from the floor and exploded through the hips, knees, and ankles to propel the bar upward, and now has brought his elbows around the bar in order to catch the bar on his shoulders. Andrew's catch position is almost correct. His placement of the bar, his arms, the depth of his squat, and width of his feet are all correct.*

*However, Andrew is making an error that is common on the power clean. His hips are too far forward and should actually be behind his shoulders, instead of in front of his shoulders, in order to support the load through his entire body. This would bring his torso into a more upright position, which is safer and more beneficial for this exercise. This position should be similar to that of the beginning of a downward movement phase for a front squat.*

---

**78.**

Which of the following describes how to start the sitting toe touch stretch?

**Dorsiflex your ankles, grab your toes or ankles and pull your chest toward your legs**

Dorsiflex your ankles, grab your toes or ankles and pull your nose toward your toes

Dorsiflex your ankles, grab your toes to pull yourself forward, then extend your fingers

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*Correct answer: Dorsiflex your ankles, grab your toes or ankles and pull your chest toward your legs*

*It is a common error to begin the stretch by pulling the nose toward the legs during the sitting toe touch stretch. To start the stretch:*

- *Dorsiflex the ankles and, grab the toes or ankles, depending on available range of motion*
- *Gently pull the chest forward and toward the legs, keeping the eyes forward*

*Those with greater flexibility should begin the stretch the same way, only allowing the nose to touch the legs once the chest is also touching the legs.*

---

**79.**

Which type of stretch is a type of functionally based stretching exercise that uses sport-generic and sport-specific movements to prepare the body for activity?

**Dynamic stretching**

Static stretching

PNF stretching

Ballistic stretching

*Correct answer: Dynamic stretching*

*Dynamic stretching is a type of functionally based stretching exercise that incorporates sport-generic and sport-specific movements to prepare the body for activity. It involves moving parts of the body and gradually increasing reach, speed of movement, or both. This type of stretching is particularly useful for warming up as it engages the muscles in a manner similar to the movements of the sport or activity, enhancing range of motion, muscle temperature, and blood flow, thereby preparing the body for the demands of the upcoming physical activity.*

*Other types of stretching include:*

- **Static Stretching:** *This involves stretching a muscle (or group of muscles) to its farthest point and then maintaining or holding that position for a period of time. While beneficial for increasing flexibility, static stretching is generally recommended for the cooldown phase after exercise rather than as a warm-up because it can temporarily reduce muscle strength, power, and explosive performance if performed before activity.*
- **Proprioceptive Neuromuscular Facilitation (PNF) Stretching:** *PNF is an advanced form of flexibility training that involves both the stretching and contracting of the muscle group being targeted. PNF stretching can be highly effective for increasing flexibility, but due to its intensity, it is more commonly used in rehabilitation settings or as part of a flexibility training program rather than as a pre-activity warm-up.*
- **Ballistic Stretching:** *This type of stretching involves trying to force a part of the body beyond its range of motion by using bouncing or jerky movements. Ballistic stretching can be risky and lead to injuries due to the high force applied to the muscles and is generally not recommended without proper supervision and for specific purposes.*

*Dynamic stretching is preferred as part of a warm-up routine because it closely mimics the movements of the sport or activity, effectively preparing the muscles,*

*joints, and nervous system for the dynamic actions involved in physical activity or competition.*

---

**80.**

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

**Closed, pronated grip**

Closed, supinated grip

Closed, hook grip

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*Correct answer: Closed, pronated grip*

*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.*

---

**81.**

During the standing long jump, how must the athlete land for the jump to be scored?

**Land on both feet**

Land with the right foot in front

Land with the left foot in front

Land on the heels

*Correct answer: Land on both feet*

*During the standing long jump, also known as the broad jump, it is required for the athlete to land on both feet for the jump to be scored. This rule ensures a uniform criterion for measuring the distance of the jump from the take-off line to the closest point of contact on the landing. Landing on both feet also promotes balance and reduces the risk of injury upon landing. The standing long jump is a test of lower body power and requires the athlete to jump forward as far as possible from a standing position with a two-foot take-off.*

*Other landing techniques mentioned are not in accordance with the standard scoring criteria for the standing long jump:*

- **Land with the right foot in front:** *This specific landing requirement is not part of the standing long jump criteria. Landing with one foot in front of the other could lead to inconsistencies in measurement and does not align with the standardized approach of landing on both feet.*
- **Land with the left foot in front:** *Similar to landing with the right foot in front, this landing technique is not standard for the standing long jump. It could introduce measurement variations and is not conducive to the balanced, two-foot landing required for a valid jump.*
- **Land on the heels:** *While athletes might inadvertently land on their heels, this is not a recommended or required landing technique for the standing long jump. Ideally, athletes should land flat-footed or slightly on the balls of their feet to absorb the impact effectively and maintain balance upon landing.*

*The requirement to land on both feet ensures a fair and consistent basis for measuring the jump distance and promotes safety by encouraging a balanced landing that distributes the impact forces more evenly across both legs.*

---

**82.**

Which of the following has been described as rapid, unpaced, maximal-effort running of 15 seconds or fewer?

**Sprinting**

Complex training

Momentum

Stretch-shortening cycle

*Correct answer: Sprinting*

*Sprinting is described as rapid, unpaced, maximal-effort running of 15 seconds or fewer. This form of running demands a high level of energy expenditure and muscular effort, as it involves pushing the body to its speed limits over very short distances. Sprinting is characterized by explosive power and high speed, relying heavily on the anaerobic energy system due to the short duration and intensity of the effort.*

*Other concepts related to physical training and performance include:*

- **Complex Training:** *Complex training involves alternating heavy resistance exercises with plyometric exercises within the same workout. This method is designed to exploit the benefits of postactivation potentiation, where the performance of a plyometric exercise is enhanced following a heavy resistance exercise. While complex training can include sprinting as a form of plyometric exercise, the term itself refers to a specific training methodology rather than a type of exercise.*
- **Momentum:** *Momentum is a physical quantity that describes the motion of an object and is the product of an object's mass and velocity. In sports and exercise, understanding and utilizing momentum can be crucial for optimizing performance in activities like sprinting, where maintaining high velocity is key. However, momentum is a broader physics concept and not specifically a type of exercise or training method.*
- **Stretch-Shortening Cycle (SSC):** *The SSC is a mechanism in which muscles are pre-stretched before contracting, allowing for a more powerful subsequent contraction. This cycle is fundamental to many explosive movements, including sprinting, where the leg muscles undergo a rapid stretch-shortening action to generate maximum force in minimal time.*

*Sprinting, as a rapid and maximal-effort form of running, distinctively stands out due to its short duration and high intensity, which requires a significant contribution from*

*the anaerobic energy system and effective use of the stretch-shortening cycle for optimal performance.*

---

**83.**

What is the percentage of overall power output one may be able to achieve when training on an unstable surface compared to a stable ground?

**Up to 70%**

Up to 75%

Up to 80%

---

*Correct answer: Up to 70%*

*Training on unstable surfaces is growing in popularity within the strength and conditioning community. While it is possible that performing standard exercises on an unstable surface may increase core activation, the capacity and rate of force generation by the agonist muscle decreases. In fact, overall force and power output may be less than 70% of what can be achieved when the exercise is performed under stable conditions.*

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**84.**

Which of the following can lead to an increased risk of injury to the anterior cruciate ligament?

**Excessive knee valgus**

Excessive knee varus

Excessive knee flexion

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*Correct answer: Excessive knee valgus*

*Excessive knee valgus may dramatically increase an athlete's risk of knee injury. Two things that are used to reduce injury risk are teaching proper landing and jumping techniques, and using unilateral exercises like single leg squats to develop unilateral strength.*

---

**85.**

Which of the following is **true** during the first pull of the power snatch?

**The torso angle should stay the same as the bar moves from the mid-shins to the knees**

The torso should become more vertical as the bar moves from the mid-shins to the knees

The elbows should point backward as the bar moves from the mid-shins to the knees

---

*Correct answer: The torso angle should stay the same as the bar moves from the mid-shins to the knees*

*The first pull is the first of four segments of the upward movement phase of the power snatch. During this portion of the movement, the torso angle should stay constant so that the hips and shoulders rise at the same rate. It is a common error to let the hips rise up faster than the shoulders.*

*The elbows should be straight and point out to the sides, and the bar should be as close to the legs as possible. The shoulders should stay directly above or slightly in front of the bar. Proper execution of the first pull is crucial to the performance of the rest of the lift.*

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**86.**

Which of the following would cause a **disqualification** in a trial of the T-test?

**Crossing the feet from cone B to cone C**

Touching the base of cone D

Shuffling from cone C to cone D

Running forward from cone A to cone B

*Correct answer: Crossing the feet from cone B to cone C*

*In a trial of the T-test, an agility test used to assess an athlete's speed and agility with directional changes, crossing the feet from cone B to cone C would cause a disqualification. The T-test involves sprinting, shuffling, and changing directions quickly without crossing the feet, as crossing the feet can increase the risk of injury and is considered a technical error in the execution of the test. Proper technique requires the athlete to maintain balance and control while moving laterally, and crossing the feet disrupts this, leading to an invalid trial.*

*Other actions within the T-test, which are part of the correct execution, include:*

- **Touching the Base of Cone D:** *This is a required part of the T-test, where the athlete must touch the base of specific cones, including cone D, to complete the drill correctly. It demonstrates agility and the ability to change levels and directions quickly.*
- **Shuffling From Cone C to Cone D:** *Lateral shuffling without crossing the feet is the correct technique for moving between cones in certain parts of the T-test. It assesses the athlete's lateral quickness and agility.*
- **Running Forward From Cone A to Cone B:** *Sprinting forward from the starting cone (A) to the next cone (B) is part of the T-test's initial phase and is a correct and necessary action to complete the test.*

*The T-test is designed to evaluate an athlete's agility, including their ability to accelerate, decelerate, and quickly change directions while maintaining body control and without losing balance. Therefore, maintaining proper footwork and avoiding disqualifying actions like crossing the feet is crucial for a valid and successful performance in the T-test.*

---

**87.**

Which of the following would **not** be recommended during the upward movement phase of the lateral shoulder raise?

**Swing the dumbbells upward**

The elbows and upper arms should rise together

Raise the dumbbells until the arms are approximately parallel with the floor

Maintain an erect upper body position

*Correct answer: Swing the dumbbells upward*

*During the upward movement phase of the lateral shoulder raise, it is not recommended to swing the dumbbells upward. Swinging or jerking the dumbbells compromises the exercise's effectiveness by relying on momentum rather than muscle contraction, which can reduce the focus on the target muscles (primarily the medial deltoids) and increase the risk of injury due to uncontrolled movements.*

*Correct practices for the upward phase of the lateral shoulder raise include:*

- **The elbows and upper arms should rise together:** This ensures that the movement is controlled and that the deltoids are effectively engaged. The arms should move in a synchronized manner, maintaining a slight bend in the elbows throughout the lift to reduce stress on the elbow joints.
- **Raise the dumbbells until the arms are approximately parallel with the floor:** Lifting the dumbbells to a height where the arms are parallel to the floor ensures an optimal range of motion for targeting the shoulder muscles without placing undue stress on the shoulder joint.
- **Maintain an erect upper body position:** Keeping the torso upright and stable throughout the exercise helps isolate the shoulder muscles and prevents the lower back from compensating for the lift. This position also helps maintain balance and ensures the focus remains on the lateral deltoids.

*By avoiding the swinging of the dumbbells and adhering to controlled, deliberate movements, the lateral shoulder raise can effectively target the shoulder muscles, promoting muscle growth and strength without unnecessary risk of injury.*

---

**88.**

Which PNF technique is being employed when Carl stretches David's hip flexor at a position of mild discomfort for approximately ten seconds, then asks David to resist while Carl applies a hip extension force to David's leg, followed by another passive stretch?

**Hold-relax technique**

Repeated contractions

Contract-relax

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*Correct answer: Hold-relax technique*

*The hold-relax technique is a form of PNF stretching that involves:*

- 1. A passive stretch for about 10 seconds*
- 2. An isometric contraction to prevent movement while force is applied in the direction of the stretch for about 6 seconds*
- 3. Relaxation and another passive stretch into an increased ROM for about 30 seconds*

*The activation of the muscles being stretched prior to the stretch can increase ROM due to autogenic inhibition.*

---

**89.**

Exercises performed during standing typically require that the feet be positioned in which position regarding hip-width?

**Slightly wider than hip-width**

Slightly narrower than hip-width

Same as hip-width

Much wider than hip-width

*Correct answer: Slightly wider than hip-width*

*Exercises performed while standing typically require that the feet be positioned slightly wider than hip-width apart. This stance provides a stable base of support, enhances balance, and allows for effective force transfer through the lower body, making it a preferred foot positioning for a variety of standing exercises, including squats, deadlifts, and overhead presses. The slight outward turn of the feet can also help in engaging the muscles more effectively and ensuring proper joint alignment, which is crucial for both performance and injury prevention.*

*Other foot positioning options, which are less commonly recommended for general standing exercises, include:*

- ***Slightly narrower than hip-width:*** While this stance might be used in specific exercises or for challenging balance and stability, it generally offers less stability than a stance that is slightly wider than hip-width, making it less ideal for exercises requiring significant load or force generation.
- ***Same as hip-width:*** Positioning the feet directly under the hips can provide a natural and comfortable stance for certain exercises or activities. However, for exercises that involve significant lower body movement or lifting, a slightly wider stance is often preferred for enhanced stability and mobility.
- ***Much wider than hip-width:*** A stance significantly wider than hip-width is typically used for specific exercises, such as sumo squats or wide-stance deadlifts, that target different muscle groups or require different movement patterns. While this stance can be effective for certain training goals, it is not the standard recommendation for most standing exercises due to the altered mechanics and increased demand on flexibility.

*Choosing a stance that is slightly wider than hip-width for standing exercises provides a solid foundation that helps in maintaining balance, ensuring proper form, and maximizing the effectiveness of the exercise while minimizing the risk of injury.*

---

**90.**

Which phase of sprinting is characterized by the torso and hips stacked over the foot of the stance leg?

**Velocity**

Acceleration

Deceleration

---

*Correct answer: Velocity*

*A straight line sprint begins with a start, followed by an acceleration phase before reaching maximal velocity. A sprinter will decelerate after crossing the finish line.*

*During the start and acceleration phase, the torso will lean forward in order to apply force efficiently to increase speed.*

*As the athlete approaches their top speed, they enter the maximum velocity phase. The body position during this phase becomes more upright, with the torso and hips stacked over the foot of the stance leg. The shoulders should be relaxed, which helps ensure the arms and legs can move in a coordinated pattern.*

---

91.

During which phase of a sprint should the shoulders be directly above the hips?

**Maximum velocity**

Launch

Acceleration

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*Correct answer: Maximum velocity*

*The maximum velocity phase of a sprint follows the start and acceleration phases, and the athlete is running at maximum speed. During this portion of a sprint, the athlete should be upright, with the shoulders directly over the hips and the hips directly over the stance leg.*

*This allows for appropriate and efficient application of force to continue to propel the athlete forward.*

---

**92.**

After completion of the catch of the power snatch, where should the weight be balanced on the feet?

**Midfoot**

Forefoot

Hindfoot

*Correct answer: Midfoot*

*During the last phase of the upward movement of a snatch (the catch), the athlete must consider the balance of the weight. To ensure that the weight is balanced overhead and the body is in proper position, the weight must be in the middle of the feet.*

---