The General Trade Knowledge portion of the examination is administered daily in Computer Based Testing (CBT) format. It will consist of 80 equally weighted questions.

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 5%
Pre-Installation and Site Preparation

1. Interpret plans that meet job requirements
   knowledge of symbols
   knowledge of abbreviations
   knowledge of terminology
   knowledge of site dimensions
   knowledge of scale dimensions
   knowledge of soil types

2. Checking code and ordinance requirements to determine appropriate equipment needed for jobs
   knowledge of site conditions
   knowledge of subsoil conditions
   knowledge of water tables
   knowledge of characteristics of concrete, tile, steel, fiberglass, vinyl, piping and wiring
   knowledge of OSHA requirements

Content Area B 15%
Pool and Spa Excavation

1. Locating underground, above ground and overhead obstructions
   knowledge of where to find information
   knowledge of site conditions
   knowledge of how to identify obstructions
   knowledge of when and how to notify appropriate authorities
   knowledge of permissible working conditions

2. Excavating or clearing sites
   knowledge of staking out excavation
   knowledge of determining location of excavation
   knowledge of basic surveying
   knowledge of layout methods
   knowledge of interpreting plans and specifications
   knowledge of surveying and leveling equipment
   knowledge of compaction equipment
   knowledge of earth moving and excavation equipment
   knowledge of structural support systems
   knowledge of protection of surrounding structures

3. Performing site grading
   knowledge of elevation requirements
   knowledge of basic surveying and leveling techniques
   knowledge of surveying and leveling equipment
   knowledge of identification of obstructions
   knowledge of removal of site debris
4. Determining water tables
   knowledge of subsoil conditions
   knowledge of aquifers and tidal influences
   knowledge of drilling equipment and practices

5. Determining water and soil conditions
   knowledge of excavation
   knowledge of sampling
   knowledge of soil composition
   knowledge of soil testing requirements

6. Performing de-watering, de-mucking and well-pointing
   knowledge of dewatering equipment
   knowledge of piping requirements
   knowledge of soils
   knowledge of soil permeability
   knowledge of excavation equipment
   knowledge of excavating techniques and requirements
   knowledge of water table
   knowledge of well points
   knowledge of drawdown
   knowledge of pump requirements and techniques

7. Removing sod
   knowledge of calculating area
   knowledge of compaction
   knowledge of soil conditions

8. Backfilling and compacting
   knowledge of different types of backfill material
   knowledge of surveying and leveling equipment
   knowledge of surveying and leveling techniques
   knowledge of soil properties
   knowledge of compaction methods
   knowledge of correct moisture content
   knowledge of percent compaction
   knowledge of soil density testing techniques
   knowledge of the amount of dirt to fill

9. Removing foreign materials and debris
   knowledge of hand tools
   knowledge of excavation equipment
   knowledge of hauling equipment
   knowledge of materials disposal requirements
   knowledge of environmental standards protection

Content Area C 12½%
Plumbing Work

1. Installing recirculating, drainage and waste lines
   knowledge of piping materials and applications
   knowledge of placement
   knowledge of associated fittings
   knowledge of valve requirements
   knowledge of related components
   knowledge of pipe support
   knowledge of gravity, pressure, suction and drainage systems

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

3. Installing filter equipment
   knowledge of filtration requirements
   knowledge of type of filters
   knowledge of gauges and valves
   knowledge of placement of pumps
   knowledge of piping requirements
   knowledge of flow rates and piping pressures
   knowledge of inlets and outlets

4. Installing pumps
   knowledge of types of pumps and pump loads
   knowledge of grounding
   knowledge of piping techniques and requirements
   knowledge of pressures and flow requirements
   knowledge of types and capacities of motors
   knowledge of hair and lint strainers

5. Installing skimmers
   knowledge of types of skimmers
   knowledge of skimmer housings
   knowledge of strainer baskets
   knowledge of weirs and valves
   knowledge of vacuum cleaning connections
6. Installing solar heaters
   knowledge of solar heating requirements and practices
   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 and local codes
   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. as tanks for gas heaters
   knowledge of heat pumps for electric heaters
   knowledge of immersion elements for electric heaters
   knowledge of ventilation requirements

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 feeders

9. Installing automatic feeders
   Knowledge of types of automatic feeders
   knowledge of piping techniques and requirements
   knowledge of pipe fitting requirements
   knowledge of pipe materials
   knowledge of processes for automatic feeders
   knowledge of feeder sizing requirements

10. Sizing pipes
    knowledge of basic hydraulics

Content Area D                                           5%
Electrical Work

1. Bonding
   knowledge of safety requirements
   knowledge of bonding requirements

2. Grounding
   knowledge of safety requirements
   knowledge of electrical grounding requirements

3. Installing light niches
   knowledge of proper installation requirements (conduit)
   knowledge of safety requirements
   knowledge of types of niches
   knowledge of location and amount of illumination
   knowledge of bonding requirements
   knowledge of product specifications
   knowledge of elevation and placement of niche

4. Installing, replacing and repairing electrical components
   knowledge of local and state codes
   knowledge of automatic timers
   knowledge of lights
   knowledge of electrical connections to chlorinating generators

Content Area E                                         10%
Shell Placement

1. Installing steel reinforcing bars
   knowledge of reinforcing practices and procedures
   knowledge of measurement requirements
   knowledge of measuring equipment

2. Installing vinyl pool walls (steel, wood, fiberglass, plastic, and structural polymer)
   knowledge of material properties
   knowledge of specific handling requirements
   knowledge of supports and anchorage
   knowledge of backfilling requirements
   knowledge of surveying and leveling equipment
   knowledge of surveying and leveling techniques
   knowledge of soil properties and angle of repose
   knowledge of excavation techniques

3. Testing for leakage in pool and spa shells
   knowledge of measuring elevation differentials
   knowledge of evaporation
4. **Installing concrete walls and flooring**
   knowledge of mixing pneumatically applied concrete
   knowledge of setting concrete beam elevations
   knowledge of concrete properties
   knowledge of concrete testing
   knowledge of placement techniques
   knowledge of finishing techniques
   knowledge of pressurized concrete equipment

5. **Testing strength of concrete**
   ability to identify inferior materials
   knowledge of slump
   knowledge of concrete testing
   knowledge of properties of concrete

6. **Installing structural support systems**
   knowledge of soils
   knowledge of piling support systems

Content Area F  5%
Deck Work

1. **Laying out and forming decks**
   knowledge of surveying and leveling equipment
   knowledge of surveying and leveling techniques
   knowledge of excavation, backfill and compaction
   knowledge of drainage requirements
   knowledge of form work
   knowledge of safety requirements
   knowledge of site requirements

2. **Installing wood and composite decks**
   knowledge of pressure treated wood
   knowledge of other wood protection
   knowledge of carpentry
   knowledge of carpentry tools
   knowledge of foundations

3. **Installing concrete decks**
   knowledge of concrete properties
   knowledge of concrete reinforcement
   knowledge of concrete placement
   knowledge of concrete finishing
   knowledge of form work
   knowledge of expansion and contraction protection
   knowledge of drainage and slope
   knowledge of drains and plumbing
   knowledge of deck finishes

4. **Installing masonry type decks**
   (tile, stone, and brick)
   knowledge of sub-base materials
   knowledge of work requirements
   knowledge of material placement
   knowledge of drainage and slope
   knowledge of drains and plumbing

5. **Tying different kinds of decks to pool shells**
   (wood, concrete, stone)
   knowledge of shell and deck interface

Content Area G  10%
Tile, Coping and Trim Work

1. **Installing tiles**
   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

2. **Installing masonry trims**
   (brick, stone, and precast coping)
   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

3. **Checking for level placement of materials**
   knowledge of leveling equipment
   knowledge of leveling techniques and requirements
4. Installing gutters and seams in commercial pools
   knowledge of leveling
   knowledge of slopes
   knowledge of concrete
   knowledge of marcite
   knowledge of tile
   knowledge of plumbing
   knowledge of inlets and outlets
   knowledge of form work

5. Checking code requirements
   knowledge of step height requirements
   knowledge of gutter level requirements
   knowledge of depth and "no diving" marker tiles

Content Area H 10%
Accessory Work

1. Installing retaining walls
   knowledge of design characteristics
   knowledge of limitations
   knowledge of proper footers
   knowledge of shotcrete and gunite walls
   knowledge of segmented wall systems

2. Installing fencing
   knowledge of state and local codes
   knowledge of location requirements
   knowledge of picket spacing
   knowledge of safety requirements
   knowledge of primary and secondary barrier codes and insurance requirements

3. Installing diving boards and diving platforms
   knowledge of materials for diving boards
   knowledge of installation requirements
   knowledge of safety requirements
   knowledge of proper placement

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

5. Constructing equipment rooms and housing
   knowledge of small structure requirements for housing

knowledge of equipment requirements
knowledge of piping placement
knowledge of drainage requirements
knowledge of ventilation requirements

6. Installing auxiliary lighting
   knowledge of fiber optic lighting
   knowledge of low voltage accent lighting

7. Installing alternate sanitation devices
   knowledge of different types of devices
   knowledge of installation requirements

Content Area I 5%
Interior Surface Preparation and Finishing

1. Performing interior pool and spa clean-ups
   knowledge of drawdown
   knowledge of possible uplift
   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 concrete pools
   knowledge of finishing
   knowledge of surface preparation
   knowledge of plaster installation methods

3. Installing lining in vinyl-lined pools
   knowledge of materials
   knowledge of methods
   knowledge of soils
   knowledge of retaining walls
   knowledge of coping
   knowledge of leveling and installing
   knowledge of anchoring

4. Resurfacing fiberglass pools
   knowledge of hydrostatic uplift
   knowledge of fiberglass materials, procedures and requirements
Content Area J                                    5%
Start Up

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

2. Testing filters and filtration
   knowledge of turnover rates
   knowledge of testing procedures
   knowledge of cleaning procedures

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

4. Starting pool and spa auxiliary equipment
   knowledge of equipment specifications
   knowledge of system design

5. Testing heating equipment
   knowledge of testing procedures
   knowledge of temperature measurement
   knowledge of system design

6. Testing pump startup
   knowledge of testing procedures
   knowledge pump requirements
   knowledge of system design

7. Performing final exterior inspection
   knowledge of material procedures
   knowledge of safety requirements

Content Area K                                    10%
Service and Maintenance

1. Demonstrating pool operation to owners
   knowledge of mechanical and hydraulic systems
   knowledge of chemical systems
   knowledge of general pool care requirements
   knowledge of communicating safety requirements
   knowledge of equipment
   knowledge of communication skills
   knowledge of daily reports

2. Sanitizing pool and spa water
   knowledge of water chemistry
   knowledge of pH
   knowledge of effects of pool chemicals
   knowledge of safety requirements
   knowledge of reporting requirements
   knowledge of chlorinating requirements
   knowledge of chlorinating procedures
   knowledge of shock treatments or superchlorinations
   knowledge of breakpoint chlorination
   knowledge of testing techniques and requirements
   knowledge of adjusting techniques and requirements
   knowledge of sanitation with other pool sanitizers
   knowledge of sanitation through oxidation
   knowledge of testing and adjusting cyanuric acid

3. Balancing pool and spa water
   knowledge of chemical balancing techniques and requirements
   knowledge of testing and adjusting water hardness
   knowledge of testing and adjusting total alkalinity
   knowledge of pH
   knowledge of saturation index

4. Testing and adjusting for metals and other water problems
   knowledge of flocculants
   knowledge of algacides
   knowledge of sequestering agents
   knowledge of degreasers and defoamers
5. Checking accurate turbidity
   knowledge of testing techniques and requirements
   knowledge of reagents
   knowledge adjusting techniques and requirements

6. 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

7. 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

8. 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

9. 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

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

11. 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

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

13. Maintaining and repairing plumbing and 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

14. Maintaining and repairing decks
    knowledge of bonding new material to old
    knowledge of cleaning in preparation for repair
    knowledge of safety requirements
    knowledge of expansion joints
    knowledge of codes
    knowledge of maintaining strength of the deck
    knowledge of soil conditions
    knowledge of compaction
    knowledge of concrete placement
15. Maintaining and repairing accessory fixtures
- knowledge of safety requirements
- knowledge of solar heating
- knowledge of conventional heating
- knowledge of materials
- knowledge of the properties of materials
- knowledge of procedures
- knowledge of material handling
- knowledge of system design
- knowledge of system design capacity

16. 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

17. Evaluating and adjusting pool and spa system requirements
- knowledge of system design
- checking for correct turnover rate
  - knowledge of testing techniques and requirements
  - knowledge calculating turnover rate
  - knowledge of adjusting techniques and requirements
- checking for effectiveness of filtering media
  - 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
- testing and adjusting for water clarity
  - 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 dangers of chlorinating agents
  - knowledge of chlorinating requirements
  - knowledge of chlorinating procedures
  - knowledge of chemical balancing techniques and requirements

18. Performing heater care and maintenance
- checking heaters or heating systems for efficiency
  - knowledge of safety requirements
  - knowledge of testing procedures and requirements
  - knowledge of system design
  - performing heater sizing
  - 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 safety requirements

Content Area L 7 1/2%

Equipment

1. Using torches
- knowledge of safety requirements
- knowledge of OSHA requirements
- knowledge of cutting materials and techniques
- knowledge of welding materials and techniques
- knowledge of oxygen
- knowledge of acetylene

2. Using jackhammers
- knowledge of safety requirements
- knowledge of OSHA requirements
- knowledge of equipment characteristics
3. **Using saw cutting machines**
   - knowledge of safety requirements
   - knowledge of OSHA requirements
   - knowledge of equipment characteristics

4. **Using bobcats or backhoes**
   - knowledge of safety requirements
   - knowledge of OSHA requirements
   - knowledge of equipment characteristics
   - knowledge of traffic regulations

5. **Using pneumatically placed or poured concrete**
   - knowledge of safety requirements for pumping equipment

6. **Using compressors**
   - knowledge of safety requirements
   - knowledge of OSHA requirements
   - knowledge of pressure regulators
   - knowledge of air tools

7. **Using cement guns**
   - knowledge of safety requirements
   - knowledge of OSHA requirements

8. **Using concrete pumps**
   - knowledge of safety requirements
   - knowledge of OSHA requirements
   - knowledge of concrete properties
   - knowledge of concrete procedures
   - knowledge of concrete testing
   - knowledge of concrete placement