Student's Name/Initial:	/	Date:	Teacher's Initials:	Date:

PLUMBING 1, 2, 3, and 4 STUDENT PROFILE

COURSE CODE: 6280, 6281, 6282, 6283

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 – Limitedly knowledgeable--requires additional instruction
N - No exposure--has not received instruction in this area

A. STUDENT ORGANIZATIONS

3	2	1	N		
__	__	__	__	1.	Identify the purpose and goals of a Career and Technology Student Organization (CTSO).
__	__	__	__	2.	Explain how CTSOs are integral parts of specific clusters, majors, and/or courses.
__	__	__	__	3.	Explain the benefits and responsibilities of being a member of a CTSO.
__	__	__	__	4.	List leadership opportunities that are available to students through participation in CTSO conferences, competitions, community service, philanthropy, and other activities.
__	__	__	__	5.	Explain how participation in CTSOs can promote lifelong benefits in other professional and civic organizations.

B. TECHNOLOGY KNOWLEDGE

3	2	1	N		
__	__	__	__	1.	Demonstrate proficiency and skills associated with the use of technologies that are common to a specific occupation.
__	__	__	__	2.	Identify proper netiquette when using e-mail, social media, and other technologies for communication purposes.
__	__	__	__	3.	Identify potential abuse and unethical uses of laptops, tablets, computers, and/or networks.
__	__	__	__	4.	Explain the consequences of social, illegal, and unethical uses of technology, e.g., piracy; illegal downloading; licensing infringement; inappropriate uses of software, hardware, and mobile devices in the work environment.
__	__	__	__	5.	Discuss legal issues and the terms of use related to copyright laws, fair use laws, and ethics pertaining to downloading of images, photographs, documents, video, sounds, music, trademarks, and other elements for personal use.
__	__	__	__	6.	Describe ethical and legal practices of safeguarding the confidentiality of business-related information.
__	__	__	__	7.	Describe possible threats to a laptop, tablet, computer, and/or network and methods of avoiding attacks.

C. PERSONAL QUALITIES AND EMPLOYABILITY SKILLS

__	__	__	__	1.	Demonstrate punctuality.
__	__	__	__	2.	Demonstrate self-representation.
__	__	__	__	3.	Demonstrate work ethic.
__	__	__	__	4.	Demonstrate respect.
__	__	__	__	5.	Demonstrate time management.
__	__	__	__	6.	Demonstrate integrity.
__	__	__	__	7.	Demonstrate leadership.
__	__	__	__	8.	Demonstrate teamwork and collaboration.
__	__	__	__	9.	Demonstrate conflict resolution.
__	__	__	__	10.	Demonstrate perseverance.
__	__	__	__	11.	Demonstrate commitment.
__	__	__	__	12.	Demonstrate a healthy view of competition.
__	__	__	__	13.	Demonstrate a global perspective.
__	__	__	__	14.	Demonstrate health and fitness.
__	__	__	__	15.	Demonstrate self-direction.
__	__	__	__	16.	Demonstrate lifelong learning.

D. PROFESSIONAL KNOWLEDGE

3	2	1	N		
__	__	__	__	1.	Demonstrate effective speaking and listening skills.
__	__	__	__	2.	Demonstrate effective reading and writing skills.
__	__	__	__	3.	Demonstrate mathematical reasoning.
__	__	__	__	4.	Demonstrate job-specific mathematics skills.
__	__	__	__	5.	Demonstrate critical-thinking and problem-solving skills.
__	__	__	__	6.	Demonstrate creativity and

resourcefulness.

__ __ __ __7. Demonstrate an understanding of business ethics.

__ __ __ __8. Demonstrate confidentiality.

__ __ __ __9. Demonstrate an understanding of workplace structures, organizations, systems, and climates.

__ __ __ __10. Demonstrate diversity awareness.

__ __ __ __11. Demonstrate job acquisition and advancement skills.

__ __ __ __12. Demonstrate task management skills.

__ __ __ __13. Demonstrate customer-service skills.

00101-15: BASIC SAFETY (Construction Site Safety Orientation)

3 2 1 N

__ __ __ __ 1. Identify the responsibilities and personal characteristics of a professional craftsperson.

__ __ __ __ 2. Describe the safe work requirements for elevated work.

__ __ __ __ 3. Identify and explain how to avoid struck-by and caught-in-between hazards.

__ __ __ __ 4. Explain the appropriate safety precautions around common job-site hazards.

__ __ __ __ 5. Demonstrate the use and care of appropriate personal protective equipment (PPE).

__ __ __ __ 6. Identify and describe other specific job-site safety hazards.

__ __ __ __ 7. Follow safe procedures for lifting heavy objects.

__ __ __ __8. Describe safe behavior on and around ladders and scaffolds.

__ __ __ __9. Explain the importance of the Hazard Communication Standard (HazCom) requirement and Safety Data Sheets (SDS).

__ __ __ __10. Describe fire prevention and fire fighting techniques

__ __ __ __11. Define safe work procedures around electrical hazards.

__ __ __ __12. Complete 10-hour OSHA course/assessment and receive card. (SDE Requirement).

__ __ __ __13. Complete Performance Tasks.

00102-15: 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 percent and percent 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.

00103-15: INTRODUCTION TO HAND TOOLS

3 2 1 N

__ __ __ __ 1. Recognize and identify various types of basic hand tools used in the construction trade.

__ __ __ __ 2. Identify and describe how to use various types of measurement and layout tools.

__ __ __ __ 3. Identify and explain how to use various types of cutting and shaping tools.

__ __ __ __4. Use these tools safely.

__ __ __ __5. Describe the basic procedures for taking care of these tools.

00104-15: INTRODUCTION TO POWER TOOLS

3 2 1 N

__ __ __ __ 1. Identify and explain how to use various types of power drills and impact wrenches used in the construction trade.

__ __ __ __ 2. Identify and explain how t use various types of power saws.

__ __ __ __ 3. Identify and explain how to use various grinders and grinder attachments.

__ __ __ __4. Identify and explain how to use miscellaneous power tools.

__ __ __ __5. Use power tools safely.

__ __ __ __6. Explain how to maintain power tools properly.

__ __ __ __7. Complete Performance Tasks.

00105-15: INTRODUCTION TO CONSTRUCTION DRAWINGS

3 2 1 N

__ __ __ __ 1. Identify and describe various types of construction drawings, including their fundamental components and features.

__ __ __ __ 2. Recognize and identify basic blueprint terms, components, and symbols.

__ __ __ __ 3. Relate information on blueprints to actual locations on the print.

__ __ __ __ 4. Recognize different classifications of drawings.

__ __ __ __ 5. Interpret and use drawing dimensions.

__ __ __ __ 6. Complete Performance Tasks.

00106-15: 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.

__ __ __ __ 4. Complete Performance Tasks.

00107-15: BASIC COMMUNICATION SKILLS (SDE Requirements)

3 2 1 N

__ __ __ __ 1. Describe the communication, listening and speaking processes and their relationship to job performance.

__ __ __ __ 2. Describe good reading and writing skills and their relationship to job performance.

__ __ __ __ 3. Demonstrate telephone and e-communication skills necessary in the workplace.

__ __ __ __ 4. Complete Performance Tasks.

00108-15: BASIC EMPLOYABILITY SKILLS (SDE Requirements)

3 2 1 N

__ __ __ __ 1. Describe the opportunities in the construction business and how an individual enters the construction workforce.
__ __ __ __ 2. Explain the importance of critical thinking and how to solve problems in the workplace.
__ __ __ __ 3. Explain the importance of social skills and identify ways good social skills are applied in the construction trade.
__ __ __ __ 4. Describe computer systems and their industry applications.
__ __ __ __ 5. Explain interpersonal relationship skills, self-presentation, and key workplace issues such as sexual harassment, stress, and substance abuse.

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.

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.

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.
__ __ __ __ 5. Demonstrate the proper maintenance for caring for hand and power tools.
__ __ __ __ 6. Demonstrate how to prepare a surface for tool use.
__ __ __ __ 7. Describe the safety requirements for using plumbing tools.

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 make-up
__ __ __ __ 10. Calculate end-to-end measurements using fitting allowances and thread makeup.

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.

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.

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.

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 handling 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.

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.

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.

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

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.

PLUMBING-ADVANCED

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

PLUMBING MATH 2

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.

READING COMMERCIAL DRAWINS

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.

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.

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.

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.

INSTALLING 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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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 pumps.

__ __ __ __ 5. Troubleshoot and repair sewage and sump pumps.

__ __ __ __ 6. Using a detailed drawing, identify system components.

__ __ __ __ 7. Install a sump pump.

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.

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.

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.

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.

02301-13 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.

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.

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.

02409-14 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.

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.

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.

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.

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.

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.

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.

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.