

Student's Name/Initials

/

Date

Teacher's Initials

Date

PLUMBING 1, 2, 3, and 4

DIRECTIONS: Evaluate the student using the applicable rating scales below and check the appropriate box to indicate the degree of competency. The ratings 3, 2, 1, and N are not intended to represent the traditional school grading system of A, B, C, and D. The description associated with each of the ratings focuses on the level of student performance or cognition for each of the competencies listed below.

PERFORMANCE RATING

- 3 - Skilled--can perform task independently with no supervision
2 - Moderately skilled--can perform task completely with limited supervision
1 - Limitedly skilled--requires instruction and close supervision
N - No exposure--has no experience or knowledge of this task

COGNITIVE RATING

- 3 - Knowledgeable--can apply the concept to solve problems
2 - Moderately knowledgeable--understands the concept
1 - Limited knowledge--requires additional instruction
N - No exposure--has not received instruction in this area

NCCER CONTREN® CORE MODULES

MODULE A.

BASIC SAFETY

3 2 1 N

- 1. Identify the responsibilities and personal characteristics of a professional craftsman.
2. Explain the role that safety plays in the construction crafts.
3. Describe what job-site safety means.
4. Explain the appropriate safety precautions around common job-site hazards.
5. Demonstrate the use and care of appropriate personal protective equipment.
6. Follow safe procedures for lifting heavy objects.
7. Describe safe behavior on and around ladders and scaffolds.
8. Explain the importance of the HazCom (Hazard Communication Standard) requirement and MSDs (Material Safety Data Sheets).
9. Describe fire prevention and fire fighting techniques.
10. Define safe work procedures around electrical hazards.
11. Complete 10-hour OSHA course/assessment and receive card. (SDE Requirement)

MODULE B.

BASIC MATH

3 2 1 N

- 1. Add, subtract, multiply, and divide whole numbers, with and without a calculator.
2. Use a standard ruler and a metric ruler to measure.
3. Add, subtract, multiply, and divide fractions.
4. Add, subtract, multiply, and divide decimals, with and without a calculator.
5. Convert decimals to percents and percents to decimals.
6. Convert fractions to decimals and decimals to fractions.
7. Explain what the metric system is and how it is important in the construction trade.
8. Recognize and use metric units of length, weight, volume, and temperature.
9. Recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them.

MODULE C:

INTRODUCTION TO HAND TOOLS

3 2 1 N

- 1. Recognize and identify some of the basic hand tools used in the construction trade.

- 2. Use these tools safely.
3. Describe the basic procedures for taking care of these tools.

MODULE D: INTRODUCTION TO POWER TOOLS

3 2 1 N

- 1. Identify commonly used power tools of the construction trade.
2. Use power tools safely.
3. Explain how to maintain power tools properly.

MODULE E: INTRODUCTION TO BLUEPRINTS

3 2 1 N

- 1. Recognize and identify basic blueprint terms, components, and symbols.
2. Relate information on blueprints to actual locations on the print.
3. Recognize different classifications of drawings.
4. Interpret and use drawing dimensions.

MODULE F: BASIC RIGGING (Optional)

3 2 1 N

- 1. Explain how ropes, chains, hoists, loaders, and cranes are used to move material and equipment from one location to another on a job site.
2. Describe inspection techniques and load-handling safety practices.

- — — — 3. Explain the American National Standards Institute (ANSI) hand signals.

MODULE G: BASIC COMMUNICATION SKILLS
(SDE Requirement)

- 3 2 1 N
— — — — 1. Explain techniques for communicating effectively with coworkers and supervisors.
— — — — 2. Demonstrate verbal and written communication skills necessary in the workplace.
— — — — 3. Demonstrate telephone and e-communication skills necessary in the workplace.

MODULE H: BASIC EMPLOYABILITY SKILLS
(SDE Requirement)

- 3 2 1 N
— — — — 1. Identify the roles of individuals and companies in the construction industry.
— — — — 2. Explain the importance critical thinking and problem solving skills in the workplace.
— — — — 3. Describe computer systems and their industry applications.
— — — — 4. Explain interpersonal relationship skills, self-presentation, and key workplace issues such as sexual harassment, stress, and substance abuse.

PLUMBING 1, 2, 3, and 4

UNIT A: INTRODUCTION TO THE PLUMBING PROFESSION

- 3 2 1 N
— — — — 1. Describe the history of the plumbing profession.
— — — — 2. Identify the responsibilities of a person working in the construction industry.
— — — — 3. State the personal characteristics of a professional.
— — — — 4. Identify the stages of progress within the plumbing profession and its positive impact on society.

UNIT B: PLUMBING SAFETY

- 3 2 1 N
— — — — 1. Describe the common unsafe acts and unsafe conditions that cause accidents.
— — — — 2. Describe how to handle unsafe acts and unsafe conditions.
— — — — 3. Explain how the cost of accidents and illnesses affects everyone on site.
— — — — 4. Demonstrate the use and care of appropriate personal protective equipment.
— — — — 5. Identify job-site hazardous work specific to plumbers.
— — — — 6. Demonstrate the proper use of ladders.
— — — — 7. Demonstrate how to maintain power tools safely.
— — — — 8. Explain how to work safely in and around a trench.
— — — — 9. Describe and demonstrate the lockout/tagout process.

UNIT C: PLUMBING TOOLS

- 3 2 1 N
— — — — 1. Identify the basic hand and power tools used in the plumbing trade.
— — — — 2. Demonstrate the proper use of plumbing tools.
— — — — 3. Demonstrate the ability to know when and how to select the proper tool(s) for tasks.
— — — — 4. Demonstrate the proper maintenance for caring for hand and power tools.
— — — — 5. Demonstrate how to prepare a surface for tool use.
— — — — 6. Describe the safety requirements for using plumbing tools.

UNIT D: INTRODUCTION TO PLUMBING MATH

- 3 2 1 N
— — — — 1. Add, subtract, multiply, and divide whole numbers.
— — — — 2. Add, subtract, multiply, and divide fractions.
— — — — 3. Add, subtract, multiply, and divide decimals.
— — — — 4. Convert decimals to percentages and percentages to decimals.

- — — — 5. Convert fractions to decimals and decimals to fractions.
— — — — 6. Explain what the metric system is and how it is important in the plumbing trade.
— — — — 7. Square various numbers and take square roots of numbers, with and without a calculator.
— — — — 8. Identify the parts of a fitting and use common pipe-measuring techniques.
— — — — 9. Use fitting dimension tables to determine fitting allowances and thread makeup.
— — — — 10. Calculate end-to-end measurements using fitting allowances and thread makeup.

UNIT E: INTRODUCTION TO PLUMBING DRAWINGS

- 3 2 1 N
— — — — 1. Identify pictorial (isometric and oblique), schematic, and orthographic drawings, and discuss how different views are used to depict information about objects.
— — — — 2. Identify the basic symbols used in schematic drawings of pipe assemblies.
— — — — 3. Explain the types of drawings that may be included in a set of plumbing drawings and the relationship among the different drawings.
— — — — 4. Interpret plumbing-related information from a set of plumbing drawings.
— — — — 5. Sketch orthographic and schematic drawings.
— — — — 6. Use an architect's scale to draw lines to scale and to measure lines drawn to scale.
— — — — 7. Discuss how code requirements apply to certain drawings.

UNIT F: PLASTIC PIPE AND FITTINGS

- 3 2 1 N
— — — — 1. Identify types of materials and schedules of plastic piping.
— — — — 2. Identify proper and improper applications of plastic piping.
— — — — 3. Identify types of fittings and valves used with plastic piping.

- ___ ___ ___ 4. Identify and determine the kinds of hangers and supports needed for plastic piping.
- ___ ___ ___ 5. Identify the various techniques used in hanging and supporting plastic piping.
- ___ ___ ___ 6. Properly measure, cut, and join plastic piping.
- ___ ___ ___ 7. Explain proper procedures for the handling, storage, and protection of plastic pipes.

UNIT G: COPPER PIPE AND FITTINGS

- 3 2 1 N
- ___ ___ ___ 1. Identify the types of materials and schedules used with copper piping.
 - ___ ___ ___ 2. Identify the material properties, storage, and handling requirements of copper piping.
 - ___ ___ ___ 3. Identify the types of fittings and valves used with copper piping.
 - ___ ___ ___ 4. Identify the techniques used in hanging and supporting copper piping.
 - ___ ___ ___ 5. Properly measure, ream, cut, and join copper piping.
 - ___ ___ ___ 6. Identify the hazards and safety precautions associated with copper piping.

UNIT H: CAST-IRON PIPE AND FITTINGS

- 3 2 1 N
- ___ ___ ___ 1. Recognize proper and improper applications of cast-iron piping.
 - ___ ___ ___ 2. Identify the material properties, storage, and handling requirements of carbon steel piping.
 - ___ ___ ___ 3. Identify the types of materials and schedules used in cast-iron piping.
 - ___ ___ ___ 4. Identify the types of fittings used with cast-iron piping.
 - ___ ___ ___ 5. Identify the various techniques used in hanging and supporting cast-iron piping.
 - ___ ___ ___ 6. Properly measure, cut, and join cast-iron piping.
 - ___ ___ ___ 7. Identify the hazards and safety precautions associated with cast-iron piping.

UNIT I: CARBON STEEL PIPE AND FITTINGS

- 3 2 1 N
- ___ ___ ___ 1. Recognize proper applications of carbon steel piping.
 - ___ ___ ___ 2. Identify the material properties, storage, and handling requirements of carbon steel piping.
 - ___ ___ ___ 3. Identify the various techniques used in hanging and supporting carbon steel piping.
 - ___ ___ ___ 4. Properly measure, cut, groove, thread, and join carbon steel piping.

UNIT J: CORRUGATED STAINLESS STEEL TUBING

- 3 2 1 N
- ___ ___ ___ 1. Identify the common manufacturers of corrugated stainless steel tubing.
 - ___ ___ ___ 2. Recognize proper and improper applications of corrugated stainless steel tubing.
 - ___ ___ ___ 3. Identify the various techniques used in hanging and supporting corrugated stainless steel tubing.
 - ___ ___ ___ 4. Explain how to properly measure, cut, join, and groove corrugated stainless steel tubing.
 - ___ ___ ___ 5. Identify the material properties, storage, and handling requirements of corrugated stainless steel tubing.

UNIT K: FIXTURES AND FAUCETS

- 3 2 1 N
- ___ ___ ___ 1. Identify the basic types of materials used in the manufacture of plumbing fixtures.
 - ___ ___ ___ 2. Discuss common types of sinks, lavatories, and faucets.
 - ___ ___ ___ 3. Identify and discuss common types of bathtubs, bath-shower modules, shower stalls, and shower baths.
 - ___ ___ ___ 4. Discuss common types of toilets, urinals, and bidets.
 - ___ ___ ___ 5. Identify and describe common types of drinking fountains and water coolers.
 - ___ ___ ___ 6. Discuss common types of garbage disposals and domestic dishwashers.

UNIT L: INTRODUCTION TO DRAIN, WASTE, AND VENT (DWV) SYSTEMS

- 3 2 1 N
- ___ ___ ___ 1. Explain how waste moves from a fixture through the drain system to the environment.
 - ___ ___ ___ 2. Identify the major components of a drainage system and describe their functions.
 - ___ ___ ___ 3. Identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals.
 - ___ ___ ___ 4. Identify the various types of drain, waste, and vent (DWV) fittings and describe their applications.
 - ___ ___ ___ 5. Identify significant code and health issues, violations, and consequences related to DWV systems.

UNIT M: INTRODUCTION TO WATER DISTRIBUTION SYSTEMS

- 3 2 1 N
- ___ ___ ___ 1. Describe the process by which water is distributed in municipal, residential, and private water systems.
 - ___ ___ ___ 2. Identify the major components of a water distribution system, and describe the function of each component.
 - ___ ___ ___ 3. Explain the relationships between components of a water distribution system.

PLUMBING – ADVANCED

For schools with more classroom instructional hours, choose from the list of advanced standards for your second, third, and fourth year students.

ADVANCED UNIT A: PLUMBING MATH TWO

- 3 2 1 N
- ___ ___ ___ 1. Calculate 11¼ -, 22½ -, 45-, 60-, and 72-degree offsets.
 - ___ ___ ___ 2. Check the squareness of a corner using the 3-4-5 ratio.
 - ___ ___ ___ 3. Lay out square corners using the 3-4-5 ratio.
 - ___ ___ ___ 4. Use a framing square to find the

travel.

- ___ ___ ___ 5. Use a folding rule to find given angles.
- ___ ___ ___ 6. Calculate 11¼ -, 22½ -, 45-, 60-, and 72-degree offsets.
- ___ ___ ___ 7. Calculate rolling offsets using constants for the angled fittings.
- ___ ___ ___ 8. Calculate rolling offsets using a framing square.
- ___ ___ ___ 9. Calculate 45-degree offsets around obstructions.

ADVANCED UNIT B: READING COMMERCIAL DRAWINGS

3 2 1 N

- ___ ___ ___ 1. Interpret information from given site plans.
- ___ ___ ___ 2. Verify dimensions shown on drawings and generate an RFI when you find discrepancies.
- ___ ___ ___ 3. Locate plumbing entry points, walls, and chases.
- ___ ___ ___ 4. Create an isometric drawing.
- ___ ___ ___ 5. Do a material takeoff for drainage, waste, and vent (DWV) and water supply systems from information shown on drawings.
- ___ ___ ___ 6. Use approved submittal data, floor plans, and architectural details to lay out fixture rough-ins, to develop estimates, and to establish general fixture locations.
- ___ ___ ___ 7. Recognize the need for coordination and shop drawings.

ADVANCED UNIT C: HANGERS, SUPPORTS, STRUCTURAL PENETRATIONS, AND FIRE STOPPING

3 2 1 N

- ___ ___ ___ 1. Identify the hangers and supports used to install DWV and water supply systems and explain their applications.
- ___ ___ ___ 2. Install pipe hangers and supports correctly according to local applicable codes and manufacturer's specifications.
- ___ ___ ___ 3. Modify structural members using the appropriate tools without weakening the structure.
- ___ ___ ___ 4. Identify and install common types of fire-stopping materials used in

penetrations through fire-rated structural members, walls, floors, and ceilings.

ADVANCED UNIT D: INSTALLING AND TESTING DWV PIPING

3 2 1 N

- ___ ___ ___ 1. Develop a material takeoff from a given set of plans.
- ___ ___ ___ 2. Use plans and fixture rough-in sheets to determine location of fixtures and route of the plumbing.
- ___ ___ ___ 3. Install a building sewer and a building drain.
- ___ ___ ___ 4. Locate the stack within the structure.
- ___ ___ ___ 5. Install a DWV system using appropriate hangers and correct grade or slope.
- ___ ___ ___ 6. Modify structural members using the appropriate tools without weakening the structure.
- ___ ___ ___ 7. Test a DWV system.

ADVANCED UNIT E: INSTALLING ROOF, FLOOR, AND AREA DRAINS

3 2 1 N

- ___ ___ ___ 1. Use a surveyor's level or transit level to set the elevation of a floor or area drain.
- ___ ___ ___ 2. Install a roof drain, a floor drain, and an area drain.
- ___ ___ ___ 3. Install waterproof membranes and flashing.

ADVANCED UNIT F: TYPES OF VALVES

3 2 1 N

- ___ ___ ___ 1. Identify the basic types of valves.
- ___ ___ ___ 2. Describe the differences in pressure ratings for valves.
- ___ ___ ___ 3. Demonstrate the ability to service various types of valves.

ADVANCED UNIT G: INSTALLING AND TESTING WATER SUPPLY PIPING

3 2 1 N

- ___ ___ ___ 1. Develop a material takeoff from a given set of plans.
- ___ ___ ___ 2. Use plans and fixture rough-in sheets to determine the location of fixtures and the route of the water supply piping.

- ___ ___ ___ 3. Locate and size a water meter.
- ___ ___ ___ 4. Locate a water heater, water softener, and hose bibbs.
- ___ ___ ___ 5. Install a water distribution system using appropriate hangers.
- ___ ___ ___ 6. Modify structural members, using the appropriate tools, without weakening the structure.
- ___ ___ ___ 7. Correctly size and install a water service line, including backflow prevention.
- ___ ___ ___ 8. Test a water supply system.

ADVANCED UNIT H: INSTALLING FIXTURES, VALVES, AND FAUCETS

3 2 1 N

- ___ ___ ___ 1. Describe the general procedures you should follow before installing any fixture.
- ___ ___ ___ 2. Install bathtubs, shower stalls, valves, and faucets.
- ___ ___ ___ 3. Install water closets and urinals.
- ___ ___ ___ 4. Install lavatories, sinks, and pop-up drains.
- ___ ___ ___ 5. Protect fixtures.

ADVANCED UNIT I: INSTALLING WATER HEATERS

3 2 1 N

- ___ ___ ___ 1. Describe the basic operation of water heaters.
- ___ ___ ___ 2. Identify and explain the functions of the basic components of water heaters.
- ___ ___ ___ 3. Install an electric water heater.
- ___ ___ ___ 4. Install a gas water heater.
- ___ ___ ___ 5. Describe the safety hazards associated with water heaters.

ADVANCED UNIT J: FUEL GAS SYSTEMS

3 2 1 N

- ___ ___ ___ 1. Identify the major components of the following fuel systems and describe the function of each component: natural gas, LP gas (liquefied petroleum gas), and fuel oil.
- ___ ___ ___ 2. Identify the physical properties of each type of fuel.
- ___ ___ ___ 3. Identify the safety precautions and potential hazards associated with each type of fuel and system.

- — — — 4. Connect appliances to the fuel gas system properly.
- — — — 5. Apply local codes to various fuel gas systems.
- — — — 6. Design, size, purge, and test fuel gas systems.
- — — — 7. Demonstrate familiarity with applicable fuel gas codes.

ADVANCED UNIT K: SERVICING OF FIXTURES, VALVES, AND FAUCETS

- 3 2 1 N
- — — — 1. Identify common repair and maintenance requirements for fixtures, valves, and faucets.
 - — — — 2. Identify the proper procedures for repairing and maintaining fixtures, valves, and faucets.

ADVANCED UNIT L: APPLIED MATH

- 3 2 1 N
- — — — 1. Identify the weights and measures used in the English and metric systems.
 - — — — 2. Demonstrate an understanding of the concepts of area and volume.
 - — — — 3. Demonstrate an understanding of the practical applications of area and volume calculations.
 - — — — 4. Demonstrate an understanding of the concepts of temperature and pressure and how they apply to plumbing installations.
 - — — — 5. Explain the functions and applications of six simple machines.

ADVANCED UNIT M: CODES

- 3 2 1 N
- — — — 1. Describe the model and local plumbing codes and their purposes.
 - — — — 2. Explain the procedure for modifying plumbing codes.
 - — — — 3. Demonstrate familiarity with the model code (if applicable) and local code used in your area.
 - — — — 4. Use the local plumbing code to find and cite references.

ADVANCED UNIT N: TYPES OF VENTING

- 3 2 1 N
- — — — 1. Demonstrate an understanding of the scientific principles of venting.
 - — — — 2. Design vent systems according to local code requirements.
 - — — — 3. Sketch the different types of vents.
 - — — — 4. Construct given vent configurations.
 - — — — 5. Install the different types of vents correctly.

ADVANCED UNIT O: INDIRECT AND SPECIAL WASTE

- 3 2 1 N
- — — — 1. Identify the reasons for using indirect systems.
 - — — — 2. Discuss the requirements for receptors and backflow preventers.
 - — — — 3. Demonstrate the ability to install an indirect waste system.
 - — — — 4. Identify the reasons for using special waste systems.
 - — — — 5. Describe the purpose of interceptors and how each type functions.
 - — — — 6. Sketch the basic installation and maintenance requirements for interceptors.
 - — — — 7. Describe the precautions that must be taken when installing interceptors to ensure ease of future maintenance and repair.
 - — — — 8. Install an interceptor.
 - — — — 9. Use the local plumbing code to cite the requirements for using indirect waste disposal systems.
 - — — — 10. Use the local plumbing code to cite the requirements for using special waste disposal systems.

ADVANCED UNIT P: SEWAGE PUMPS AND SUMP PUMPS

- 3 2 1 N
- — — — 1. Explain the functions, components, and operation of sewage and sump pumps.
 - — — — 2. Size a storm water sump by calculating the runoff from paved and unpaved land surfaces.
 - — — — 3. Size a sewage sump by calculating the sewage flow from a structure.
 - — — — 4. Install and adjust sensors, switches, and alarms in sewage and sump

- — — — 5. pumps.
- — — — 5. Troubleshoot and repair sewage and sump pumps.
- — — — 6. Using a detailed drawing, identify system components.
- — — — 7. Install a sump pump.

ADVANCED UNIT Q: SIZING WATER SUPPLY PIPING

- 3 2 1 N
- — — — 1. Calculate pressure drops in a water supply system.
 - — — — 2. Size pipe for different flow rates.
 - — — — 3. Explain the difference between and advantages of a continuous-flow system and an intermittent-flow system.
 - — — — 4. Identify fixtures with high flow rates.
 - — — — 5. Explain the proper viscosity of liquids used in water supply installation.
 - — — — 6. Lay out a water supply system.
 - — — — 7. Calculate developed lengths of branches for a given water supply system.
 - — — — 8. Calculate flow rates for high flow rate fixtures.

ADVANCED UNIT R: BACKFLOW PREVENTERS

- 3 2 1 N
- — — — 1. Explain the principle of backflow due to back siphonage or back pressure.
 - — — — 2. Explain the hazards of backflow and demonstrate the importance of backflow preventers.
 - — — — 3. Identify and explain the applications of the six basic backflow prevention devices.
 - — — — 4. Install common types of backflow preventers.

ADVANCED UNIT S: WATER PRESSURE BOOSTER AND RECIRCULATION SYSTEMS

- 3 2 1 N
- — — — 1. Explain the complete water pressure booster system and its components.
 - — — — 2. Explain the maintenance and basic troubleshooting processes for water pressure booster systems.

- ___ ___ ___ 3. Describe the characteristics of the different recirculation systems.
- ___ ___ ___ 4. Identify the basic components of a recirculation system.
- ___ ___ ___ 5. Identify the location of various components within a recirculation system.
- ___ ___ ___ 6. Install a water pressure booster system per engineering plans and specifications.
- ___ ___ ___ 7. Install the basic components of a recirculation system.
- ___ ___ ___ 8. Use the local plumbing code to find and cite requirements for recirculation systems.
- ___ ___ ___ 9. Diagnose basic problems in recirculation systems.

ADVANCED UNIT T: SERVICING PIPING SYSTEMS, FIXTURES, AND APPLIANCES

- 3 2 1 N
- ___ ___ ___ 1. Diagnose water supply problems.
 - ___ ___ ___ 2. Diagnose water quality problems.
 - ___ ___ ___ 3. Explain different types of corrosion and their effects on pipes.
 - ___ ___ ___ 4. Diagnose and solve fixture and appliance problems.
 - ___ ___ ___ 5. Troubleshoot and repair water supply problems.
 - ___ ___ ___ 6. Troubleshoot and repair water heater problems.
 - ___ ___ ___ 7. Troubleshoot and repair water drainage problems.
 - ___ ___ ___ 8. Troubleshoot lawn irrigation systems.

ADVANCED UNIT U: BUSINESS MATH FOR PLUMBERS

- 3 2 1 N
- ___ ___ ___ 1. Correctly price a small job.
 - ___ ___ ___ 2. Understand how components of cost relate to profit.

ADVANCED UNIT V: SIZING DWV AND STORM SYSTEMS

- 3 2 1 N
- ___ ___ ___ 1. Calculate drainage fixture units for waste systems.
 - ___ ___ ___ 2. Size building drains and sewers.
 - ___ ___ ___ 3. Size a vent system.
 - ___ ___ ___ 4. Identify and size special kinds of waste and vent systems.
 - ___ ___ ___ 5. Size roof drainage systems.

ADVANCED UNIT W: PRIVATE WATER SUPPLY SYSTEMS

- 3 2 1 N
- ___ ___ ___ 1. Identify the qualities of a good well.
 - ___ ___ ___ 2. Explain the operation of various types of pumps and well components.
 - ___ ___ ___ 3. Explain the installation of private water supply system components.
 - ___ ___ ___ 4. Troubleshoot a private water supply system.

ADVANCED UNIT X: PRIVATE WASTE DISPOSAL SYSTEMS

- 3 2 1 N
- ___ ___ ___ 1. Describe the types of private waste disposal systems.
 - ___ ___ ___ 2. Discuss the maintenance and replacement of private waste disposal systems.
 - ___ ___ ___ 3. Discuss the local code requirements for private waste disposal systems.

ADVANCED UNIT Y: LOCATING BURIED SEWER AND WATER LINES

- 3 2 1 N
- ___ ___ ___ 1. Use plans and blueprints to locate lines.
 - ___ ___ ___ 2. Use an electronic pipe locator to locate metallic and nonmetallic pipe.
 - ___ ___ ___ 3. Use a camera to locate and diagnose metallic and nonmetallic pipe.
 - ___ ___ ___ 4. Describe utility protection and notification procedures.

ADVANCED UNIT Z: HYDRONIC AND SOLAR HEATING SYSTEMS

- 3 2 1 N
- ___ ___ ___ 1. Describe the basic types of hydronic and solar heating systems and their components.
 - ___ ___ ___ 2. Describe the procedures for roughing in and testing the piping in hydronic or solar heating systems.
 - ___ ___ ___ 3. Describe the procedures for installing equipment in hydronic or solar heating systems.
 - ___ ___ ___ 4. Describe the procedures used to test, balance, and start up hydronic or solar heating systems.

ADVANCED UNIT AA: WATER SUPPLY TREATMENT

- 3 2 1 N
- ___ ___ ___ 1. Flush out visible contaminants from plumbing systems.
 - ___ ___ ___ 2. Disinfect a potable water plumbing system.
 - ___ ___ ___ 3. Identify common water problems.
 - ___ ___ ___ 4. Practice methods used to soften water.
 - ___ ___ ___ 5. Analyze and measure water-conditioning problems.

ADVANCED UNIT BB: SWIMMING POOLS AND HOT TUBS

- 3 2 1 N
- ___ ___ ___ 1. Explain swimming pool and hot tub systems and their components.
 - ___ ___ ___ 2. Explain the local procedures and codes for plumbing a swimming pool.
 - ___ ___ ___ 3. Explain the local procedures and codes for plumbing a hot tub.
 - ___ ___ ___ 4. Discuss water quality issues related to swimming pools and hot tubs.
 - ___ ___ ___ 5. Identify and discuss backflow requirements for swimming pools and hot tubs according to local procedures and codes.

ADVANCED UNIT CC: COMPRESSED AIR

- 3 2 1 N
- ___ ___ ___ 1. Discuss the installation of compressed air systems and their components and accessories.
 - ___ ___ ___ 2. Describe the applications of compressed air systems.
 - ___ ___ ___ 3. Identify the different methods of conditioning compressed air.
 - ___ ___ ___ 4. Identify the types, functions, and capacities of different air compressor systems.
 - ___ ___ ___ 5. Identify the safety issues related to compressed air systems.
 - ___ ___ ___ 6. Troubleshoot a compressed air system.

ADVANCED UNIT DD: CORROSIVE-RESISTANT WASTE PIPING

- 3 2 1 N
- ___ ___ ___ 1. Discuss corrosive wastes and

explain where they are found.

- — — — 2. Discuss common types of materials used for corrosive-resistant waste piping.
- — — — 3. Explain the methods of joining corrosive-resistant waste piping.
- — — — 4. Discuss safety issues and hazard communications.

ADVANCED UNIT EE: PLUMBING FOR MOBILE HOMES AND MOBILE HOME PARKS

3 2 1 N

- — — — 1. Describe the proper location and layout of sewer and supply lines for a mobile home park.
- — — — 2. Explain the procedure for connecting water and sewer lines to mobile homes.
- — — — 3. Discuss code issues that are specific to mobile homes.
- — — — 4. Explain a travel trailer park and its plumbing needs.
- — — — 5. Describe a sanitary dump system.