The General Trade Knowledge portion of the examination is administered daily in Computer Based Testing (CBT) format. It will consist of 60 equally weighted questions. (Note: Both parts of the Service Pool examination will be administered on the first day.)

The examination will have questions relating to the following content areas and necessary knowledge for each area includes:
- reading and interpreting plans and specifications
- reading and interpreting codes
- basic mathematics (addition, subtraction, multiplication, division, calculations of area and volume, fractions, decimals, percentages, calculating the sides of triangles, square roots, powers of numbers, and solving simple algebraic equations for unknown variables)

You should be prepared to respond to examination questions on any of the content areas listed. Questions asked and content areas tested on previous examinations should not be assumed to be the only possible questions to be asked or content areas to be tested on this examination.

The percentage of questions shown for each content area may vary by as much as plus or minus three (3) percent. Please refer to the Candidate Information Brochure and the Reference List for additional information.

### Content Area A  
**Plumbing Work**

1. **Replacing and repairing recirculating lines**  
   - knowledge of piping materials and applications  
   - knowledge of placement  
   - knowledge of associated fittings  
   - knowledge of valve requirements  
   - knowledge of related components

2. **Pressure testing recirculating lines**  
   - knowledge of psi  
   - knowledge of hook-up and placement  
   - ability to understand pressure test results  
   - knowledge of dangers of pressure plugs and pressurized lines  
   - knowledge of open trench hazards  
   - knowledge of pressure testing techniques

3. **Replacing and repairing filter equipment**  
   - knowledge of filtration requirements  
   - knowledge of type of filters  
   - knowledge of gauges and valves  
   - knowledge of placement of pumps  
   - knowledge of types and capacities of motors  
   - knowledge of piping requirements  
   - knowledge of flow rates and piping pressures  
   - knowledge of inlets and outlets

4. **Replacing and repairing pumps**  
   - knowledge of filtration requirements  
   - knowledge of types of pumps and pump loads  
   - knowledge of grounding versus bonding  
   - knowledge of piping techniques and requirements  
   - knowledge of pressures and flow requirements

5. **Replacing and repairing skimmers**  
   - knowledge of filtration requirements  
   - knowledge of types of skimmers  
   - knowledge of skimmer housings  
   - knowledge of strainer baskets  
   - knowledge of weir and valves  
   - knowledge of vacuum cleaning connections  
   - knowledge of flow rates, pressures, and overflow systems

6. **Installing solar heaters**  
   - knowledge of solar heating requirements and practices  
   - knowledge of state codes  
   - knowledge of solar collectors  
   - knowledge of piping techniques and requirements  
   - knowledge of pipe fittings  
   - knowledge of control requirements
knowledge of pump requirements

7. Installing conventional heaters (gas, heat pump, electric)
   knowledge of state codes
   knowledge of additional licensure requirements
   knowledge of location requirements
   knowledge of fire and gas codes
   knowledge of sizing and flow rates
   knowledge of heat exchangers for gas heaters
   knowledge of location of L.P. gas tanks or natural gas line for gas heaters
   knowledge of heat pumps for electric heaters
   knowledge of immersion elements for electric heaters

8. Installing automatic cleaners
   knowledge of piping requirements
   knowledge of pipe fitting
   knowledge of fittings
   knowledge of pumps
   knowledge of filtration requirements
   knowledge of materials
   knowledge of processes for automatic cleaners

9. Installing and repairing automatic feeders
   knowledge of piping techniques and requirements
   knowledge of feeder chemical hazards and compatibility
   knowledge of pipe fitting requirements
   knowledge of pipe materials
   knowledge of processes for automatic feeders
   knowledge of ORP sensor and pH adjuster requirements

10. Calculating proper pipe size
    knowledge of hydraulics
    knowledge of flow rates

Content Area B 10%
Deck Work

1. Repairing and replacing wood decks
   knowledge of pressure treated wood
   knowledge of other wood protection
   knowledge of carpentry
   knowledge of foundations
   knowledge of composite deck materials

2. Repairing and replacing masonry type decks
   (concrete, tile, stone, brick, and pavers)
   knowledge of sub-base materials
   knowledge of work requirements
   knowledge of work placement
   knowledge of drainage and slope
   knowledge of drains and plumbing
   knowledge of form work
   knowledge of expansion and contraction protection
   knowledge of deck finishes
   knowledge of reinforcement materials
   knowledge of bonding new material to old
   knowledge of cleaning in preparation for repair
   knowledge of safety requirements
   knowledge of expansion joints
   knowledge of state codes
   knowledge of maintaining strength of the deck
   knowledge of soil conditions
   knowledge of compaction
   knowledge of concrete placement

Content Area C 10%
Tile, Coping and Trim Work

1. Replacing and repairing tile and trim work
   knowledge of code requirements
   knowledge of material properties
   knowledge of specific handling requirements
   knowledge of measurements
   knowledge of measuring equipment
   knowledge of types of grouts and requirements
   knowledge of adhesive requirements
   knowledge of mortar requirements
   knowledge of cleaning
   knowledge of leveling techniques and requirements
   knowledge of architectural effects
   knowledge of mitering

2. Checking for level placement of materials
   knowledge of code requirements
   knowledge of leveling equipment
   knowledge of leveling techniques and requirements

3. Replacing and repairing gutters
   knowledge of code requirements
   knowledge of leveling
   knowledge of slopes
   knowledge of concrete
   knowledge of finishes
knowledge of tile
knowledge of plumbing
knowledge of inlets and outlets
knowledge of form work

Content Area D 10%
Accessory Work

1. Replacing and repairing electrical components
   - knowledge of state codes
   - knowledge of automatic timers
   - knowledge of lights
   - knowledge of electrical connections to chlorinating generators
   - knowledge of electrical connections to heaters
   - knowledge of electrical connections to pumps
   - knowledge of automation devices

2. Installing diving boards and diving platforms
   - knowledge of materials for diving boards
   - knowledge of installation requirements
   - knowledge of proper placement

3. Installing slides
   - knowledge of materials for slides
   - knowledge of installation requirements
   - knowledge of proper placement
   - knowledge of safety requirements

4. Installing ladders and rails
   - knowledge of state codes
   - knowledge of safety requirements
   - knowledge of water balancing
   - knowledge of installation requirements
   - knowledge of electrical bonding
   - knowledge of anchoring

5. Installing auxiliary lighting
   - knowledge of fiber optic lighting
   - knowledge of low voltage accent lighting

6. Installing pool and spa safety barriers
   - knowledge of installation procedures
   - knowledge of state codes
   - knowledge of safety requirements
   - knowledge of gate requirements

7. Utilizing pool blankets and covers
   - knowledge of materials and types

knowledge of the properties of materials
knowledge of safety requirements
knowledge of installation
knowledge of securing installation
knowledge of chemical balance effects

Content Area E 10%
Interior Surface Preparation and Finishing

1. Performing interior pool and spa clean-ups
   - knowledge of drawdown
   - knowledge of complete pool draining
   - knowledge of possible uplift and dewatering
   - knowledge of chemicals
   - knowledge of cleaning solutions
   - knowledge of cleaning procedures
   - knowledge of safety requirements
   - knowledge of disposal requirements

2. Performing interior pool and spa plastering of pneumatically placed or poured concrete pools
   - knowledge of gunite materials, procedures, and requirements
   - knowledge of shotcrete materials and procedures
   - knowledge of concrete requirements
   - knowledge of concrete testing
   - knowledge of concrete properties
   - knowledge of form work
   - knowledge of finishing and brazing
   - knowledge of surface preparation
   - knowledge of state codes
   - knowledge of dewatering procedures
   - knowledge of plastering materials

3. Resurfacing fiberglass pools and spas
   - knowledge of materials
   - knowledge of fiberglass resurfacing practices
   - knowledge of soils
   - knowledge of coping
   - knowledge of leveling and installing
   - knowledge of fiberglass pool shell construction

4. Installing lining in vinyl-lined pools
   - knowledge of materials
   - knowledge of methods
   - knowledge of soils
   - knowledge of pool wall construction
   - knowledge of coping
   - knowledge of leveling and installing
   - knowledge of anchoring and bracing
Content Area F 10%

Start Up

1. Pre-testing and balancing fill water
   knowledge of water chemistry
   knowledge of testing procedures and requirements
   knowledge of reagents
   knowledge of saturation index
   knowledge of pH
   knowledge of total alkalinity
   knowledge of hardness
   knowledge of metals
   knowledge of phosphates

2. Testing filters and filtration
   knowledge of differences between pressure and vacuum filtration
   knowledge of turnover rates
   knowledge of pumps
   knowledge of testing procedures

3. Balancing pool and spa water
   knowledge of saturation index
   knowledge of water chemistry
   knowledge of testing procedures and requirements
   knowledge of solutions
   knowledge of reagents
   knowledge of pH
   knowledge of total alkalinity
   knowledge of hardness
   knowledge of disinfecting
   knowledge of sanitizing
   knowledge of safety requirements
   knowledge of chemical hazards

4. Perform equipment startup
   knowledge of equipment specifications
   knowledge of system design
   knowledge of heating equipment
   knowledge of filtration equipment
   knowledge of auxiliary equipment
   knowledge of pumps

Content Area G 35%

Service and Maintenance

1. Demonstrating pool operation to the operator
   knowledge of mechanical and hydraulic systems

   knowledge of chemical systems
   knowledge of general pool care requirements
   knowledge of safety requirements
   knowledge of equipment
   knowledge of daily reports (commercial pools)

2. Sanitizing pools and spas through chlorination
   knowledge of water chemistry
   knowledge of chlorinating feeder types
   knowledge of pH
   knowledge of pool chemicals
   knowledge of effects of pool chemicals
   knowledge of practices of pool chemicals
   knowledge of safety requirements
   knowledge of dangers of chlorinating agents
   knowledge of chlorinating requirements
   knowledge of chlorinating procedures
   knowledge of chemical balancing techniques and requirements
   knowledge of testing techniques and requirements
   knowledge of reagents
   knowledge of adjusting techniques and requirements

3. Performing shock treatment or superchlorination
   knowledge of water chemistry
   knowledge of pH
   knowledge of pool chemicals
   knowledge of effects of pool chemicals
   knowledge of safety requirements
   knowledge of dangers of chlorinating agents
   knowledge of chlorinating requirements
   knowledge of chlorinating procedures and techniques
   knowledge of chemical balancing
   knowledge of testing techniques and requirements
   knowledge of reagents
   knowledge of adjusting techniques and requirements
   knowledge of turbidity

4. Determining breakpoint chlorination
   knowledge of pH
   knowledge of pool chemicals
   knowledge of effects of pool chemicals
   knowledge of practices of pool chemicals
   knowledge of safety requirements
   knowledge of dangers of chlorinating agents
   knowledge of chlorinating requirements
knowledge of chlorinating procedures
knowledge of chemical balancing techniques and requirements
knowledge of testing techniques and requirements
knowledge of reagents
knowledge of adjusting techniques and requirements

5. **Sanitizing pools and spas through chlorine**
generating salt system
knowledge of electrolysis
knowledge of water chemistry
knowledge of pH
knowledge of pool chemicals
knowledge of effects of pool chemicals
knowledge of practices of pool chemicals
knowledge of safety requirements
knowledge of salt system requirements
knowledge of salt system procedures
knowledge of chemical balancing techniques and requirements
knowledge of testing techniques and requirements
knowledge of reagents
knowledge of adjusting techniques and requirements

6. **Sanitizing pools and spas through oxidation**
knowledge of effects of pool chemicals
knowledge of practices of pool chemicals
knowledge of safety requirements
knowledge of chemical balancing techniques and requirements
knowledge of testing techniques and requirements
knowledge of reagents
knowledge of adjusting techniques and requirements

7. **Testing and adjusting pH values**
knowledge of water chemistry
knowledge of pH
knowledge of pool chemicals
knowledge of effects of pool chemicals
knowledge of safety requirements
knowledge of dangers of chlorinating agents
knowledge of chlorinating requirements
knowledge of chlorinating procedures
knowledge of chemical balancing techniques and requirements

8. **Testing and adjusting water hardness**
knowledge of water chemistry
knowledge of pH
knowledge of pool chemicals
knowledge of effects of pool chemicals
knowledge of practices of pool chemicals
knowledge of safety requirements
knowledge of dangers of chlorinating agents
knowledge of chlorinating requirements
knowledge of chlorinating procedures
knowledge of chemical balancing techniques and requirements
knowledge of testing techniques and requirements
knowledge of reagents
knowledge of adjusting techniques and requirements

9. **Testing and adjusting total alkalinity**
knowledge of water chemistry
knowledge of pH
knowledge of pool chemicals
knowledge of effects of pool chemicals
knowledge of safety requirements
knowledge of dangers of chlorinating agents
knowledge of chlorinating requirements
knowledge of chlorinating procedures
knowledge of chemical balancing techniques and requirements
knowledge of testing techniques and requirements
knowledge of reagents
knowledge of adjusting techniques and requirements

10. **Testing and adjusting cyanuric acid**
knowledge of water chemistry
knowledge of pH
knowledge of pool chemicals
knowledge of effects of pool chemicals
knowledge of safety requirements
knowledge of dangers of chlorinating agents
knowledge of chlorinating requirements
knowledge of chlorinating procedures
knowledge of chemical balancing techniques and requirements
knowledge of testing techniques and requirements
knowledge of reagents
knowledge of adjusting techniques and requirements

11. Testing and adjusting metals
knowledge of water chemistry
knowledge of pool chemicals
knowledge of effects of pool chemicals
knowledge of safety requirements
knowledge of dangers of chlorinating agents
knowledge of chlorinating procedures
knowledge of chemical balancing techniques and requirements
knowledge of testing techniques and requirements
knowledge of reagents
knowledge of adjusting techniques and requirements

12. Knowledge of the effect of chemical balances on staining
knowledge of safety requirements
knowledge of chemicals
knowledge of chemical properties
knowledge of mixing procedures
knowledge of chemical effects
knowledge of storage procedures and requirements
knowledge of water balancing
knowledge of filtration
knowledge of pool and spa surface finishes

13. Cleaning D.E. filters by pressure backwashing and jet spraying
knowledge of system design
knowledge of pump requirements
knowledge of flow rates
knowledge of safety requirements
knowledge of testing procedures
knowledge of water clarity
knowledge of gauges
knowledge of drainage
knowledge of valves
knowledge of filter media

14. Backwashing sand filters
knowledge of system design
knowledge of pump requirements
knowledge of flow rates
knowledge of safety requirements
knowledge of testing procedures
knowledge of water clarity
knowledge of gauges
knowledge of drainage
knowledge of valves
knowledge of filter media

15. Cleaning cartridge filters
knowledge of system design
knowledge of pump requirements
knowledge of flow rates
knowledge of safety requirements
knowledge of testing procedures
knowledge of water clarity
knowledge of gauges
knowledge of drainage
knowledge of valves
knowledge of filter media

16. Disinfecting and sanitizing decks and locker rooms
knowledge of sodium hypochlorite
knowledge of calcium hypochlorite
knowledge of lithium hypochlorite
knowledge of safety requirements
knowledge of chemical properties
knowledge of mixing procedures
knowledge of chemical effects
knowledge of storage procedures and requirements
knowledge of alternate sanitation device installation

17. Using other pool sanitizers
(e.g., bromine, iodine, ozone, ultraviolet, ions)
knowledge of safety requirements
knowledge of chemicals
knowledge of chemical properties
knowledge of mixing procedures
knowledge of chemical effects
knowledge of chemical balancing techniques and requirements
knowledge of storage procedures and requirements
knowledge of alternate sanitation device installation

18. Using other pool chemicals
(e.g., flocculants, algacides, sequestering agents, phosphate treatments, degreasers and defoamers)
knowledge of safety requirements
knowledge of chemicals
knowledge of chemical properties
knowledge of mixing procedures
knowledge of filtration requirements
knowledge of filtration media
knowledge of chemical effects
knowledge of chemical balancing techniques and requirements
knowledge of storage procedures and requirements

19. Testing and adjusting saturation index
knowledge of water chemistry
knowledge of pH
knowledge of pool chemicals
knowledge of effects of pool chemicals
knowledge of safety requirements
knowledge of chlorinating techniques and procedures
knowledge of chemical balancing techniques and requirements
knowledge of testing procedures
knowledge of reagents
knowledge of adjusting procedures

20. Replacing light bulbs and underwater lights
knowledge of different voltage lights
knowledge of proper safety procedures and requirements
knowledge of importance of GFCI requirements
knowledge of safe wiring and sealing water out
knowledge of material specifications
knowledge of bonding and grounding requirements
knowledge of state codes

21. Installing markers and signs to notify the public of safety procedures
knowledge of state codes
knowledge of safety requirements
knowledge of placement
knowledge of location

22. Maintaining and repairing plumbing equipment
knowledge of safety requirements
knowledge of piping requirements
knowledge of fittings
knowledge of pipe fittings
knowledge of piping protection
knowledge of pressure requirements
knowledge of gauges

knowledge of pressure testing
knowledge of flow rates
knowledge of pumps
knowledge of leak detection

23. Maintaining and repairing pool shells
knowledge of leak detection
knowledge of leak testing
knowledge of safety requirements
knowledge of materials
knowledge of the properties of materials
knowledge of crack repair procedures

24. Evaluating and adjusting system requirements
knowledge of system design
knowledge of checking for correct turnover rate
knowledge of checking for filtering media effectiveness
knowledge of checking flow rate
knowledge of testing and adjusting water chemistry
knowledge of checking and clearing strainer baskets
knowledge of automatic cleaner strainers
knowledge of D.E. separation tank cleaning

25. Performing heater maintenance and repair
knowledge of heating system efficiency
knowledge of safety requirements
knowledge of system design
knowledge of system capacity
knowledge of temperature measurements
knowledge of effects of temperature
knowledge of changes in temperature
knowledge of effects of water chemistry on heater components
knowledge of pool chemistry
knowledge of gas and electric requirements
knowledge of state codes
knowledge of additional licensure requirements

Content Area H Safety Procedures

1. Complying with state and federal requirements
knowledge of state and federal codes
knowledge of ADA requirements
knowledge of VGBA requirements
2. **Implementing a safety program**
   - knowledge of safety requirements

3. **Utilizing accident prevention techniques**
   - knowledge of storage procedures
   - knowledge of safety requirements
   - knowledge of transportation requirements and procedures
   - knowledge of pool closure procedures