



# COMMERCIAL POOL CONTRACTORS GENERAL TRADE KNOWLEDGE EXAMINATION CONTENT INFORMATION

Revised March 2009

The General Trade Knowledge examination will be administered in one session on the morning of the first day of the examination administration. 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. Drawing 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 gunite, tile, steel, fiberglass, vinyl, concrete piping, and wiring

## **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 invert elevations
- 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

### **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 augers  
 knowledge of aquifers  
 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
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 tamping  
 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**

**12 ½%**

1. **Installing 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 theory  
 knowledge of psi's  
 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 types and capacities of motors  
 knowledge of piping requirements  
 knowledge of flow rates and piping pressures  
 knowledge of inlets and outlets
4. **Installing pumps**  
 knowledge of filtration requirements  
 knowledge of types of pumps and pump loads  
 knowledge of grounding  
 knowledge of piping techniques and requirements  
 knowledge of pressures and flow requirements
5. **Installing skimmers**  
 knowledge of filtration requirements  
 knowledge of types of skimmers  
 knowledge of skimmer housings  
 knowledge of strainer baskets  
 knowledge of weirs 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 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. Gas tanks 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 feeders
- 9. Installing automatic feeders**
  - knowledge of piping techniques and requirements
  - knowledge of pipe fitting requirements
  - knowledge of pipe fitting
  - knowledge of pipe materials
  - knowledge of processes for automatic feeders
- 10. Sizing pipes**
  - knowledge of hydraulics

**Content Area D  
Electrical Work**

**5%**

- 1. Determining power line requirements**
  - knowledge of wire size based on amperage
  - knowledge of size of conduit
  - knowledge of wire type
  - knowledge of overhead power
  - knowledge of “call before you dig”
  - knowledge for determining line sizes
- 2. Installing electric control panels**
  - knowledge of safety requirements
  - knowledge of electrical grounding requirements
  - knowledge of sizing breakers
- 3. Bonding**
  - knowledge of safety requirements
  - knowledge of bonding requirements
- 4. Grounding**
  - knowledge of safety requirements
  - knowledge of electrical grounding requirements
- 5. 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
- 6. 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**  
**Shell Placement**

**10%**

**1. Installing steel reinforcing bars**

knowledge of reinforcing practices and procedures  
knowledge of measurement requirements  
knowledge of measuring equipment

**2. Installing fiberglass walls**

knowledge of material properties  
knowledge of supports and anchorage  
knowledge of specific handling requirements  
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. Installing wood walls**

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

**4. Installing metal walls**

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

**5. Installing plastic walls**

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

**6. Installing structural polymer walls**

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

**7. Testing for leakage in pool and spa shells**

knowledge of measuring elevation differentials  
knowledge of evaporation

**8. Mixing pneumatically applied concrete**

knowledge of concrete reinforcement requirements  
knowledge of concrete properties  
knowledge of concrete testing  
knowledge of placement techniques  
knowledge of finishing techniques  
knowledge of pressurized concrete equipment

**9. Testing strength of concrete**

ability to identify inferior materials  
knowledge of slump  
knowledge of concrete testing  
knowledge of properties of concrete

**10. Installing precast support pilings**

knowledge of soils  
knowledge of precast piles  
knowledge of pile driving methods and procedures

**11. Installing concrete blocks by region and soil condition**

**Content Area F**  
**Deck Work**

**5%**

- 1. Laying out and forming decks**  
knowledge of surveying and leveling equipment  
knowledge of surveying and leveling techniques  
knowledge of excavation and backfill  
knowledge of drainage requirements  
knowledge of form work  
knowledge of safety requirements
- 2. Installing wood 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 work placement  
knowledge of drainage and slope  
knowledge of drains and plumbing
- 5. Tying different kinds of decks to pool shells (wood, concrete, stone)**

**Content Area G**  
**Tile, Coping and Trim Work**

**10%**

- 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**

**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
- 2. Installing fencing**  
knowledge of state and local codes  
knowledge of location requirements  
knowledge of picket spacing  
knowledge of safety requirements  
knowledge of barrier code 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
- 5. Constructing equipment rooms and housing**  
knowledge of concrete requirements  
knowledge of concrete masonry units  
knowledge of construction materials and methods  
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

**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 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
- 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

**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 pressurizing procedures and requirements
  - knowledge of turnover rates
  - knowledge of pumps
  - knowledge testing 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 wiring
  - knowledge of fuels
  - knowledge of solar input
  - knowledge of testing procedures
  - knowledge of temperature measurement
  - knowledge of system design
- 6. Testing pump sections**
  - knowledge of testing procedures
  - knowledge pump requirements
  - knowledge of system design
- 7. Performing exterior pool and spa clean-ups**
  - 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 pools and spas through chlorination**
  - 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
- 3. Performing shock treatments or super-chlorinations**
  - 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

**4. Determining breakpoint chlorinations**

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 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

**6. Checking accurate turbidity**

knowledge of testing techniques and requirements  
knowledge of reagents  
knowledge 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  
knowledge of testing techniques and requirements  
knowledge of reagents  
knowledge of adjusting 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. 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

**13. 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

**14. Using sodium hypochlorite for disinfecting and deck cleaning**

knowledge of safety requirements  
knowledge of chemical properties  
knowledge of mixing procedures  
knowledge of filtration requirements  
knowledge of chemical effects  
knowledge of chemical balancing techniques and requirements  
knowledge of storage procedures and requirements

**15. Using calcium hypochlorite to sanitize decks and locker rooms**

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

**16. Using other pool sanitizers (e.g., bromine, iodine, ozone, ultraviolet, silver and electrolytic cells)**

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

**17. Using other pool chemicals (e.g., flocculents, algicides, sequestering agents, 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

**18. Testing and adjusting water saturation and undersaturation**

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

**19. 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

**20. Replacing light bulbs and underwater lights**

knowledge of different voltage lights  
knowledge of proper safety procedures and requirements  
knowledge of pressure and suction factors  
knowledge of importance of GFIR  
knowledge of safe wiring and sealing water out  
knowledge of material specifications  
knowledge of bonding and grounding requirements

**21. 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

**22. Installing markers and signs to notify the public of safety procedures**

knowledge of safety requirements  
knowledge of placement  
knowledge of location

**23. 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

**24. 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

**25. 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

**26. 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

**27. Evaluating and adjusting 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

**28. 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

**29. 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 1/2%**

**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 brazing 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