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Topic Break Down

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Topic 1, Initial Client Consultation and Assessment	119
Topic 2, Exercise Programming and Implementation	190
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QUESTION NO: 1

Which cues help a client maintain safer technique during a body-weight squat?

A. Maintain a neutral spinal position

B. Track the knees generally in line with the toes

C. Keep the feet in contact with the floor

D. Allow the knees to collapse inward during descent

E. Lift the heels as soon as the descent begins

ANSWER: A B C

Explanation:

Maintaining a neutral spinal position, tracking the knees generally in line with the toes, and keeping the feet in contact with the floor support controlled squat mechanics. The knees may travel forward to varying degrees depending on the individual and squat variation; however, forcing them inward increases valgus stress and is not an appropriate cue. Lifting the heels prematurely may indicate a need to modify depth, stance, or mobility demands. Exercise technique should be individualized to the client's ability and movement pattern.

QUESTION NO: 2

Which four extrinsic risk factors may be associated with an increased risk of musculoskeletal injury?

A. Restricted range of motion, previous injury, adverse environmental conditions, faulty equipment

B. Adverse environmental conditions, muscle weakness and imbalance, body composition, faulty equipment

C. Excessive Load on the body, training errors, adverse environmental conditions, faulty equipment

D. Bony alignment abnormalities, joint laxity, training errors, faulty equipment

ANSWER: C

Explanation:

“Excessive Load on the body, training errors, adverse environmental conditions, faulty equipment” is correct because each factor originates outside the participant and can be addressed through exercise-program design, supervision, and the training setting. Excessive external loading may exceed the capacity of tissues to tolerate a session or repeated sessions, particularly when load, volume, or intensity are not matched to the individual’s conditioning and recovery status. Training errors include poorly planned progression, abrupt changes in workload, inadequate recovery, and inappropriate exercise selection or technique instruction. Environmental conditions, such as heat, cold, poor surface conditions, or inadequate visibility, can change the physical demands and safety of activity. Equipment that is damaged, improperly maintained, incorrectly fitted, or unsuitable for the activity can also increase mechanical stress or create direct hazards. ACSM emphasizes that exercise-related injury risk is multifactorial and that modifiable training and environmental exposures should be considered when designing safe activity programs. A personal trainer should therefore screen the exercise environment, inspect equipment, prescribe a sensible progression, and adjust loading based on the client’s response and goals. See the ACSM position stand on exercise-related injury among recreational exercisers and ACSM’s physical activity guidance.

QUESTION NO: 3

Which measure is calculated by dividing body weight in kilograms by height in meters squared?

A. Body mass index

B. Waist-to-hip ratio

C. Percent body fat

D. Basal metabolic rate

ANSWER: A

Explanation:

Body mass index (BMI) is calculated as body mass in kilograms divided by height in meters squared. BMI is a screening measure that can help classify weight status at the population level, but it does not directly measure body fat or distinguish lean mass from fat mass. Therefore, a personal trainer should interpret it with other relevant information, such as waist circumference, health history, and fitness measures. See the CDC overview of adult BMI.

QUESTION NO: 4

From a seated position, with dumbbells to the sides, raising the dumbbells laterally to shoulder level with elbows slightly flexed, exercises primarily the _____:

A. bicep brachii and latisimus dorsi

B. posterior deltoid

C. anterior deltoid and triceps brachii

D. middle deltoid.

ANSWER: D

Explanation:

The seated dumbbell lateral raise primarily exercises the middle deltoid. Raising the arms laterally away from the body in the frontal plane is shoulder abduction. The middle deltoid is the principal muscle producing this movement through most of the range up to shoulder level, especially once the arm has moved beyond the initial portion of abduction. Keeping the elbows slightly flexed is a standard technique that maintains a comfortable joint position and reduces the lever length without changing the exercise's primary target. Although the supraspinatus contributes to initiating abduction and other shoulder-stabilizing muscles assist in controlling the movement, the middle deltoid supplies the primary training stimulus during a lateral raise. Performing the exercise seated also limits assistance from the legs and torso, helping focus the movement at the shoulder joint. This exercise is therefore appropriately classified as an isolation exercise for the lateral, or middle, portion of the deltoid. ACSM exercise guidance identifies lateral raises as a shoulder exercise, and standard anatomy references describe the deltoid's middle fibers as abducting the arm at the shoulder. See ACSM physical activity resources and OpenStax Anatomy and Physiology.

QUESTION NO: 5

A client takes a beta-blocking medication and has been cleared for exercise. Which methods are appropriate for monitoring aerobic exercise intensity?

A. Rating of perceived exertion

B. Talk test

C. External workload record

D. Age-predicted maximal heart rate alone

E. Resting heart rate alone

ANSWER: A B C

Explanation:

Beta-blockers can blunt the heart-rate response to exercise, making age-predicted heart-rate targets less reliable. Rating of perceived exertion, the talk test, and a consistent record of external workload are practical methods for monitoring intensity. The trainer should also follow any exercise parameters provided by the client's health care professional. ACSM discusses using multiple methods to monitor exercise intensity in its Guidelines for Exercise Testing and Prescription.

QUESTION NO: 6

Which strategies can support long-term exercise adherence for a client beginning a physical-activity program?

A. Set realistic process goals

B. Identify likely barriers and solutions

C. Use self-monitoring tools

D. Encourage appropriate social support

E. Begin with an unsustainably demanding schedule

ANSWER: A B C D

Explanation:

Adherence is more likely when goals are realistic, barriers are identified in advance, progress is monitored, and social support is available. Process-oriented goals, such as completing planned walks each week, give the client controllable behaviors to practice. Programs that begin with an excessively demanding schedule may reduce confidence and increase dropout risk. The CDC provides practical information on building physical activity into daily life at Physical Activity Basics.

QUESTION NO: 7

Which signs or symptoms during exercise require a client to stop exercising and be referred for medical evaluation?

A. Chest pain or pressure

B. Unusual shortness of breath

C. Dizziness or near-fainting

D. Sweating during vigorous exercise

E. A higher heart rate during an interval

ANSWER: A B C

Explanation:

Chest pain or pressure, unusual shortness of breath, and dizziness or near-fainting during exercise are concerning symptoms that require the activity to stop and warrant appropriate medical referral. Expected exertional responses, such as sweating or increased breathing during appropriately challenging exercise, are not by themselves reasons for emergency referral. Trainers should follow facility emergency procedures when symptoms suggest an urgent condition. ACSM discusses signs and symptoms that may indicate cardiovascular, metabolic, or renal disease in its Guidelines for Exercise Testing and Prescription.

QUESTION NO: 8

The stroke volume of a client who has a cardiac output of 5 liters per minute and a heart rate of 70 beats per minute is approximately _____.

A. 70 L

B. 350 L

C. 70 mL

D. 350 mL

ANSWER: C

Explanation:

The correct value is **70 mL** per beat. Stroke volume is the amount of blood ejected by the left ventricle during each heartbeat. Cardiac output represents the volume of blood pumped each minute and is determined by the relationship: cardiac output = heart rate × stroke volume. Therefore, stroke volume can be calculated by dividing cardiac output by heart rate. In this case, 5 L/min divided by 70 beats/min equals 0.0714 L/beat. Converting liters to milliliters gives approximately 71.4 mL/beat, which rounds to 70 mL/beat. This is also consistent with a typical resting stroke-volume value in a healthy adult. Understanding this relationship helps a personal trainer interpret basic cardiovascular physiology: cardiac output may increase during exercise through increases in heart rate, stroke volume, or both. The calculation requires compatible time units, since both the cardiac-output and heart-rate values are expressed per minute. For additional discussion of the cardiac-output equation and stroke volume, see OpenStax Anatomy and Physiology: Cardiac Physiology and the NCBI StatPearls overview of cardiac output.

QUESTION NO: 9

Which elements are appropriate to include in an informed-consent process before fitness assessment or exercise participation?

A. Purpose of the assessment or exercise

B. Foreseeable risks and benefits

C. Voluntary nature of participation

D. Opportunity to ask questions

E. A guarantee of specific results

ANSWER: A B C D

Explanation:

Informed consent should communicate the general purpose of the activity, foreseeable risks and benefits, the voluntary nature of participation, and the client's opportunity to ask questions. It does not guarantee outcomes or eliminate the trainer's responsibility to provide appropriate supervision and follow professional standards. These practices support client autonomy and professional risk management.

QUESTION NO: 10

Which strategies can help reduce the risk of heat-related illness during outdoor exercise in hot conditions?

A. Acclimatize progressively to the heat

B. Adjust fluid intake for exercise and environmental conditions

C. Reduce intensity or duration when heat stress is high

D. Wear lightweight, loose-fitting clothing

E. Wear impermeable clothing to increase sweating

ANSWER: A B C D

Explanation:

Progressive heat acclimatization, appropriate fluid intake, and reducing exercise intensity or duration when environmental heat stress is high can reduce heat strain. Lightweight, loose-fitting clothing also supports heat dissipation. Deliberately wearing impermeable clothing to increase sweating is unsafe because it impairs evaporative cooling and raises heat stress. See the CDC guidance on preventing heat-related illness.

QUESTION NO: 11

The risk of developing a myocardial infarction increases when there is a family history of myocardial infarction or sudden death before the ages of:

A. 50 years of age in a first-degree female relative; 60 years of age in a first-degree male relative

B. 50 years of age in any male relative; 60 years of age in any female relative

C. 55 years of age in a first-degree male relative; 65 years of age in a first-degree female relative

D. 55 years of age in any male relative; 65 years of age in any female relative

ANSWER: C

Explanation:

55 years of age in a first-degree male relative; 65 years of age in a first-degree female relative is correct. ACSM's traditional coronary artery disease risk-factor definition identifies a positive family history when myocardial infarction, coronary revascularization, or sudden cardiac death occurs prematurely in a first-degree relative: before age 55 for a father or other first-degree male relative, or before age 65 for a mother or other first-degree female relative. First-degree relatives include parents, siblings, and children. This distinction recognizes that premature clinical coronary disease occurs at different age thresholds for male and female relatives and helps identify an individual whose inherited and shared familial risk may warrant attention during health screening and exercise preparticipation evaluation. In practical personal-training settings, this history should be obtained as part of a client's health assessment and considered alongside current symptoms, diagnosed disease, and other cardiovascular risk information when determining whether medical clearance or further clinical evaluation may be appropriate. ACSM's current preparticipation screening process emphasizes known cardiovascular, metabolic, or renal disease; symptoms; and intended exercise intensity, while family history remains valuable health-history information for overall risk awareness. The age and first-degree-relative criteria stated in the answer are the established ACSM family-history thresholds. See ACSM's Guidelines for Exercise Testing and Prescription and CDC information on heart-disease risk factors.

QUESTION NO: 12

Which of the following is the term used for a training regimen that begins with rapid eccentric muscle action followed by concentric action of the same muscle?

A. Proprioceptive Neuromuscular Facilitation

B. Plyometrics

C. Dynamic Activity Preparation

D. Progression

ANSWER: B

Explanation:

Plyometrics is the correct term for training that uses a rapid eccentric muscle action immediately followed by a concentric action of the same muscle or muscle group. This sequence uses the stretch-shortening cycle: the muscle-tendon unit is quickly lengthened under load, briefly transitions, and then shortens forcefully. When the transition from the eccentric phase to the concentric phase is rapid, elastic energy stored during the lengthening phase and neuromuscular reflex activity can

contribute to subsequent force production. Common plyometric movements include jumps, hops, bounds, and explosive medicine-ball throws. In personal-training practice, plyometric exercise is selected and progressed according to the client's current strength, movement competency, orthopedic status, training experience, and ability to safely absorb landing forces. Proper landing mechanics and an appropriate training surface are important components of safe implementation. ACSM materials identify plyometric activity as a form of power training involving rapid stretching and shortening actions, while the National Strength and Conditioning Association describes plyometrics as exercises that exploit the stretch-shortening cycle. See ACSM's Guidelines for Exercise Testing and Prescription and the NSCA overview of plyometrics.

QUESTION NO: 13

Which sensory receptor primarily detects changes in muscle length and the rate of muscle lengthening?

A. Golgi tendon organ

B. Muscle spindle

C. Pacinian corpuscle

D. Neuromuscular junction

ANSWER: B

Explanation:

Muscle spindles are proprioceptors located within skeletal muscle that detect changes in muscle length and the speed of that change. Their feedback contributes to the stretch reflex and helps regulate muscle activity during movement. Golgi tendon organs primarily detect tension within tendons. See OpenStax: Nervous System Control of Muscle Tension.

QUESTION NO: 14

What is the leading cause of non-cardiovascular death in young athletes?

A. Contact Sports Injuries

B. Anemia

C. Hypothermia

D. Exertional heat illness (particularly exertional heat stroke)

ANSWER: D

Explanation:

Exertional heat illness, particularly exertional heat stroke, is the correct answer. Exertional heat stroke is a life-threatening condition caused by intense physical activity that produces a dangerous elevation in core body temperature, usually accompanied by central nervous system dysfunction such as confusion, collapse, altered behavior, or loss of consciousness. It can develop rapidly during strenuous training or competition, particularly when environmental heat, humidity, equipment, inadequate acclimatization, dehydration, illness, or other individual risk factors increase heat strain.

For a personal trainer, the essential principle is prompt recognition and emergency action. Exercise must stop immediately, emergency medical services should be activated, and rapid whole-body cooling should begin without delay when exertional heat stroke is suspected. Current sports-medicine guidance emphasizes "cool first, transport second" when appropriate resources and trained personnel are available, because the duration of severe hyperthermia is strongly associated with adverse outcomes. Prevention includes heat acclimatization, appropriate training modifications, hydration planning, environmental monitoring, and avoiding excessive exertion during high-risk conditions. ACSM's guidance on exertional heat illness is available in its Position Stand on Exertional Heat Illness During Training and Competition; practical recognition and treatment guidance is also provided by the National Athletic Trainers' Association.

QUESTION NO: 15

Which of the following is the correct sequence of events when starting the process for exercise prescription for a new client?

A. Obtain a medical history, have the client perform a risk factor assessment, interpret the data, prescribe exercise, give lifestyle counseling.

B. Obtain a medical history, have the client perform a risk factor assessment, administer fitness tests, interpret the data, prescribe exercise.

C. Have the client perform a risk factor assessment, obtain a medical history, administer fitness tests, prescribe exercise and interpret the data.

D. Have the client perform a fitness assessment, obtain a medical history, give lifestyle counseling, interpret the data, prescribe exercise.

ANSWER: B

Explanation:

“Obtain a medical history, have the client perform a risk factor assessment, administer fitness tests, interpret the data, prescribe exercise.” is the correct sequence because exercise prescription should be based on information gathered systematically before a program is designed. The initial health and medical history identifies relevant health conditions, symptoms, medications, lifestyle factors, and prior activity that may affect exercise participation. Assessing cardiovascular disease risk factors and applying preparticipation-screening principles helps determine whether exercise testing or medical clearance is indicated and supports safe selection of assessment procedures. Appropriate fitness testing can then be performed when it is suitable for the client’s health status, goals, and capabilities. The professional must interpret the resulting health, risk-factor, and fitness information before selecting exercise mode, frequency, intensity, time, progression, and other program components. This order ensures that the final prescription is individualized, evidence-informed, and appropriately conservative where risk or uncertainty exists. ACSM’s exercise-testing and prescription resources describe screening, assessment, interpretation, and program design as connected stages of an effective exercise-program process. See ACSM’s Guidelines for Exercise Testing and Prescription and the ACSM preparticipation screening guidance.

QUESTION NO: 16

A client has completed a walking program of 20 minutes, 3 days per week, at a comfortable pace for several weeks without excessive fatigue. Which changes could provide progressive overload? Select all that apply.

A. Increase each walk to 30 minutes

B. Add a fourth walking day each week

C. Increase walking pace slightly

D. Reduce walking to 2 days per week

E. Double each session to 40 minutes immediately

ANSWER: A B C

Explanation:

Progressive overload occurs when the exercise stimulus is increased gradually beyond the level to which the body has adapted. For a walking program, appropriate methods include increasing session duration, adding a weekly session, or modestly increasing pace or grade. These changes should be individualized and introduced one at a time when possible so the trainer can monitor tolerance and recovery.

Reducing walking frequency does not provide overload, and abruptly doubling duration may create an unnecessarily large increase in workload. Gradual progression supports adherence and reduces the likelihood of excessive fatigue or musculoskeletal discomfort.

QUESTION NO: 17

Which of the following circumference sites are used to compute a waist-to-hip ratio?

A. Abdomen, suprailiac

B. Midaxillary, hips/thigh

C. Waist, buttocks/hips

D. Midaxillary, suprailiac

ANSWER: C

Explanation:

Waist, buttocks/hips is correct because waist-to-hip ratio (WHR) is calculated by dividing waist circumference by hip circumference. This anthropometric index describes the distribution of body fat, particularly the relative pattern of abdominal versus gluteofemoral fat deposition. For the waist measurement, standardized protocols use a defined landmark around the abdomen; the specific landmark may vary slightly according to the protocol used. Hip circumference is measured at the level of the greatest posterior extension of the buttocks, with the tape held horizontal. Because both measurements are circumferences, consistent anatomical landmarks, a horizontal tape position, and a snug but noncompressive tape are essential for a meaningful ratio. WHR is commonly used in health-risk assessment because a higher value can indicate a greater concentration of central adiposity, which is associated with cardiometabolic risk. The ratio itself is simply: waist circumference ÷ hip circumference, so both the waist and buttocks/hips sites are necessary to compute it. ACSM discusses waist and hip circumference measurements as body-composition and health-risk assessment tools in its Guidelines for Exercise Testing and Prescription. Standardized measurement procedures are also outlined by the World Health Organization in its Waist Circumference and Waist-Hip Ratio report.

QUESTION NO: 18

A client's workout plan shows scheduled increases and decreases in exercise volume. What training concept is being demonstrated?

A. Specificity

B. Overtraining

C. Reversibility

D. Periodization

ANSWER: D

Explanation:

Periodization is the planned, systematic manipulation of training variables over time, including exercise volume, intensity, frequency, exercise selection, and recovery. A program with deliberately scheduled increases and decreases in volume demonstrates this principle because the fluctuations are purposeful rather than random. For example, volume may build progressively during a training phase to provide an adequate overload stimulus, then be reduced in a planned recovery or taper phase to manage accumulated fatigue and support adaptation. Periodized programming helps align training demands with a client's current fitness level, goals, experience, and anticipated events or testing dates. In personal training practice, the size and timing of volume changes should be individualized and monitored using the client's performance, recovery, tolerance, and adherence. ACSM recognizes progression and appropriate program design as central components of safe, effective resistance and aerobic exercise prescription; periodization provides an organized method for applying those changes across weeks or longer training cycles. See the ACSM's Guidelines for Exercise Testing and Prescription and the ACSM Physical Activity Guidelines resources.

QUESTION NO: 19

A client who uses insulin has been medically cleared for exercise and has an individualized diabetes-management plan. Which actions can help reduce the risk of exercise-related hypoglycemia?

A. Keep rapid carbohydrate available

B. Follow the prescribed glucose-monitoring plan

C. Wear medical identification

D. Independently reduce insulin dosage

E. Ignore unusual sweating or confusion

ANSWER: A B C

Explanation:

Appropriate precautions include following the client's prescribed glucose-monitoring plan, having a rapid source of carbohydrate available, and recognizing symptoms that may indicate hypoglycemia. Medical identification can assist responders if an emergency occurs. Trainers should not independently alter medication or insulin dosage; those decisions are made by the client and the prescribing health care professional. The CDC provides guidance on physical activity and diabetes at Physical Activity and Diabetes.

QUESTION NO: 20

Downhill walking/jogging/running is characterized by eccentric activation of which of the following muscle groups?

A. Hamstrings

B. Gastrocnemius

C. Brachioradialis

D. Quadriceps femoris

ANSWER: D

Explanation:

Quadriceps femoris

is correct because downhill locomotion requires controlled lowering of the body's center of mass while the knee bends during stance. As the foot accepts body weight on a decline, the external forces acting at the knee tend to produce knee flexion. The quadriceps femoris must generate tension while its muscle-tendon units lengthen, making its action eccentric. This braking action regulates the rate and amount of knee flexion, helps attenuate impact, and supports stable progression down the slope. The eccentric loading demand is particularly substantial during downhill running because each step combines forward movement with a repeated controlled descent. Eccentric contractions can produce high force at a comparatively low metabolic cost, but unfamiliar or excessive downhill exercise may also lead to post-exercise soreness and temporary reductions in muscle function, especially in the knee extensors. Understanding this pattern is useful for programming: downhill running volume and intensity should be introduced progressively, particularly for clients who have not recently performed eccentric lower-body training. ACSM describes resistance and neuromuscular training principles relevant to progressive exercise prescription in its Guidelines for Exercise Testing and Prescription. Research comparing level and downhill running also documents the distinctive eccentric muscular loading of downhill running: PubMed: Downhill running and eccentric exercise effects.

QUESTION NO: 21

Which practices are appropriate when a personal trainer measures a client's resting blood pressure?

A. Have the client sit quietly before measurement

B. Support the arm at heart level

C. Use a cuff size appropriate for the client's arm

D. Place the cuff over a thick sleeve

E. Encourage the client to talk during the reading

ANSWER: A B C

Explanation:

The client should be seated quietly before the measurement, with the arm supported at heart level. An appropriately sized cuff is essential because an undersized cuff can falsely elevate the reading. Measuring over clothing and talking during the measurement can reduce accuracy. Standardized technique improves the reliability of exercise-facility screening data. See the American Heart Association guidance on blood-pressure monitoring.

QUESTION NO: 22

Which is most associated with proprioceptive neuromuscular facilitation?

A. Breathing techniques

B. Stretching techniques

C. Resistance training

D. Cardiovascular exercise

ANSWER: B

Explanation:

Proprioceptive neuromuscular facilitation is most associated with stretching techniques. In exercise and rehabilitation settings, PNF stretching is an assisted or partner-applied flexibility approach designed to improve joint range of motion. A common format involves placing the target muscle in a gentle stretch, having the individual perform a brief voluntary contraction—often isometric—then relaxing before moving into a further controlled stretch. This is commonly described through methods such as hold-relax and contract-relax. The contraction-relaxation sequence is the defining practical feature that connects PNF with flexibility training rather than simply passive positioning. ACSM flexibility guidance recognizes proprioceptive neuromuscular facilitation as a stretching method that may be used to improve range of motion, particularly when it is applied with appropriate technique, intensity, and attention to individual tolerance. For personal-training practice, the emphasis should be on controlled movement, clear communication, and avoiding painful end ranges. The American College of Sports Medicine's flexibility recommendations and the evidence review in ACSM's position stand on quantity and quality of exercise discuss flexibility exercise as part of a comprehensive fitness program. Additional clinical evidence on PNF techniques and range-of-motion outcomes is available through this systematic review indexed by PubMed.

QUESTION NO: 23

Mr. Smith wishes to enroll in your exercise program. Preliminary evaluation revealed the following information:

Age = 50 years Resting heart rate = 78 beats/min

Weight = 198 lb (90 kg) Resting blood pressure = 162/94 mm Hg

Height = 70 inches (178 cm) Body fat = 30%

Blood chemistry:

Total cholesterol = 240 mg/dl (6.21 mmol/L)

HDL cholesterol = 34 mg/dl (0.88 mmol/L)

Triglycerides = 180 mg/dl (2.03 mmol/L)

Glucose = 98 mg/dl (5.55 mmol/L)

Family history and current habits:

Father died of heart attack at 90 years of age

Hypertensive mother died at age 84

Smokes a pipe after dinner each evening

Smokes cigarettes (25-30 per day)

Reports too much work and is struggling to meet deadlines

Currently doing moderate exercise

No medications at present

According to ACSM stratification guidelines, Mr. Smith has which of the following coronary artery disease risk factors?

A. Hypertension, obesity, high total cholesterol:HDL ratio.

B. Smoking, probable diabetes, high blood pressure.

C. Smoking, high total cholesterol, aggressive type A personality.

D. Hypertension, high total cholesterol, smoking.

ANSWER: D

Explanation:

Hypertension, high total cholesterol, smoking. is correct because each item is an established positive coronary artery disease risk factor under the traditional ACSM cardiovascular risk-factor framework used in exercise testing and prescription questions. Mr. Smith's resting blood pressure of 162/94 mm Hg clearly meets the hypertension criterion, which is based on a measured resting blood pressure at or above 140/90 mm Hg or the use of antihypertensive medication. His total cholesterol value of 240 mg/dL meets the dyslipidemia criterion based on total serum cholesterol of at least 200 mg/dL. His HDL cholesterol of 34 mg/dL also independently supports the presence of dyslipidemia, as low HDL cholesterol is a clinically important adverse lipid finding. Finally, his daily cigarette and pipe use establishes current tobacco smoking, another positive risk factor. These findings are based on objective screening information obtained during the preliminary evaluation and identify multiple modifiable cardiovascular risk factors relevant to safe exercise-program planning. ACSM's exercise screening and risk-assessment principles are summarized in its physical activity guidance resources; hypertension classification and cardiovascular implications are also described by the American Heart Association.

QUESTION NO: 24

Which of the following risk factors for coronary heart disease enables you to subtract one risk factor from the total amount of positive risk factors?

A. Body Mass Index < 30 kg/m2

B. High serum HDL cholesterol > 60 mg/dl (1.6mmol/L)

C. Fasting blood glucose of < 110mg/dL (6.1 mmol/L)

D. A former cigarette smoker who stopped more than six months ago.

ANSWER: B

Explanation:

High serum HDL cholesterol > 60 mg/dl (1.6mmol/L) is the factor that functions as a negative coronary heart disease risk factor in the traditional ACSM cardiovascular risk-factor-counting method. HDL cholesterol is commonly called “good” cholesterol because it participates in reverse cholesterol transport, carrying cholesterol away from peripheral tissues and arterial walls to the liver for processing and removal. Higher HDL values are associated with a lower risk of atherosclerotic cardiovascular disease in population-based risk assessment. Therefore, when an individual’s HDL cholesterol is at least 60 mg/dL (approximately 1.55 mmol/L), ACSM’s former risk stratification criteria allow one risk factor to be subtracted from the number of positive risk factors. This adjustment recognizes the favorable association of high HDL cholesterol with coronary heart disease risk while retaining the need to consider the person’s full clinical profile, including lipids, blood pressure, diabetes status, smoking history, symptoms, and diagnosed disease. The American Heart Association describes HDL’s role in transporting cholesterol to the liver at HDL: The “Good” Cholesterol. Additional clinical context on cholesterol testing is available from CDC: About Cholesterol.

QUESTION NO: 25

A client with osteoporosis has been cleared by their health care professional for exercise. Which programming practices are appropriate for the personal trainer? Select all that apply.

A. Progress resistance exercises gradually

B. Teach neutral-spine positioning during exercise

C. Use tolerated weight-bearing activity such as walking

D. Program high-volume sit-ups as a core exercise

E. Use loaded twisting movements to end range

ANSWER: A B C

Explanation:

Appropriate programming emphasizes safe loading and movement quality. Progressive resistance exercise can help support muscular strength and bone health when individualized to the client’s ability. Weight-bearing activities such as walking are also commonly appropriate when tolerated. Teaching neutral-spine control and avoiding rapid, loaded spinal flexion can help reduce excessive stress on vertebrae that may be vulnerable to compression fracture.

High-volume sit-ups and forceful twisting under load can combine spinal flexion or rotation with substantial forces and are not appropriate general choices for a client with osteoporosis. Exercise selection should remain consistent with the client’s medical guidance, fracture history, symptoms, and functional capacity.

For additional information, see the National Institute of Arthritis and Musculoskeletal and Skin Diseases overview of osteoporosis.

QUESTION NO: 26

Which is true about energy content of the macronutrients?

A. fat = 9 kcal/gram, carbohydrate = 7 kcal/gram, water = 0 kcal/gram

B. carbohydrate = 7 kcal/gram, protein = 4 kcal/gram, alcohol = 7 kcal/gram

C. water = 0 kcal/gram, protein = 4 kcal/gram, alcohol = 7 kcal/gram

D. protein = 9 kcal/gram, fat = 4 kcal/gram, carbohydrate = 4 kcal/gram

ANSWER: C

Explanation:

“water = 0 kcal/gram, protein = 4 kcal/gram, alcohol = 7 kcal/gram” is the fully accurate statement. Water has no caloric value because it does not yield metabolizable energy when consumed. Protein supplies approximately 4 kilocalories per

gram, a value used in nutrition assessment and dietary planning. Although alcohol is not classified as a macronutrient, it does provide energy—approximately 7 kilocalories per gram—and therefore contributes to total caloric intake. These standard energy values, commonly called Atwater factors, help personal trainers and nutrition professionals estimate the energy contribution of foods and beverages. They are especially relevant when discussing body-weight management, dietary patterns, and the effects of alcohol intake on an individual's overall energy balance. The U.S. Food and Drug Administration identifies protein as providing 4 kcal/g and alcohol as providing 7 kcal/g, while water provides no calories. Nutrition.gov likewise explains that calories come from carbohydrate, protein, fat, and alcohol rather than water. See the FDA's guidance on calories and the Nutrition Facts label and Nutrition.gov's overview of calories.

QUESTION NO: 27

Which energy system has the highest capacity for ATP production?

A. ATP-CP

B. Rapid glycolysis

C. Slow glycolysis

D. Oxidative phosphorylation

ANSWER: D

Explanation:

Oxidative phosphorylation has the highest capacity for ATP production. This aerobic energy system operates primarily in the mitochondria and resynthesizes ATP by using oxygen to metabolize carbohydrate and, importantly, the body's extensive fat stores; protein can also contribute under particular conditions. Its ATP-production rate is lower than the immediate phosphagen system and rapid glycolysis, but its total capacity is far greater because aerobic metabolism can sustain ATP resynthesis for prolonged exercise when oxygen delivery and fuel availability are adequate. This distinction is central to exercise physiology: "capacity" refers to the total amount of ATP that can be generated over time, rather than the maximum speed at which ATP can be supplied. During long-duration, lower-to-moderate intensity activity, oxidative metabolism increasingly supplies the predominant share of the required ATP and supports continued muscular work. ACSM educational materials describe oxidative metabolism as the pathway supporting sustained activity through aerobic ATP production. See the ACSM's Guidelines for Exercise Testing and Prescription and the NCBI overview of cellular respiration and oxidative phosphorylation.

QUESTION NO: 28

Which programming practices are appropriate when initiating resistance training for a previously sedentary adult with no contraindications to exercise?

A. Emphasize correct movement technique

B. Use gradual load progression

C. Allow recovery between sessions

D. Train all major muscle groups

E. Begin with maximal-effort sets each session

ANSWER: A B C D

Explanation:

Beginning with manageable loads, emphasizing correct technique, training major muscle groups, and allowing recovery between sessions are appropriate initial programming practices. Load and volume should progress gradually as the client demonstrates proper form and tolerates the program. Frequent maximal-effort training is not appropriate for most previously sedentary adults. ACSM progression principles are outlined in its position stand on resistance training progression.

QUESTION NO: 29

What does the sit-and-reach test assess?

A. Trunk flexion

B. Trunk extension

C. Shoulder extension

D. Shoulder flexion

ANSWER: A

Explanation:

The sit-and-reach test assesses trunk flexion flexibility, with the measurement used primarily as a field assessment of hamstring and low-back flexibility. During the test, the individual sits with the knees extended and reaches forward at the hips toward or beyond the feet. The resulting reach distance reflects the ability to move into a flexed trunk/hip position, which is why *Trunk flexion* is the best answer among the listed choices. In fitness assessment, this test is commonly used because it is simple, standardized, inexpensive, and practical for evaluating flexibility in the posterior thigh and lower-back region. Results should be interpreted as a test-specific flexibility measure rather than a complete assessment of all joints or all aspects of functional mobility; limb lengths, pelvic movement, and testing technique can affect reach distance. ACSM describes flexibility testing as assessing range of motion at a joint or series of joints, and the sit-and-reach is a widely recognized field measure for the trunk/hip-flexion movement pattern. See the ACSM's Guidelines for Exercise Testing and Prescription and the PubMed review of the sit-and-reach test's relationship to hamstring and lumbar flexibility.

QUESTION NO: 30

Which of the following bones facilitate movement of the chest during both inspiration and expiration?

A. clavicle

B. scapula

C. carpal

D. scalene

E. ribs

ANSWER: E

Explanation:

The ribs are correct because they form the mobile bony framework of the thoracic cage and articulate posteriorly with the thoracic vertebrae and, for most ribs, anteriorly with the sternum through costal cartilage. These articulations permit small but essential movements that alter the dimensions and volume of the thorax throughout the respiratory cycle. During inspiration, elevation and outward rotation of the ribs increase thoracic volume. Upper-rib pump-handle movement increases the anteroposterior diameter, while lower-rib bucket-handle movement increases the transverse diameter. This expansion contributes to the pressure changes that draw air into the lungs. During expiration, the rib cage returns toward its resting position as inspiratory muscles relax and the elastic recoil of the lungs and chest wall reduces thoracic volume; forced expiration can include active depression of the ribs by expiratory muscles. Thus, the ribs facilitate the mechanical movements of the chest in both phases of breathing, even though muscles supply the force for much of that motion. The thoracic cage and rib mechanics are described in StatPearls: Anatomy, Thorax, Wall and the respiratory mechanics overview from StatPearls: Physiology, Lung.

QUESTION NO: 31

Which adaptations are expected following a regular resistance-training program in an untrained adult?

A. Increased muscular strength

B. Increased muscle-fiber size

C. Improved motor-unit recruitment

D. Lower resting heart rate as the primary adaptation

E. Reduced body-fat percentage without changes in energy balance

ANSWER: A B C

Explanation:

Progressive resistance training commonly increases muscular strength and can increase skeletal-muscle cross-sectional area through hypertrophy. Early strength gains also reflect neural adaptations, such as improved motor-unit recruitment and coordination. A lower resting heart rate and a reduction in body-fat percentage may occur with broader lifestyle changes, but they are not the primary, direct adaptations expected from resistance training alone. See the ACSM position stand on Progression Models in Resistance Training for Healthy Adults.

QUESTION NO: 32

When considering the acute responses of arm versus leg exercise, which is true?

A. At the same work load, systolic blood pressure is lower with arm exercise.

B. At the same work load, diastolic blood pressure is lower with arm exercise.

C. At the peak work load, systolic blood pressure is greater with arm exercise.

D. At the peak work load, oxygen consumption is greater with leg exercise.

ANSWER: D

Explanation:

At the peak work load, oxygen consumption is greater with leg exercise. Peak oxygen consumption reflects the integrated capacity of the cardiovascular and respiratory systems to deliver oxygen and of active skeletal muscle to extract and use it aerobically. Dynamic leg exercise recruits a substantially larger muscle mass than arm exercise, allowing a greater total metabolic demand and usually a higher attainable cardiac output at maximal effort. Consequently, a maximal treadmill or cycle-ergometer test using the legs generally produces a higher measured VO_2peak than an upper-body exercise test in the same individual.

This distinction is important for exercise testing and prescription. Modality-specific testing should be used when feasible because an upper-body value should not be assumed to represent the person's maximal capacity during leg-based activity. ACSM's exercise-testing guidance recognizes that physiologic responses and maximal exercise capacity depend on the exercise mode and the amount of muscle mass recruited. See the ACSM's Guidelines for Exercise Testing and Prescription and the PubMed record for research comparing arm and leg exercise responses.