

Aquatic Exercise for Rehabilitation and Training

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Learning Objectives

After reading *Aquatic Exercise for Rehabilitation and Training*, the participant will be able to:

1. Explain the benefits of performing aquatic exercises.
2. Identify the origins and history of aquatic exercises.
3. Know and understand contraindications as well as indications of an aquatic-based program
4. Address the advantages and precautions associated with an aquatic-based program
5. Identify aquatic service providers, licensure and certification needs and requirements
6. Understand the properties of water and fluid dynamics in order to provide a safe program
7. Design and address the physiological responses to aquatic exercise for the major systems of the body
8. Understand the principles of Ai Chi and Watsu including applications, benefits, progressions, and certifications
9. Select appropriate evaluations and assessment tools for each client
10. Understand how to modify and incorporate various aquatic methods for a variety of special populations such as cerebral palsy, brain injury, pregnancy, fibromyalgia, and more.
11. Address the application of neuromuscular training and techniques
12. Understand and identify appropriate program design for a variety of populations via case study review.



CEC/CEU Test for Aquatic Exercise for Rehabilitation and Training

Choose the best answer. Mark all answers on the answer sheet

1. Which civilization was the first to recognize the relation between state of mind and physical well-being?
 - A. Middle Ages
 - B. Roman
 - C. Greek
 - D. European

2. Which civilization was the first to include varying temperatures in the bathing system?
 - A. Romans
 - B. Greek
 - C. European
 - D. Middle Ages

3. Hydrotherapy earned its definition of a treatment of disease via external application of water during what time frame?
 - A. Twentieth century
 - B. Roman Empire
 - C. Middle Ages
 - D. 17th and 18th century

4. Where is the location of the most famous original natural spring in the U.S?
 - A. Hot Springs in Virginia
 - B. Saratoga Springs in New York
 - C. Berkeley Springs in West Virginia
 - D. Warm Springs in Georgia

5. What invention helped in the development of pool exercise programs?
 - A. The Warm Springs Foundation
 - B. The Hubbard Tank
 - C. The invention of heating systems
 - D. The formulation of a list of approved health resorts and standards

6. Which of the following is not considered to be an absolute contraindication to aquatic rehabilitation?
 - A. Uncontrolled diabetes
 - B. Unstable cardiac conditions
 - C. High water turbulence
 - D. Unstable vital signs

7. Which of the following is not typically a member of the Lyton Model team?
 - A. Massage Therapist
 - B. Exercise Physiologist
 - C. Certified Athletic Trainer
 - D. Registered Dietitian

8. Which statement is false concerning qualifications of team members?
 - A. An exam is required for regulation by licensure
 - B. The term "therapists" is legally protected
 - C. No consistent standard exists for aquatic therapy training
 - D. Insurance reimbursement is limited for those who are not licensed

9. Which of the following is not considered a requirement for certification through ICAT-RIC?
 - A. Passing the written exam, education, or education alternative
 - B. Undergraduate degree in exercise science or related field
 - C. An approved water fitness certification and 5 yrs or 5000 hours of work in aquatic therapy
 - D. Unrelated undergraduate degree and 5000 hours in aquatic therapy

10. Which of the following does not require a college degree?
 - A. Massage therapy
 - B. Certified Athletic Trainers
 - C. Kinesiotherapists
 - D. Therapeutic Recreation Specialists

11. Buoyancy can be modified by all of the following methods EXCEPT:
 - A. Depth of immersion of the body
 - B. Length of the lever arm
 - C. Strength of the client
 - D. Positioning of the buoyancy device

12. Buoyancy supported movements are performed when:
 - A. An extremity is vertical in the water
 - B. An extremity is just below and parallel to the water surface
 - C. When the client is able to touch the bottom of the pool
 - D. When the client is in deep water with a floatation device

13. Which of the following is the correct weight-bearing status for a female who is standing in water up to her xiphoid process?
 - A. 35%
 - B. 28%
 - C. 25%
 - D. 47%

14. The magnitude of internal friction among individual molecules in a liquid is called
 - A. Refraction
 - B. Buoyancy
 - C. Viscosity Cohesion
 - D. Cohesion

15. What is the name given to water molecules that move in an irregular fashion causing rotary movements of the molecules?
- A. Streamlining
 - B. Drag force
 - C. Wakes
 - D. Eddies
16. Clinicians should maximize the use of _____ when gait training patients who have difficulty walking on land.
- A. Eddies
 - B. Wake
 - C. Drag force
 - D. Streamlining
17. Which of the following is an example of streamlining?
- A. Walking or stepping sideways
 - B. Walking or stepping forwards
 - C. Waling forward with a plow in front of the client for resistance
 - D. Pulling the arms horizontally just underneath the surface of the water with the hands facing forward
18. Which of the following does not affect air volume in the lungs?
- A. Gender
 - B. Height
 - C. Musculoskeletal injury
 - D. Smoking
19. When the chest compresses:
- A. Intrathoracic blood volume increases
 - B. Hydrostatic pressure increases
 - C. ERV increases
 - D. The diaphragm ascends
20. All of the following pulmonary functions are influenced by water immersion EXCEPT:
- A. Carbon dioxide
 - B. Partial pressures of venous oxygen
 - C. Pulmonary flow resistance
 - D. Carbon monoxide
21. The name given to the ability of the heart to respond to myocardia fiber stretch with an increase in the strength of contractility of the heart is:
- A. Frank Starling reflex
 - B. Stroke volume preload effect
 - C. Righting reflex
 - D. Myocardial Fiber reflex
22. When a person is submerged to hip or xiphoid-level water:
- A. SV and CO decrease
 - B. The Bainbridge reflex activates
 - C. HR increases
 - D. HR decreases

23. In regards to the renal system, water immersion:
- A. Decreases the need for urination
 - B. Increases the need for urination
 - C. Increases ADH secretion
 - D. Is not recommended for those with kidney failure
24. Aquatic exercise can decrease pain, edema, and joint compression via what principle?
- A. Neuromuscular facilitation
 - B. Peristalsis
 - C. Hemodynamic
 - D. Hydrodynamic
25. All of the following are hydrodynamic influences on the somatosensory system EXCEPT:
- A. Pain reduction
 - B. Increased inflammatory mediators
 - C. Decreased nutrients
 - D. Edema reduction
26. What technique has influenced the Bad Ragaz ring method in the U.S?
- A. Effluerage
 - B. METs
 - C. PNF
 - D. Halliwick concept
27. Which of the following statements is false concerning the Halliwick method?
- A. It uses a problem-solving approach
 - B. It was originally developed to help teach those with physical disabilities to swim
 - C. The client must be willing to lose balance and have ability to regain it
 - D. It is a 15 point method
28. Which statement is false concerning the Halliwick method?
- A. It has a static component
 - B. It is mostly dynamic
 - C. Activities can be repeated and varied
 - D. It has the disadvantage of gravity
29. Which of the following is the correct Domain of Activities and Participation from the ICF?
- A. Community, social, and civic life – d3
 - B. Mobility – d7
 - C. Self Care – d5
 - D. General tasks and demands – d4
30. Which of the following is not one of the 10 points for the classification of D410 from table 5.4?
- A. Longitudinal rotation control
 - B. Sagittal rotation control
 - C. Combined rotation control
 - D. Turbulent gliding
31. Which of the following defines mental adjustment?
- A. The ability to respond to a different environment or task
 - B. The ability to create and effective, efficient skilled activity
 - C. The ability remember previous skills from previous sessions
 - D. The ability to maintain a positive demeanor during each session

32. Why does the center of buoyancy constantly move?
- A. Because of wakes
 - B. Because of respiration
 - C. Because of torque
 - D. Because of injury
33. When the therapist removes manual and visual support, this is referred to as:
- A. Disembodiment
 - B. Metacentric effects
 - C. Disengagement
 - D. Imbalance therapy
34. When is the client instructed to blow out (exhale)?
- A. On exertion of an exercise
 - B. When his mouth gets close to the water
 - C. As he lifts the body above water level
 - D. It does not matter
35. Which of the following is not considered a longitudinal rotation control activity for the Halliwick method?
- A. Roll from supine to prone
 - B. Shift the center of gravity
 - C. Turn around while standing
 - D. Turn from supine to prone
36. Which rotation is usually performed through a small range of motion?
- A. Sagittal
 - B. Transversal
 - C. Longitudinal
 - D. Combined
37. During the activity of transversal rotation control, where is the critical anatomical point located?
- A. T11
 - B. Center of gravity
 - C. Pelvis
 - D. Mid-sternum
38. The first movements in a horizontal plane are:
- A. Seated
 - B. Multi-planar
 - C. Symmetrical
 - D. Small
39. When a client learns and can demonstrate that the body will always float to the top, this is called:
- A. Static
 - B. Rotationally controlled
 - C. Balanced
 - D. Waterfree

40. Which of the following is not considered a feature of the basic Halliwick swimming stroke?
- A. Symmetry
 - B. Take the hands and forearms out of the water during recovery
 - C. Recovery movement is from 0-120 degrees of abduction
 - D. Use only the arms for propulsion
41. What is the proper sequence for balancing in the water?
- A. Mental adjustment, mental inversion, longitudinal control, transversal control, sagittal control, longitudinal control
 - B. Mental adjustment, mental inversion, transversal control, combined control, sagittal control, longitudinal control
 - C. Mental adjustment, sagittal control, longitudinal control, combined control, transversal control, mental inversion
 - D. Mental inversion, mental adjustment, transversal control, combined control, sagittal control, longitudinal control
42. The corrective non-intentional balance strategy for weight-bearing in general is:
- A. Ankle strategy
 - B. Stepping strategy
 - C. Hip strategy
 - D. Stumble strategy
43. When German therapists added floatation rings to the now know BRRM method while directing patients to move towards and away from the therapist, the therapists were able to address specific client problems because:
- A. The client was floating, so the therapists were able to let the client relax
 - B. Therapists could see who could perform the movements and adjust the rings
 - C. Movements were better assessed
 - D. Resistance was manually applied
44. When the client uses a body part as a counterweight to restrict continuous movement, this is referred to as:
- A. Active counterforce
 - B. Activated passive counterforce
 - C. Unstable equilibrium
 - D. Counter balancing
45. Movements that are activated passive counterforce have great therapeutic value because they are:
- A. Predictable
 - B. Reactive
 - C. Stable
 - D. Static
46. Drag resistance to movement is:
- A. Equal in the water as in the air
 - B. 14 times greater in the water than in air
 - C. 14 times greater in the air than in the water
 - D. Is 5 times less in the water than in the air due to turbulence

47. If adduction in flexion occurs in the right hip, what muscles are contracted to counter the force?
- A. Internal rotators in the left hip
 - B. Abduction of the left hip
 - C. Extension of the left hip
 - D. Adduction of the left hip
48. When using PNF during the BRRM, the therapist should not be immersed any deeper than ____ in order to be stabilized enough to provide the method to the client.
- A. S1
 - B. L5
 - C. T11
 - D. T9
49. When rings are overinflated during BRRM:
- A. More force development occurs
 - B. The body sits lower in the water
 - C. The body becomes unstable
 - D. The body becomes more stable
50. The ring at the hips should be located at:
- A. The waist
 - B. T11
 - C. S2
 - D. L3
51. The minimum treatment time for BRRM is:
- A. 1 hour
 - B. 30 minutes
 - C. Depends on the patient
 - D. 15 minutes
52. Which of the following is not a typical movement pattern for BRRM?
- A. Symmetrical
 - B. Bilateral
 - C. Unilateral
 - D. Movements are conducted in the prone position
53. When working the trunk and applying traction, where should the therapist stand?
- A. Level with T9 of the patient
 - B. Near the trunk of the patient
 - C. To the outside of the leg being worked
 - D. Between the patient's abducted legs
54. What is the proper movement order of the lower extremities when performing bilateral reciprocal isotonic patterns?
- A. Flexion, adduction, external rotation with knee flexion
 - B. Extension, adduction, external rotation with the knee extended
 - C. Flexion, abduction, external rotation with knee flexion
 - D. Extension, abduction, external rotation with the knee extended

55. When working bilateral symmetrical patterns through extended legs, which of the following is not correct procedure for the flexion-lateral flexion-rotation of the spine?
- A. If the patient rotates to the right, the left arm comes out of the water
 - B. The pelvis should not rotate
 - C. The patient pivots the thorax about 45 degrees
 - D. The therapist applies traction at the patients right leg (if client rotates right)
56. For the isotonic trunk patter, what is the appropriate starting position for lateral flexion?
- A. Straight line, feet dorsal extension
 - B. Pelvic rotation of 20 degrees, feet dorsal extension
 - C. Straight line, feet plantar flexed
 - D. Straight line, feet in a comfortable position
57. What is the starting position for the isotonic arm pattern?
- A. Adduction, external rotation, flexion of fingers/wrist, elbow extended
 - B. Adduction, internal rotation, extension with fingers/wrist flexed and elbow extended
 - C. Abduction, internal rotation, extension with fingers/wrist flexed and elbow extended
 - D. Abduction, external rotation, flexion of fingers/wrist, elbow extended
58. Which pattern includes application techniques of reversal of antagonists, combination of isotonics, hold/relax, and contract/relax?
- A. Pure lateral flexion
 - B. Flexion-abduction-external rotation
 - C. Extension-lateral flexion-rotation
 - D. Flexion-lateral flexion-rotation
59. Jun Konno, the creator of Ai Chi, learned of efficient movement through the water by watching:
- A. Olympic swimmers
 - B. Dolphins
 - C. Whales
 - D. Sea snakes
60. The sympathetic nervous system performs all of the following functions EXCEPT:
- A. Increases blood pressure
 - B. Fight or flight
 - C. Contracts pupils
 - D. Increases heart rate
61. Which of the following does not occur during diaphragmatic breathing?
- A. positive pressure is produced forcing air into the lungs
 - B. The abdomen expands on inhalation
 - C. The diaphragm extends downward on inhalation
 - D. Blood is pulled into the chest
62. Which of the following is not a movement principle used in Ai Chi?
- A. One foot should remain on the pool bottom at all times
 - B. Visualization can be used
 - C. Body weight is balanced
 - D. Balance is static

63. What should be the focus of the Ai Chi session to ensure the best experience?
- A. Breathing techniques
 - B. Slow, purposeful movements
 - C. Remaining centered and balanced on the pool floor
 - D. Maintaining core and stabilization
64. All of the following are considered to be key posture points in Ai Chi EXCEPT:
- A. Try to move with a flat back
 - B. Relax the shoulders muscles
 - C. Think about the head moving up and back slightly
 - D. Lift the rib cage straight up
65. The first movement in Ai Chi is called:
- A. Gathering
 - B. Enclosing
 - C. Contemplating
 - D. Floating
66. Which of the following movements is a full-body movement requiring a good amount of core strength?
- A. Floating
 - B. Enclosing
 - C. Gathering
 - D. Accepting
67. All of the following are benefits of Ai Chi EXCEPT:
- A. It is beneficial for many types of illness and chronic pain syndromes
 - B. Equipment is required, but not expensive
 - C. The hair and face stay dry
 - D. It can be taught in groups or individually
68. What is considered to be an independent predictor of quality of life?
- A. Diaphragmic breathing
 - B. Dynamic balance
 - C. Upper body movement
 - D. Lower body mobility
69. Which statement is false when working with patient populations with Ai Chi techniques?
- A. Clients who have had a stroke should try 2-3 movements at each session
 - B. Keep the pace slow for those with fibromyalgia if the water temperature, air temperature and humidity are high to reduce the risk of fatigue
 - C. Clients with respiratory diseases should work in deeper water to improve buoyancy and ease of exercise
 - D. Watch for signs of overheating, especially in patients who have had cardiac issues
70. Clients with recent hip replacements should:
- A. Avoid warm pool temperatures
 - B. Avoid hip flexion past 90 degrees
 - C. Not participate
 - D. Perform movements in deep water
71. All of the following apply appropriately to those clients with arthritis EXCEPT:
- A. Include a longer warm up
 - B. Submerge affected joints
 - C. Follow the 2 hour rule regarding pain
 - D. Work on increasing active range of motion

72. Which statement is false concerning Ai Chi?
- A. Ai Chi should be performed 2-3 times per week
 - B. There are no regulations that govern who can teach Ai Chi
 - C. Practitioners must get permission to use the Ai Chi name for classes
 - D. There is a certifying body for Ai Chi
73. Which statement is incorrect when discussing Watsu?
- A. It was developed as recently as 1980
 - B. The client is usually back floating
 - C. The therapists moves the client through the water
 - D. The water temperature should not exceed 90 degrees F.
74. Concepts of Watsu:
- A. Is rooted in Chinese medicine
 - B. Is based from Western medicine
 - C. Is based on the concept that meridians should be blocked to prevent "loss" of energy
 - D. Literally means "needle pressure"
75. Watsu begins with:
- A. The therapist gently rocking and cradling the client
 - B. Warm up and stretches like a traditional workout
 - C. Lap swimming to adjust to the pool temperature
 - D. Clients floating individually on their backs to become "one" with the water
76. Which of the following is not a premise of Jahara?
- A. It creates a sense of alignment
 - B. The elongation helps decompress the spine
 - C. A floatation device is required
 - D. The purposeful movements bring about relaxation for the client
77. What is the "home" position in Watsu?
- A. Floating supine
 - B. Balancing
 - C. Cradling
 - D. Standing
78. The saddle position in Watsu is use for all of the following EXCEPT:
- A. Tissue work
 - B. Energy balancing
 - C. Floating
 - D. Grounding
79. In what stage of Watsu training will the student gain the skills necessary to develop a Watsu session?
- A. Watsu 3
 - B. Watsu 1
 - C. Basic Watsu
 - D. Watsu 2
80. What level is required to earn the Watsu Therapist Certificate?
- A. Watsu 3
 - B. Watsu 1
 - C. Basic Watsu
 - D. Watsu 2

81. How many hours of training are required to earn the Watsu Therapist certification?
- A. 530 hrs.
 - B. 150 hrs.
 - C. 176 hrs.
 - D. 275 hrs.
82. Which of the following is not necessary in order to provide a safe and effective Watsu session once certified?
- A. Knowledge of joint protection techniques
 - B. Familiarity of the clients propensity to motion sickness
 - C. Understanding of the client's condition
 - D. Formal lifeguard training and certification
83. Which is not a reason to include swim training in an aquatic therapy program?
- A. Swimming is a closed chain activity for trunk stabilization
 - B. Clients can develop motor control and body awareness
 - C. It helps to improve cardiovascular endurance
 - D. It allows for pain management and relaxation
84. Which of the following is not a rule to follow for a beginner swimmer?
- A. Keep motions far away from the midline to make it easier
 - B. Bilateral and symmetric motions are easier to perform
 - C. Motions where the limbs are submerged are easier
 - D. Supine strokes make breath control easier
85. What would be an appropriate suggestion to the client with a right rotator cuff injury?
- A. Breaststroke with arms and legs submerged
 - B. Sidestroke with the right side submerged
 - C. Traditional backstroke
 - D. Elementary backstroke
86. What would be an appropriate suggestion for the client with MS and low back pain in the trunk with lower extremity weakness and limited ROM?
- A. Backstroke
 - B. Sidestroke
 - C. Breaststroke
 - D. Kicking with a kick board
87. Which of the following is the proper swim training progression?
- A. Changing directions, swim strokes, use of swim training equipment
 - B. Breathing control, recovery skills, static floating, suspension skills
 - C. Mental adjustment to the water, safe entry and exit from the pool, breathing control
 - D. Suspension skills, static floating control, swim strokes, swim training equipment
88. When learning recovery skills, the client should:
- A. Hold breath
 - B. Keep knees straight throughout the activity
 - C. Avoid transitioning from standing to floating
 - D. Avoid using the wall
89. What action is the most important during the component of recovery?
- A. Knees
 - B. Head
 - C. Arms
 - D. Hips

90. When performing the prone float to stand recover skill, the client should:
- A. Flex arms overhead with palms facing upward
 - B. Bend legs when in the vertical position
 - C. Pivot by lifting head and bringing knees forward
 - D. Turn head in the desired direction
91. Which of the following transitions is considered to be the most difficult?
- A. Supine to standing
 - B. Supine to prone
 - C. Prone to standing
 - D. Prone to supine
92. What position should be used for safe breathing for those who cannot maintain a vertical position with the head out of the water?
- A. Prone floating position
 - B. Side floating position
 - C. Supine floating position
 - D. Standing position
93. Which of the following is not recommended to help a “sinker” improve the supine float position?
- A. Keep knees straight
 - B. Lift hands out of water
 - C. Place arms overhead
 - D. Take a deep breath
94. When a client floats prone, lifts the head, and sculls the arms as need to take a breath, this is referred to as the:
- A. General sign for help
 - B. Survival float
 - C. Treading water
 - D. Sculling
95. When using a floatation belt, the proper placement on the client is:
- A. Around the waist
 - B. Under the arms
 - C. Around the pelvis and sacrum
 - D. Where ever it is comfortable on the client
96. Which of the following is not a proper instruction for using a mask and snorkel?
- A. Defog the mask with saliva
 - B. Place the face in the water first, then breathe through the snorkel
 - C. Breath out through the nose while pressing top of mask into forehead
 - D. Clear extra water out of snorkel
97. Which is not an appropriate purpose or use of fins?
- A. To facilitate proper leg motion
 - B. To increase kick power
 - C. To strengthen the lower extremity
 - D. To decrease the surface area of the foot
98. How should a client with shoulder impingement hold a kickboard?
- A. Out in front of them with the elbows bent in a comfortable position
 - B. Out in front of them with elbows fully extended
 - C. Under the chest
 - D. They should not use a kickboard at all

99. Which statement is false concerning swim strokes and modifications?
- A. The aquatics instructor teaches the arms first, and then the kick
 - B. Swim skills are best taught by example
 - C. The aquatic instructor decides which swim strokes are appropriate
 - D. The use of equipment should be avoided if possible
100. Which of the following is incorrect technique for the basic stroke?
- A. The hips and legs are slightly lower than the head and shoulders
 - B. The ears are submerged in the water
 - C. It is a supine stroke with asymmetrical continuous movement of the arms
 - D. The face is out of the water
101. If a client is having problems with sufficient plantarflexion with the kick, what should be recommended?
- A. Decrease knee flexion if plantarflexion range of motion is limited
 - B. Use fins
 - C. Keep the foot flat
 - D. Keep the foot stiff
102. For the arm power phase of the elementary backstroke, the client should NOT:
- A. Keep the wrist in neutral
 - B. Keep the elbow straight
 - C. Pull both arms into adduction
 - D. Keep the palms facing the midline
103. Which statement is correct about the stroke coordination of the elementary backstroke?
- A. The glide occurs before the power phase
 - B. The arms start recovery just before the legs, but the arms and legs finish the power phase together
 - C. The glide occurs after the recovery phase
 - D. The hips stay deep in the water
104. All of the following should be considered for the client who is learning the elementary backstroke EXCEPT:
- A. It helps to facilitate chest expansion
 - B. It uses mass flexion and extension patterns making it an easy stroke
 - C. It encourages trunk stabilization
 - D. It is not a good stroke to begin clients with who have poor motor control and coordination
105. Which statement is false concerning the snorkel stroke?
- A. It is a supine stroke
 - B. It involves symmetric legs and asymmetric arms
 - C. The arms are flexed overhead about 6-8 inches below the surface of the water
 - D. The head is with the waterline near the hairline of the forehead
106. All of the following are considerations to bear in mind for the snorkel stroke EXCEPT:
- A. It is not an appropriate stroke for those who cannot tolerate spinal extension
 - B. It is appropriate for those who cannot tolerate spinal rotation
 - C. It is appropriate for those who cannot perform the breathing pattern required in traditional strokes
 - D. It is appropriate for those who do not have adequate trunk stabilization strength

107. All of the following are correct concerning the back crawl EXCEPT:
- A. The first finger enters the water first
 - B. The hand sweeps downward and laterally during the arm power phase
 - C. During recovery, the wrist pronates
 - D. The waterline is at the top of the head, around the face to the chin line
108. Considerations and treatments for the back crawl include:
- A. It is appropriate for those with limited shoulder range of motion
 - B. Body awareness is not required
 - C. Promotion of dissociation of the two sides of the body
 - D. It is an easier stroke
109. The inverted scissor kick is the same as the scissor kick except:
- A. The knees stay straight during the regular scissor kick
 - B. The feet are plantar flexed only in the inverted scissor kick
 - C. The top leg and the bottom leg are switched
 - D. The top and bottom leg actions are reversed
110. Which statement is false concerning the sidestroke?
- A. It is an easier kick for clients who cannot tolerate spinal lateral flexion and hip extension
 - B. It promotes dissociation of the two sides of the body
 - C. Body awareness is required
 - D. Arm and leg movements must be coordinated
111. Which technique below is incorrect for stroke coordination during breaststroke?
- A. Arms reach full overhead flexion just before the legs finish the kick
 - B. The swimmer lifts the head at the end of the arm power phase
 - C. Start to recover the arms after the legs are finished recovering
 - D. The arm power phase starts from the glide position
112. All of the following are appropriate considerations for the difficulty of breaststroke EXCEPT:
- A. May not be appropriate for those with shoulder injuries that are aggravated with repetitive motions
 - B. The client needs body awareness and the ability to stabilize the trunk
 - C. It is a wonderful stroke for clients with low back issues
 - D. The stroke requires coordination
113. What is the proper cue to give to help correct poor coordination with arms and legs during breaststroke?
- A. Push down, around, up, and then glide
 - B. Push up, around, down, and then glide
 - C. Glide, push down, around and push up
 - D. Glide, push up, around, and push down
114. Which is not considered one of the log roll movements for freestyle?
- A. Only the legs roll with the body to maintain a good streamlined position
 - B. Higher recovery of one arm
 - C. Downward sweep of the other arm during the power phase
 - D. Sideways force of the kicks as legs roll with the rest of the body

115. What is the appropriate arm position during the recovery phase of freestyle?
- A. Thumb and index finger enters water first
 - B. The arm extends just medially to the shoulder
 - C. Thumb and index finger exits water first
 - D. Pinky finger enters water first
116. Which of the following is considered to be the more difficult stroke to master?
- A. Freestyle
 - B. Back crawl
 - C. Side stroke
 - D. Elementary backstroke
117. Which of the following is not recommended in order to address the problem of lateral flexion or rotation of trunk when breathing during freestyle?
- A. Make sure the arm is not reaching past the midline
 - B. Teach proper log roll technique
 - C. Instruct the client to look at the bottom of the pool when face is in the water
 - D. Emphasize raising the shoulders more out of the water
118. Which stroke is the most challenging for an amputation high on the upper arm?
- A. Snorkel stroke
 - B. Sidestroke
 - C. Breaststroke
 - D. Elementary backstroke
119. For someone with hemiparesis, the proper recommendation during the basic stroke in order to correct the problem of deviating towards the hemiparetic side is to:
- A. Choose a different stroke
 - B. Emphasize relaxation glide
 - C. Give hands-on assistance
 - D. Laterally flex the head away from the hemiparetic side
120. At what level of quadriplegia is functional swimming not an option?
- A. C8
 - B. C7
 - C. C6
 - D. C4-C5
121. Which statement is false concerning swimming and the shoulder?
- A. Clients with limited shoulder ROM have more trouble with back and front crawl
 - B. Clients with impingement syndrome may have trouble with the entry phase of the crawl or freestyle strokes
 - C. All swim strokes produce a stronger external rotation component
 - D. Clients with unstable shoulder joints should not perform the back crawl
122. Which statement is false concerning clients with hip, knee, or ankle issues or injuries?
- A. Those clients with hip and knee problems do better with flutter kicks
 - B. The frog kick should be avoided with clients who have hip and knee problems
 - C. Clients with ankle and foot extensor tendinitis have difficulty with flutter kick
 - D. Fins increase the resistance on the lower extremities and might be tolerated

123. Which stroke should be avoided for those clients with poor tolerance for lumbar extension?
- A. Back crawl
 - B. Side stroke
 - C. Breaststroke
 - D. Snorkel and mask
124. What should be checked if a client has excessive lumbar extension with breaststroke?
- A. Kick
 - B. Head position
 - C. Hip extension
 - D. Decrease kick propulsion and intensity
125. Which of the following is not a part of the client exam and assessment prior to beginning aquatic therapy with a client?
- A. Availability of resources
 - B. Functional level of the client
 - C. Preferences of the client
 - D. Medical clearance
126. Which of the following is a contraindication to aquatic exercise participation?
- A. Open skin for a client with a compromised immune system
 - B. Stable cardiac conditions
 - C. High-risk pregnancies
 - D. COPD
127. Which of the following is considered to be an “activity limitation” as defined by the author?
- A. Trouble standing from a chair
 - B. Inability to participate in social settings
 - C. Inability to see well
 - D. Incontinence
128. Lymphedema falls under which system for evaluation and exams conducted by the aquatic therapist?
- A. Integumentary
 - B. Neuromuscular
 - C. Endocrine
 - D. Cardiovascular
129. Dialysis and chemo ports fall under which system for evaluation and exams conducted by the aquatic therapist?
- A. Cardiovascular
 - B. Integumentary
 - C. Gastrointestinal
 - D. Metabolic
130. When is the STAR document used?
- A. When an aquatic rehab practitioner refers a patient to land-based therapy
 - B. When an aquatic rehab patient has progressed to the next level
 - C. When a land-based practitioner refers a patient to aquatic rehab
 - D. When an aquatic patient needs to be evaluated prior to being released from aquatic therapy

131. Which of the following is NOT a part of the written intake procedures and informed consent of a potential aquatic client?
- A. Acknowledgement by the patient that all current medical conditions were reported to the intake staff
 - B. Discussion of alternative exercises other than aquatic exercise
 - C. Understanding of the risk and benefits of the program
 - D. Medical clearance
132. Essential screening information gathered from all clients includes competence in all of the following EXCEPT:
- A. Return to wall without assistance
 - B. Hold breath for 60 seconds
 - C. Tread water for 20-30 seconds
 - D. Pace feet o bottom of pool from a floating position
133. What is necessary to monitor in order to properly evaluate and give activity dosage?
- A. Physical evaluation of client
 - B. Goals
 - C. Medications and heart rate only
 - D. Heart rate, blood pressure, and respiratory rate
134. Which medication will affect heart rate the most during exercise thus requiring the use of a perceived exertion scale instead of monitoring of heart rate?
- A. Ace inhibitors
 - B. Chemotherapy medications
 - C. Beta blockers
 - D. Medications for MS
135. The American College of Sports Medicine recommends how many kcals per week be expended in order to reduce body fat?
- A. 600
 - B. 500
 - C. 900
 - D. 1500
136. When males are submerged to the level of the anterior superior iliac crests, they will experience how much of their body weight?
- A. 28%
 - B. 35%
 - C. 47%
 - D. 54%
137. Heat stress during exercise is especially problematic for what special population?
- A. COPD
 - B. Cancer
 - C. Arthritis
 - D. Multiple sclerosis
138. What is the lower heart rate limit for a 76 year old client when submerged in the pool to the neck?
- A. 69
 - B. 103
 - C. 86
 - D. 95

139. The Talk Test involves:
- A. The point where the client cannot speak any longer which is the intensity they should work each session
 - B. Checking clients for slurred speech in order to prevent their blood sugar from dropping too low
 - C. The ability of a client to talk and communicate in order to determine the need for hand signals to determine pain levels while exercising.
 - D. The point at which a client can comfortably carry on a conversation comfortably while exercising at their highest intensity possible
140. Studies mentioned in the book have found that the RPE in water is:
- A. 10-15 points higher than it is on land
 - B. 1-2 points higher than it is on land
 - C. The same as it is on land
 - D. 1-2 points lower than it is on land
141. What did the study by Hutzler, Chacham, Bergman, and Szeinbert find in children with CP?
- A. Children reported a lower level intensity in the pool than on land
 - B. That sessions needed to last a minimum of 6 months
 - C. An increase in vital capacity of 65% in children who exercised in the pool
 - D. That children with CP show reduced respiratory function
142. All of the following are recommended exercises for those with cerebral palsy EXCEPT:
- A. Lower-extremity kicking in prone position while holding onto a rail
 - B. Knees to chest in deep water without a floatation device
 - C. Ball tossing
 - D. Squats
143. Which of the following was not a finding in the study by Driver, O'Conner, Lox, and Rees for those with brain injury or stroke?
- A. Aquatic exercise can be maintained at a target range of 50-75% safely
 - B. All fitness parameters increased
 - C. Identification of specific exercises to perform
 - D. Aquatic exercise helped with development of baseline tasks
144. What is the most commonly reported symptom affecting those with MS?
- A. Pain
 - B. Fatigue
 - C. Dizziness
 - D. Imbalance
145. Which water temperatures may be problematic for those with MS.
- A. Above 92°F
 - B. Below 92°F
 - C. Below 33°C
 - D. Water temperatures do not typically affect MS
146. What did Hall, et al recommend based on their study of clients who had RA?
- A. To keep the water temperature cooler
 - B. To use interval training
 - C. Treadmill walking in the pool was very beneficial to improve aerobic capacity
 - D. Exercising 1 day per week can "break the vicious cycle of pain..."

147. What should be avoided during pregnancy?
- A. Low impact aerobics
 - B. Cycling
 - C. Large increases in core body temperature
 - D. Moderate intensity workouts
148. What did Katz, McMurray, Goodwin, and Cefalo find in their 1990 research on pregnancy and exercise?
- A. Mothers and fetus both tolerated water exercise at 70% of maximal HR better than land exercises at the same intensity
 - B. The best benefits of water exercise are seen when mothers are submerged at xiphoid level
 - C. Proper modes of heat dissipation is imperative during exercise
 - D. Interval training is best for this population
149. What is considered to be the primary determinant of exercise tolerance in a person with cardiopulmonary disease?
- A. Arterial oxygen saturation
 - B. Breathlessness
 - C. Peak expiratory flow
 - D. Fatigue
150. Which method is considered an excellent monitoring tool for intensity for cardiopulmonary clients?
- A. RPE
 - B. Talk Test
 - C. HR formulas
 - D. Respiratory Rate
151. Which statement is false concerning fibromyalgia?
- A. Prevalence increases with age
 - B. It is a chronic painful condition
 - C. Interventions have shown limited success
 - D. Men are more susceptible to the disorder than women
152. The Norwegian cardiovascular fitness model recommends:
- A. 20 minutes of aerobic dancing
 - B. Strength training heart rates between 80-99
 - C. A 5 minute warm up
 - D. A 10 minute relaxation
153. What is the definition of postpoliomyelitis syndrome?
- A. Positive trigger points in 11 of 18 locations on the body
 - B. Functional limitations
 - C. Development of new or increased symptomology
 - D. Swollen and inflamed joints for longer than 3 days
154. Ruoti, Troup, and Berger (1994) found improvements in in the older population who participated in water exercise at what land intensity?
- A. 65% max HR
 - B. 60% max HR
 - C. 75% max HR
 - D. 80% max HR

155. Cardiovascular fitness can decline in athletes who become inactive in as little as:
- A. 3 weeks
 - B. 3 days
 - C. 1 week
 - D. 1 month
156. The study by Michaud, Brennan, Wilder, and Sherman (1995) found that exercise sessions consisting of _____ were sufficient to produce a training stimulus in injured athletes.
- A. Sessions performed 5x per week
 - B. 63-82% of max HR
 - C. Sessions lasting 30-50 minutes each
 - D. Shallow water running
157. Injured runners should use all of the following for proper form while running in the water EXCEPT:
- A. Slight forward lean
 - B. Avoid circular leg motions
 - C. Hands open so that dog paddling can propel them forward
 - D. Elbows bent at 90°
158. For proper circuit training in the water for an injured athlete, all of the following are recommended EXCEPT:
- A. Avoid the use of floatation devices
 - B. Perform 30-50 repetitions of each exercise
 - C. Perform each activity for 2-3 minutes
 - D. Use a workload for each activity of 50-70% of functional capacity
159. High knee water running is ideal for what sport?
- A. Ice hockey
 - B. Football
 - C. Baseball
 - D. Volleyball
160. Which sport would benefit most from box drops in the water?
- A. Football
 - B. Tennis
 - C. Sprinters
 - D. Skating
161. The inability to perform a movement despite intact sensation, automatic motor output, and understanding of the task is called:
- A. Apraxia
 - B. Diplopia
 - C. Oscillopsia
 - D. Aphasia
162. The inability to move accurately to an intended distance is called:
- A. Dysmetria
 - B. Chorea
 - C. Nystagmus
 - D. Athetosis

163. Warm temperatures can help with all of the following neurological dysfunctions except:
- A. Spasticity
 - B. Tremor
 - C. Rigidity
 - D. Hypokinesia
164. Which of the following is not considered to be a neuromuscular dysfunction?
- A. Performing transfers
 - B. Reaching
 - C. The patient's fear
 - D. Walking
165. Injury to which part of the brain can cause delirium, dysarthria, and dysphagia?
- A. Brainstem
 - B. Diencephalon
 - C. Cerebellum
 - D. Cerebral hemispheres
166. Which part of the brain controls smooth or coordinated movement?
- A. Brainstem
 - B. Cerebellum
 - C. Diencephalon
 - D. Thalamus
167. Parkinson's disease can be the result of injury or damage to the:
- A. Cerebral hemispheres
 - B. Brainstem
 - C. Diencephalon
 - D. Thalamus
168. Which statement is false concerning the hierarchical model for the CNS?
- A. The higher centers of the cerebral cortex controls the brainstem and spinal cord
 - B. The higher centers control the more complex movements
 - C. Lower centers control the voluntary movements
 - D. Reflexive movements may override voluntary movements
169. What type of patients were served more by therapists in the early days of neuro-rehabilitation?
- A. Those who had strokes
 - B. Those with poliomyelitis
 - C. Those who had ALS
 - D. Those who had traumatic brain injuries
170. When working with those who have neuromuscular disorders, deeper water is used first except for:
- A. Those who have poliomyelitis
 - B. Those who have had a stroke
 - C. Leg exercises
 - D. Arm exercises
171. Which statement is false concerning movements and stabilization?
- A. Effort and drag can be minimized if patient moves only one extremity at a time
 - B. As speed of movement increases in water, resistance also increases
 - C. Symmetric bilateral movements are easier than asymmetric bilateral movements
 - D. Improper movement patterns indicate the client is moving too fast

172. Which is not one of the four positions Campion follows during aquatic treatment for neuromuscular disorders?
- A. Ball
 - B. Cube
 - C. Tripod
 - D. Stick
173. Which statement is false concerning Watsu for those with neuromuscular disorders?
- A. Patients often exhibit ROM limitations secondary to soft tissue restrictions
 - B. Patients often have lowered threshold to muscle contractions
 - C. Rotational movements can reduce hypertonicity
 - D. Rotational movements create blocked energy
174. Which of the following is not a proper maneuver with specific applications for patients with neuromuscular impairments?
- A. Near leg rotation
 - B. Leg curl
 - C. Leg push
 - D. Accordion
175. When using the Halliwick Concept for patients with neuromuscular disorders, how does the therapist decrease difficulty?
- A. Decrease turbulence
 - B. Disengage
 - C. Create turbulence
 - D. Change the patterns of the movement from the usual movement
176. While Task-type training is for all patients with neuromuscular disorders, it was originally designed for those:
- A. Who have ALS
 - B. Who have had a stroke
 - C. Who have fibromyalgia
 - D. Who have had a closed head injury
177. All of the following can affect sensory receptors EXCEPT:
- A. Turbulence
 - B. Thermal influence
 - C. Heart rate
 - D. Hydrostatic pressure
178. The hydrodynamic principles of hydrostatic pressure affect balance and control through all of the following EXCEPT:
- A. Edema reduction
 - B. Providing unequal resistance in all planes
 - C. Assists with muscle contractions
 - D. Input into proprioceptors
179. Increased frontal plane motion is caused by core weakness especially in which muscle?
- A. Quadriceps
 - B. Hamstrings
 - C. Gluteus minimus
 - D. External hip rotators

180. Which of the following is not considered appropriate range of motion in the lumbar region?
- A. 20 degrees of lateral flexion
 - B. 50 degrees of flexion
 - C. 10 degrees of rotation in each direction
 - D. 15 degrees of extension
181. For those with facet joint degeneration, which movement typically provides relief from pain?
- A. Slight flexion
 - B. Slight extension
 - C. Slight lateral flexion
 - D. Sitting
182. Where does rotation movement of the spine typically occur?
- A. L1-S2
 - B. L1-L5
 - C. L5-S2
 - D. T1-5
183. Extensibility of the soft tissues is referred to as:
- A. Flexibility
 - B. Active mobility
 - C. Passive mobility
 - D. Plastic elongation
184. Which stretch requires caution for those with disc disease, facet arthropathy, or osteoporosis?
- A. Knee to chest
 - B. Prone press-up
 - C. Side bending #1
 - D. Rotation #1
185. Mobility into side bending is especially important for all EXCEPT:
- A. Lateral hip pain
 - B. Scoliosis
 - C. Ankylosing spondylitis
 - D. Shoulder impingement
186. All of the following are important considerations for dynamic mobility exercises EXCEPT:
- A. They are less controlled than stretching exercises
 - B. They are not good for increasing pain free range of motion
 - C. They increase functional range of motion
 - D. Patients are more likely to move too quickly
187. Which of the following is not modified to create overload?
- A. Change in mode
 - B. Change in exercise frequency
 - C. Change in intensity
 - D. Change in duration

188. Which of the following is not recommended in order to safely increase difficulty while performing isometric exercises?
- A. Increase speed
 - B. Increase surface area
 - C. Excessive repetitive resistance
 - D. Increase turbulence
189. What should be the next focus of the exercise training after a client can maintain a neutral spine without peripheral pain?
- A. Lumbar isotonic exercises
 - B. Proximal arm and leg movements
 - C. Isotonic abdominal exercises
 - D. Distal arm and leg movements
190. Specific problem areas of muscle shortening in the upper quadrant include all of the following muscles EXCEPT:
- A. Teres major
 - B. Upper trapezius
 - C. Pectoralis major
 - D. Subscapularis
191. Which of the following would not benefit from stretching the pectoralis muscle?
- A. ankylosing spondylitis
 - B. Thoracic lordosis
 - C. Osteoporosis
 - D. Fibromyalgia
192. Many people with shoulder and neck pain have decreased mobility in what muscle?
- A. Pectoralis minor
 - B. Upper trapezius
 - C. Longus colli
 - D. Rhomboids
193. Neural mobilization can be maintained by performing all of the following movements EXCEPT:
- A. scapular depression
 - B. Elbow extension
 - C. Shoulder lateral rotation
 - D. Pronation followed by shoulder adduction
194. In order to provide isometric resistance for the upper quadrant during forward walking, the client should
- A. Hold forearms neutral with arms slightly adducted
 - B. Hold elbows flexed to 90 degrees with forearms supinated
 - C. Hold arms slightly abducted with forearms supinated
 - D. Hold arms slightly abducted with forearms pronated
195. Which exercise below has the highest percentage of contraction at 45 degrees/second?
- A. Supraspinatus on land
 - B. Infraspinatus in water
 - C. Anterior deltoid on land
 - D. Middle deltoid in water

196. Which of the following is not a recommendation for the initial exercise program for someone with chronic pain?
- A. Low intensity
 - B. Alternate upper extremity activities with lower extremity activities
 - C. Decreased surface area for large muscles
 - D. Small muscle group activities with short lever arms
197. What ankle bone sits directly below and in contact with the tibia and fibula?
- A. Navicular
 - B. Cuneiform
 - C. Calcaneus
 - D. Talus
198. The proximal end of the femur articulates with the:
- A. Tibia
 - B. Patella
 - C. Ischium
 - D. Acetabulum
199. Which of the following is not a proper instruction to give when modifying the hamstring stretch in order to focus the stretch on the lateral hip muscles and the ITB?
- A. Start in the traditional hamstring stretch position
 - B. The client should horizontally adduct the leg across the body by 45 degrees
 - C. Maintain the pelvis in the frontal plane
 - D. The client should slowly rotate the hip internally
200. The D2 flexion neuromuscular facilitation patten includes all of the following movements EXCEPT:
- A. External rotation
 - B. Flexion
 - C. Abduction
 - D. Internal rotation