



COMMERCIAL POOL CONTRACTORS GENERAL TRADE KNOWLEDGE EXAMINATION CONTENT INFORMATION

Revised September 14

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
Plumbing Work

12½%

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 Accessory Work 10%

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 Interior Surface Preparation and Finishing 5%

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
Start Up

5%

- 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
Service and Maintenance

10%

- 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 super-chlorinations
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 algaecides
knowledge of sequestering agents
knowledge of degreasers and defoamers

knowledge of metal testing techniques and requirements

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

knowledge of storage procedures and requirements

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

- knowledge of testing techniques and requirements
- knowledge of reagents
- knowledge of adjusting techniques and requirements
- checking and clearing outlet strainers
 - knowledge of system design
 - knowledge of pump requirements
 - knowledge of flow rates
 - knowledge of safety requirements
 - knowledge of testing procedures
 - knowledge of gauges
 - knowledge of drainage
 - knowledge of valves

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 safety requirements
 - knowledge of system design
 - knowledge of system capacity
- checking thermostats
 - 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
Equipment**

7 ½%

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