

Plumber Level 1

Plumber

UNIT: A1 SAFETY RELATED FUNCTIONS

Subunit: A1a Trade Safety Awareness

Level: One

Duration: 10 hours

Theory: 10 hours

Practical: 0 hours

Overview:

Safe working procedures and conditions, injury prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers, and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to incidents or injury. It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe, and accident-free working environment. It is imperative to apply and be familiar with the Workplace Safety and Health Act and Regulations. As well, it's essential to determine workplace hazards and take measures to protect oneself, co-workers, the public, and the environment. Safety education is an integral part of the Plumber apprenticeship training both in school and on-the-job. Unit content is supplemented throughout technical training by trade-specific information about the Plumber safety hazards and precautions presented in the appropriate contexts of discussion and study. **Note: No percentage-weightings for test purposes are prescribed for this unit's objectives. A "Pass/Fail" grade will be recorded for the unit. A Pass mark is assumed to be 70%. Therefore 70% is the mark to be submitted to the Apprenticeship Branch clerks for inputting into computer records.**

Objectives and Content:

**Percent of
Unit Mark (%)**

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| <p>1. Identify safety and health requirements.</p> <ul style="list-style-type: none">a. Overview of The Workplace Safety and Health Act<ul style="list-style-type: none">• Rights and responsibilities of employees under the Act• Rights and responsibilities of employers under the Act• Rights and responsibilities of supervisors under the Actb. Fourteen (14) regulationsc. Codes of practiced. Guidelinese. Right to refuse<ul style="list-style-type: none">• Explanation of right to refuse process• Rights and responsibilities of employees• Rights and responsibilities of employers• Rights and responsibilities of supervisors under the Act | <p>n/a</p> |
| <p>2. Identify personal protective equipment (PPE) and procedures.</p> <ul style="list-style-type: none">a. Employer and employee responsibilities as related to personal protective equipmentb. Standards: ANSI (U.S.A. standards), etc. | <p>n/a</p> |

- c. Work protective clothing and danger if it fits poorly
 - d. Gloves – Importance of proper glove selection (when handling chemicals, cold items, slivers, etc.)
 - e. Headwear – appropriate protective headwear when required and the approved type of headwear
 - f. Eye protection – comparison and distinction of everyday eyeglasses, industrial safety glasses and safety goggles
 - g. Foot protection – when required according to safety standards
 - h. Hearing protection
 - Hazards of various noise levels (hearing protection must be worn)
 - Laws
 - Types of hearing protection
 - i. Respiratory protection – types, overview of proper selection
 - j. Fall protection – Manitoba requirements standards guidelines
 - ANSI (U.S.A. standards), etc.
 - k. Ladders and scaffolding
 - l. Safety principles for working with or around industrial trucks site-specific (forklifts, pallet trucks, etc.)
- 3. Identify workplace regulations applicable to:** n/a
- a. The care and cleanliness in the working area
 - b. The safe use of chemicals
 - c. The use of scaffolding, and
 - d. The use of ladders and related equipment
- 4. Identify ergonomics.** n/a
- a. Definition of ergonomics and conditions that may affect the body
 - Working postures
 - Repetition
 - Force
 - Lifting
 - Tools
 - Identify tool and safety equipment
 - Causes of hand tool accidents
 - Equipment
- 5. Hazard recognition and control.** n/a
- a. HPA and HPR. Hazardous Products Act and Hazardous Products Regulations
 - b. Safe work practices
 - c. Basic risk assessment
 - d. Injury prevention and control measures
 - e. Identification of hazards involved in pneumatic tool use and explanation of how to guard against them
 - f. Refrigerants
 - g. Toxic chemical (non-refrigerant)
 - h. High pressure fluids
- 6. Hazard of confined space entry.** n/a
- a. Identification of a confined space
 - b. Hazards of a confined space (including physical and biological hazards)
 - c. Working in a confined space
 - d. Emergency response plan
 - e. Self-contained breathing apparatus (SCBA)

7. **Identify first aid/CPR.** n/a
- a. Overview of first aid regulation
 - b. Obligations of employers regarding first aid
 - Who is certified to provide first aid?
 - What to do while waiting for help?
 - Where is the first aid kit located?
 - c. Describe basic first aid requirements and techniques
 - Scope and limits of first aid intervention
 - Specific interventions (cuts, burns, abrasions, fractures, suffocation, shock, electrical shock, etc.)
 - Interface with other services and agencies (e.g., Workers Compensation claims)
 - d. Describe basic CPR requirements and techniques
 - How do you get certified?
 - Scope and limits of CPR intervention (include varieties of CPR certification)
8. **Identify the safety requirements as they apply to WHMIS 2015 with emphasis on:** n/a
- a. WHMIS 1988 vs 2015 as system. What is same and what has changed? What is GHS?
 - b. Provincial regulation under the Safety and Health Act
 - Each province has a WHMIS regulation
 - c. Federal Hazardous Products Act
 - d. WHMIS generic training:
 - WHMIS defined and the format used to convey information about hazardous materials in the workplace
 - Information found on supplier and workplace labeling using WHMIS
 - Hazardous materials in accordance with WHMIS
 - Compliance with government safety standards and regulations
 - e. Description of WHMIS (include varieties of WHMIS Certification)
 - Typology of WHMIS labels, symbols, and classifications
 - Scope and use of Materials/Safety Data Sheets (M/SDS)
9. **Identifying and controlling hazards.** n/a
- a. Basic control measures (injury prevention)
 - b. Safe work procedures
 - c. Explanation on the importance of industrial housekeeping
 - d. Employer responsibilities
 - e. How and where to store materials
 - f. Safety measures related to walkways, stairs and floor openings
 - g. Explanation of how to protect the worker and others when working in traffic paths
10. **Describe the safe storage of stock equipment in service vehicles and transportation of dangerous goods.** n/a
11. **Describe Asbestos Safety and Health Requirements.** n/a
- a. Describe what asbestos is, and why it has been used so much
 - b. Describe the potential health hazards associated with asbestos
 - c. Identify typical products and materials that contain asbestos
 - d. Describe proper precautions and work practices when working around asbestos
 - e. Describe how to recognize asbestos hazards due to damage or deterioration
 - f. Describe appropriate response to an asbestos fiber release

9. Describe what Workplace Safety and Health regulations, guidelines and bulletins apply to workers who work with or work around asbestos and what aspects of those regulations, guidelines and bulletins affect you or your company

12. Review the amendments to The Workplace Safety and Health Regulation to meet harmonization recommendations of the Occupational Safety and Health of the Canadian Association of Administrators of Labour Legislation, a cross-jurisdictional advisory and consultative body respecting shared issues relating to occupational safety and health which include:

n/a

- a. Updating first-aid kits and first-aid certifications in accordance with newly developed Canadian Standards Association standards as part of a national system for workplace first aid;
- b. Extending baseline hearing test requirements from within 70 days of hire to up to six months and replace annual hearing reports with requirements to report every two years;
- c. Clarifying existing requirements for the provision and use of several types of personal protective equipment including high-visibility safety apparel, hearing protection, life jackets and personal flotation devices; and
- d. Ensuring a secondary air supply is carried on the person or within arm's reach for workers working in dangerous atmospheres.

Plumber

UNIT: A2 TOOLS AND EQUIPMENT

Subunit: A2a Plumber Tools and Equipment

Level: One

Duration: 15 hours

Theory: 15 hours

Practical: 0 hours

Overview:

This unit introduces Plumber apprentices to basic procedures for selecting, using, and maintaining tools and equipment in a variety of plumbing-project settings. The principles and practical methods introduced here are pursued in greater depth and complexity throughout technical training.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe use, selection, and maintenance of safety gear and personal protective equipment by plumbers.	5%
2. Demonstrate basic techniques for use, selection, and maintenance of safety gear and personal protective equipment by plumbers.	5%
3. Describe use, selection, and maintenance of hand tools by plumbers.	9%
4. Demonstrate basic techniques for hand-tool selection, use, and maintenance.	9%
5. Describe the selection, use, and maintenance of power tools/equipment.	5%
6. Demonstrate basic techniques for the selection, use, and maintenance of power tools/equipment.	9%
7. Describe the selection, use, and maintenance of technical instruments, and testers, and other tools and equipment as specified by the instructor.	5%
8. Demonstrate basic techniques for the selection, use, and maintenance of technical instruments, testers, and other tools and equipment as specified by the instructor.	10%
9. Describe the selection, use, and maintenance of soldering tools and equipment.	15%
10. Demonstrate basic techniques for selection, use, and maintenance of soldering tools and equipment.	16%

11. **Describe the selection, use, and maintenance of steel welding tools and equipment. 6%**
12. **Demonstrate basic techniques for selection, use, and maintenance of steel welding. 6%**

Plumber

Subunit: A2b Hoisting and Lifting and Rigging

Level: One

Duration: 20 hours

Theory: 10 hours

Practical: 10 hours

Overview:

After completing this unit, Plumber apprentices will:

Describe and demonstrate hoisting, lifting and rigging equipment, their applications, limitations and procedures for use. Describe and demonstrate the procedures used to perform hoisting and lifting operations, and Describe and demonstrate calculations required when performing hoisting and lifting operations.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with hoisting, lifting and rigging.	5%
2. Identify hazards and describe safe work practices pertaining to hoisting, lifting and rigging.	5%
3. Identify codes and regulations pertaining to hoisting, lifting and rigging.	5%
4. Identify types of rigging equipment and accessories and describe their limitations, applications and procedures for use.	5%
5. Identify types of hoisting and lifting equipment and accessories and describe their applications and procedures for use.	5%
6. Describe the procedures used to inspect, maintain and store hoisting, lifting and rigging equipment.	5%
7. Identify types of knots, hitches and bends and describe their applications and the procedures used to tie them.	5%
8. Describe the procedures used to rig material/equipment for lifting.	5%
9. Describe the procedures used to ensure the work area is safe for lifting. a. Supervision of lift b. Securing work area c. Communication	5%
10. Identify and describe procedures used to communicate during hoisting, lifting and rigging operations.	5%

- a. Hand signals
 - b. Electronic communications
 - c. Audible/visual
- 11. Explain sling angle when preparing for hoisting and lifting operations. 5%**
- 12. Identify the factors to consider when selecting rigging equipment. 5%**
- a. Load characteristics
 - b. Environment
 - c. Safety factor
- 13. Describe the procedures used for attaching rigging equipment to the load. 5%**
- 14. Describe the procedures used to perform a lift. 5%**
- a. Load determination
 - b. Communication methods
 - c. Pre-lift checks
 - d. Placement of load
 - e. Post-lift inspection
- 15. Demonstrate the procedures used to perform hoisting and lifting operations. 15%**
- 16. Demonstrate calculations required when performing hoisting and lifting operations. 15%**

Plumber

Subunit: A2c Access Equipment

Level: One

Duration: 7 hours

Theory: 5 hours

Practical: 2 hours

Overview:

Plumbers require a good, practical grasp of access equipment. This unit of instruction is the program gateway to further learning about access equipment knowledge and skills related to ladders, scaffolding and hydraulic lifts, their applications, limitations and procedures for use.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with ladders, scaffolding and hydraulic lifts.	11%
2. Identify hazards and describe safe work practices pertaining to ladders, scaffolding and hydraulic lifts.	11%
3. Identify codes and regulations pertaining to ladders, scaffolding and hydraulic lifts.	11%
4. Identify types of ladders, scaffolding and hydraulic lifts and describe their characteristics and applications.	11%
5. Describe the procedures used to erect and dismantle ladders and scaffolding.	10%
6. Describe the procedures used to inspect, maintain and store ladders, scaffolding and hydraulic lifts.	10%
7. Demonstrate procedures for use of ladders, scaffolding and hydraulic lifts, their applications, and limitations.	36%

Plumber

Subunit: A2d Fuel Brazing and Cutting

Level: One

Duration: 25 hours

Theory: 5 hours

Practical: 20 hours

Overview:

Plumbers require a good, practical grasp of fuel brazing and cutting. This unit of instruction is the program gateway to further fuel brazing and cutting skills.

Objectives and Content:

**Percent of
Unit Mark (%)**

- | | |
|---|----|
| 1. Define terminology associated with fuel brazing and cutting. | 6% |
| 2. Identify hazards and describe safe work practices pertaining to fuel brazing and cutting.
a. Personal
b. Workplace | 6% |
| 3. Interpret codes and regulations pertaining to fuel brazing and cutting. | 6% |
| 4. Identify types of fuel brazing and cutting equipment and describe their components and applications.
a. Air-propane
b. Air-acetylene
c. Oxy-propane
d. Oxy-acetylene | 6% |
| 5. Identify fuel brazing and cutting equipment accessories and describe their applications and procedures for use. | 6% |
| 6. Describe the procedures used to set-up, adjust and shut-down fuel cutting and brazing equipment. | 6% |
| 7. Describe the procedures used to cut materials using fuel cutting equipment. | 6% |
| 8. Identify cutting faults and describe the procedures to prevent and correct them. | 6% |
| 9. Describe the procedures used to braze materials using fuel brazing equipment. | 6% |
| 10. Describe the procedures used to inspect and maintain fuel cutting and brazing equipment. | 6% |

11. Describe the procedures used to transport and store fuel cutting and brazing equipment. **10%**
12. Demonstrate the procedures used to cut and braze materials using fuel brazing and cutting equipment. **30%**

Plumber

UNIT: A3 ROUTINE TRADE ACTIVITIES

Subunit: A3a Routine Trade Activities I

Level: One

Duration: 7 hours

Theory: 0 hours

Practical: 7 hours

Overview:

The unit's purpose is to provide Level 1 information about routine trade practices in the Plumber trade.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Perform Piping System Layout.	20%
2. Calculate pipe lengths.	20%
3. Calculate piping offsets.	20%
4. Install piping supports	20%
5. Coordinate excavation and backfilling of trenches.	20%

Plumber

Subunit: A3b Learning About Work

Level: One

Duration: 5 hours

Theory: 5 hours

Practical: 0 hours

Overview:

One sign that an apprentice has become competent in a task or technique is to be asked to share this knowledge. Jobsite skills-exchange has long been fundamental to trade-learning. Even trade veterans rely on peers to refine their knowledge and skill. The opportunity to benefit from this process, however, is shaped by complex factors that include jobsite 'politics' and industrial/construction deadlines. As adult trade-learners, apprentices at all levels of training must use their observational, listening and interpersonal skills to benefit from the JP's knowledge and experience. This requires understanding the trade's dynamics, as well as the roles and responsibilities which order workplace/jobsite work-life.

This unit profiles the trade's structure and scope as determined by the Apprenticeship and Certification Act, regulations, Provincial Advisory Committees and the National/Provincial Occupational Analysis from which the training standards are derived (core tasks and skill requirements), as well as its job-ladders and long-term career options and social competencies. This includes information about major areas of working knowledge, activities and interactions at work, and expansive and restrictive workplaces, stressing their application to apprenticeship on-the-job training.

A sound grasp of the roles, workplace relationships, and possibilities introduced in this unit are part of 'learning to learn' in Manitoba's apprenticeship system. Senior apprentices are later offered information about learning to *teach* in this system – a central and time-honored foundation of Trades journeywork.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe structure and scope of the Plumber trade.	50%
a. The Apprenticeship and Certification Act <ul style="list-style-type: none">• Apprenticeship and Certification Board and Provincial Advisory Committees• General and specific trade regulation• Policies regarding attendance, evaluation procedures, conduct and progression requirements (Apprenticeship Manitoba, Training provider)	
b. Uses of the Red Seal Occupational Standards (RSOS). <ul style="list-style-type: none">• Technical training in-school curriculum• On-the-job record book of hours (Manitoba blue book)• Examinations (level placement tests, final certification examinations)	
c. Opportunities and future career options <ul style="list-style-type: none">• Generalists and specialists. The move toward specialization is well known to modern tradespeople. Some prefer to specialize and others want to do it all. Supervisory positions require a broad scope.• Lead hands and other immediate supervisors. Apprentices need to know how to become a lead-hand as much as they need to know the benefits and pit-falls of leadership between management and shop floor workers.	

- Geographic mobility. What does it mean to a construction/industrial worker to have to travel to find work? Are there more opportunities if they do? What are they? What are the draw-backs and benefits to being away from home for several weeks at a time?
- Job hierarchies and innovations. What trade specific special training opportunities are available in your trade? Is there travel involved? Is there an opportunity to move up the ladder on a work crew as opposed to staying in the shop?

2. Describe two levels of workplace competency. 40%

- Job competencies related to workplace culture
 - Knowledge of workplace equipment and materials
 - Skills and techniques
- Social competencies related to workplace culture
 - Frame of reference for evaluation workplace events
 - Language of work
 - Workplace belief systems
 - Rules and meanings
 - Multiculturalism and equity in the workplace

3. Describe accommodation for apprentices with disabilities. 10%

- Technical training
 - Requirements
 - Roles and responsibilities
 - Services and information required by persons with disabilities
- On-the-job
 - Requirements
 - Roles and responsibilities
 - Services and information required by persons with disabilities

Plumber

Subunit: A3c Drawings

Level: One

Duration: 25 hours

Theory: 10 hours

Practical: 15 hours

Overview:

Plumbers require a good, practical grasp of project design basics, as well as the ability to use technical drawings for a variety of trade tasks. Technical drawing is medium for exploring built structures in detail, as well as a tool for developing new ideas and solving problems. This unit of instruction is the program gateway to further learning about construction-project design variations, technical drawing, and blueprint-reading skills. The unit also offers Plumber apprentices a chance to apply some of the techniques, procedures, and conventions used in professional drafting and design. Elsewhere in technical training, apprentices will refine their skills in the use of trade documents through hands-on work with a variety of construction-project blueprints.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with drawings and sketches.	6%
2. Describe metric and imperial systems of measurement and the procedures used to perform conversions.	6%
3. Identify the types of drawings and describe their applications.	6%
a. Civil/Site	
b. Architectural	
c. Mechanical	
d. Structural	
e. Electrical	
f. Shop drawings	
g. Sketches	
h. Schematics/flow diagrams	
4. Identify types of symbols and describe their characteristics and applications.	6%
5. Identify construction/project related documents and describe their applications.	6%
a. Change orders	
b. Addendums	
c. As-builts	
d. Specifications	
6. Identify drawing projections and views and describe their applications.	6%
a. Projections (orthographic, oblique, isometric)	

- b. Views (plan, section, detail, elevation, cross section)
- 7. **Describe the use of scales.** **6%**
- 8. **Describe the procedures used for the care, handling and storage of drawings.** **6%**
- 9. **Describe plumber and gas layout drawings.** **4%**
- 10. **Interpret information on drawings.** **12%**
 - a. Lines
 - b. Legend
 - c. Symbols and abbreviations
 - d. Notes and specifications
 - e. Schedules
 - f. Scales
- 11. **Demonstrate the procedures used for the care, handling and storage of drawings.** **12%**
- 12. **Demonstrate basic sketching techniques.** **12%**
- 13. **Demonstrate basic plumber and gas layout drawings.** **12%**

Plumber

UNIT: A4 COMMUNICATION TECHNIQUES

Subunit: A4a Intro to Computers

Level: One

Duration: 5 hours

Theory: 0 hours

Practical: 5 hours

Overview:

Plumbers require a good, practical grasp of computers. This unit of instruction is the program gateway to further learning about communication techniques.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Explain requirements for loading software and for file management.	25%
2. Explain internet access software.	25%
3. Load software and use proper file management techniques.	25%
4. Use internet access software.	25%

Plumber

UNIT: A5 PIPE PREPARATION

Subunit: A5a Materials and Pipe, Tube and Tubing, and Fundamentals Theory

Level: One

Duration: 5 hours

Theory: 5 hours

Practical: 0 hours

Overview:

Upon completion of this unit of instruction apprentices will be able to show understanding of materials, pipe, tube and tubing, and fundamentals theory related to plumber situations.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with pipe, tube and tubing.	12%
2. Identify types of pipe, tube and tubing systems.	12%
a. Water supply	
b. Sanitary drainage, waste and vent	
c. Storm drainage	
d. Heating	
e. Sprinkler	
f. Gas	
g. Process and power generating	
h. Refrigeration	
i. Compressed air	
3. Identify types of pipe, tube and tubing and describe their applications.	11%
a. Steel	
b. Plastic	
c. Copper	
d. Brass	
e. Aluminum	
f. Cast iron: ductile, duriron and grey.	
g. Historic	
h. Glass	
i. Asbestos-cement	
j. Reinforced concrete	
k. Stainless steel	
l. Fibreglass	

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| 4. Explain forces that impact on pipe, tube and tubing systems and perform associated calculations. | 11% |
| a. Thermal expansion | |
| b. Thermal contraction | |
| c. Weight | |
| d. Friction loss | |
| e. Turbulence | |
| f. Galvanic action | |
| g. Environmental | |
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| 5. Perform calculations to determine pipe, tube and tubing measurements. | 27% |
| a. Run and branch | |
| b. Fitting allowances | |
| c. Offsets including travel, rise and run, rolling, equal spread, unequal spread | |
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| 6. Demonstrate pipe, tube and tubing applications. | 27% |

Plumber

Subunit: A5a Plastic Piping

Level: One

Duration: 5 hours

Theory: 5 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of plastic piping. After completing this unit, apprentices will be able to learn, amongst other skills, the following objectives.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with plastic piping.	3%
2. Identify hazards and describe safe work practices pertaining to plastic piping.	3%
3. Interpret codes and regulations pertaining to plastic piping.	3%
4. Interpret information pertaining to plastic piping found on drawings and specifications.	3%
5. Describe the identification systems and methods for plastic piping.	3%
6. Identify tools and equipment relating to plastic piping and describe their applications and procedures for use.	3%
7. Identify plastic piping systems and describe their characteristics and applications.	3%
8. Identify types of plastic piping and describe their properties and characteristics.	3%
a. Thermoset	
b. Thermoplastic	
9. Identify fittings used with plastic piping and describe their purpose and applications.	3%
10. Identify plastic piping accessories and describe their purpose and applications.	3%
a. Supports	
b. Hangers	
c. Sleeves	
11. Explain the systems of measurement for plastic piping.	3%

- a. Dimension
 - b. Length
 - c. Wall thickness/schedule
- 12. Describe the procedures used to measure plastic piping. 3%**
- 13. Perform calculations to determine plastic piping measurements. 3%**
- a. Run and branch
 - b. Fitting allowances
 - c. Offsets
- 14. Describe the procedures used to inspect plastic piping. 3%**
- 15. Identify the methods used to cut plastic piping and describe their associated procedures. 3%**
- 16. Identify the methods used to join plastic piping and describe their associated procedures. 3%**
- a. Heat fusion welding
 - b. Threading
 - c. Solvent welding
 - d. Compression fittings
 - e. Mechanical joints
- 17. Describe the procedures used to install fittings and accessories for plastic piping. 3%**
- 18. Demonstrate the procedures used to measure, cut and join plastic piping. 49%**

Plumber

Subunit: A5a Copper Tube and Tubing

Level: One

Duration: 5 hours

Theory: 5 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of copper tube and tubing.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with copper tube and tubing.	3%
2. Identify hazards and describe safe work practices pertaining to copper tube and tubing.	3%
3. Interpret codes and regulations pertaining to copper tube and tubing.	3%
4. Interpret information pertaining to copper tube and tubing found on drawings and specifications.	3%
5. Describe the identification systems and methods for copper tube and tubing.	3%
6. Identify tools and equipment relating to copper tube and tubing and describe their applications and procedures for use.	3%
7. Identify copper tube and tubing systems and describe their characteristics and applications.	3%
8. Identify types of copper tube and tubing and describe their properties and characteristics.	3%
9. Identify fittings used with copper tube and tubing and describe their purpose and applications.	3%
10. Identify copper tube and tubing accessories and describe their purpose and applications.	3%
a. Supports	
b. Hangers	
c. Sleeves	
11. Explain the systems of measurement for copper tube and tubing.	3%

- a. Dimension
 - b. Length
 - c. Wall thickness/schedule
- 12. Describe the procedures used to measure copper tube and tubing. 3%**
- 13. Perform calculations to determine copper tube and tubing measurements. 3%**
- a. Run and branch
 - b. Fitting allowances
 - c. Offsets
- 14. Describe the procedures used to inspect copper tube and tubing. 3%**
- 15. Identify the methods used to cut copper tube and tubing and describe their associated procedures. 3%**
- 16. Describe the procedures used to bend copper tube and tubing. 3%**
- 17. Identify the methods used to join copper tube and tubing and describe their associated procedures. 3%**
- a. Brazing
 - b. Soldering
 - c. Flaring
 - d. Roll groove
 - e. Compression fittings
 - f. Mechanical joints
- 18. Describe the procedures used to install fittings and accessories for copper tube and tubing. 3%**
- 19. Demonstrate the procedures used to measure, cut and join copper tube and tubing. 46%**

Plumber

Subunit: A5a Steel Piping

Level: One

Duration: 5 hours

Theory: 5 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of steel piping.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with steel piping.	3%
2. Identify hazards and describe safe work practices pertaining to steel piping.	3%
3. Interpret codes and regulations pertaining to steel piping.	3%
4. Interpret information pertaining to steel piping found on drawings and specifications.	3%
5. Describe the identification systems and methods for steel piping.	3%
6. Identify tools and equipment relating to steel piping and describe their applications and procedures for use.	3%
7. Identify steel piping systems and describe their characteristics and applications.	3%
8. Identify types of steel piping and describe their properties and characteristics. a. Carbon steel b. Galvanized c. Stainless steel	3%
9. Identify fittings used with steel piping and describe their purpose and applications.	3%
10. Identify steel piping accessories and describe their purpose and applications. a. Supports b. Hangers c. Sleeves	3%

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| 11. Explain the systems of measurement for steel piping. | 3% |
| a. Dimension | |
| b. Length | |
| c. Wall thickness/schedule | |
| d. Grades. | |
| 12. Describe the procedures used to measure steel piping. | 3% |
| 13. Perform calculations to determine steel piping measurements. | 3% |
| a. Run and branch | |
| b. Fitting allowances | |
| c. Offsets | |
| 14. Describe the procedures used to inspect steel piping. | 3% |
| a. Quality control requirements | |
| 15. Identify the methods used to cut steel piping and describe their associated procedures. | 3% |
| 16. Identify the methods used to join steel piping and describe their associated procedures. | 3% |
| a. Threading and grooving | |
| b. Welding | |
| c. Flanging | |
| d. Mechanical joints | |
| e. Roll groove | |
| 17. Describe the procedures used to install fittings and accessories for steel piping. | 3% |
| 18. Demonstrate the procedures used to measure, cut and join steel piping. | 49% |

Plumber

Subunit: A5a Cast Iron Piping

Level: One

Duration: 3 hours

Theory: 3 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of cast iron piping.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with cast iron.	3%
2. Identify hazards and describe safe work practices pertaining to cast iron.	3%
3. Interpret codes and regulations pertaining to cast iron.	3%
4. Interpret information pertaining to cast iron found on drawings and specifications.	3%
5. Describe the identification systems and methods for cast iron.	3%
6. Identify tools and equipment relating to cast iron and describe their applications and procedures for use.	3%
7. Identify cast iron systems and describe their characteristics and applications.	3%
8. Identify types of cast iron and describe their properties and characteristics.	3%
a. Soil	
b. Ductile	
c. Duriron	
9. Identify fittings used with cast iron and describe their purpose and applications.	3%
10. Identify cast iron accessories and describe their purpose and applications.	3%
a. Supports	
b. Hangers	
c. Sleeves	
11. Explain the systems of measurement for cast iron.	3%
a. Dimension	

- b. Length
 - c. Wall thickness/schedule
- 12. Describe the procedures used to measure cast iron. 3%**
- 13. Perform calculations to determine cast iron measurements. 3%**
- a. Run and branch
 - b. Fitting allowances
 - c. Offsets
- 14. Describe the procedures used to inspect cast iron. 3%**
- 15. Identify the methods used to cut cast iron and describe their associated procedures. 3%**
- 16. Identify the methods used to join cast iron and describe their associated procedures. 3%**
- a. Mechanical joints
 - b. Hub and spigot
- 17. Describe the procedures used to install fittings and accessories for cast iron. 3%**
- 18. Demonstrate the procedures used to measure, cut and join cast iron. 49%**

Plumber

Subunit: A5a Glass Piping

Level: One

Duration: 3 hours

Theory: 3 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of glass piping.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with glass piping.	6%
2. Identify hazards and describe safe work practices pertaining to glass piping.	6%
3. Interpret codes and regulations pertaining to glass piping.	6%
4. Interpret information pertaining to glass piping found on drawings and specifications.	6%
5. Describe the identification systems and methods for glass piping.	6%
6. Identify tools and equipment relating to glass piping and describe their applications and procedures for use.	6%
7. Identify glass piping systems and describe their characteristics and applications.	6%
8. Identify types of glass piping and describe their properties and characteristics. a. Soil b. Ductile c. Duriron	6%
9. Identify fittings used with glass piping and describe their purpose and applications.	6%
10. Identify glass piping accessories and describe their purpose and applications. a. Supports b. Hangers c. Sleeves	6%

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|---|-----------|
| 11. Explain the systems of measurement for glass piping. | 6% |
| a. Dimension | |
| b. Length | |
| c. Wall thickness/schedule | |
| 12. Describe the procedures used to measure glass piping. | 6% |
| 13. Perform calculations to determine glass piping measurements. | 6% |
| a. Run and branch | |
| b. Fitting allowances | |
| c. Offsets | |
| 14. Describe the procedures used to inspect glass piping. | 6% |
| 15. Identify the methods used to cut glass piping and describe their associated procedures. | 6% |
| 16. Identify the methods used to join glass piping and describe their associated procedures. | 5% |
| a. Bead end to bead end | |
| b. Bead end to plain end | |
| c. Plain end to plain end | |
| 17. Describe the procedures used to install fittings and accessories for glass piping. | 5% |

Plumber

Subunit: A5a Asbestos Cement Piping

Level: One

Duration: 1 hour

Theory: 1 hour

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of asbestos cement piping.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with asbestos-cement.	5%
2. Identify hazards and describe safe work practices pertaining to asbestos-cement piping.	5%
3. Interpret codes and regulations pertaining to asbestos-cement piping.	5%
4. Interpret information pertaining to asbestos-cement piping found on drawings and specifications.	5%
5. Describe the identification systems and methods for asbestos-cement piping.	5%
6. Identify tools and equipment relating to asbestos-cement piping and describe their applications and procedures for use.	5%
7. Identify asbestos-cement piping systems and describe their characteristics and applications.	5%
8. Identify types of asbestos-cement piping and describe their properties and characteristics.	5%
9. Identify fittings used with asbestos-cement piping and describe their purpose and applications.	5%
10. Identify asbestos-cement piping accessories and describe their purpose and applications. a. Supports b. Hangers c. Sleeves	5%
11. Explain the systems of measurement for asbestos-cement piping.	5%

- a. Dimension
 - b. Length
 - c. Wall thickness/schedule
- 12. Describe the procedures used to measure asbestos-cement piping. 5%**
- 13. Perform calculations to determine asbestos-cement piping measurements. 5%**
- a. Run and branch
 - b. Fitting allowances
 - c. Offsets
- 14. Describe the procedures used to inspect asbestos-cement piping. 5%**
- 15. Identify the methods used to cut asbestos-cement piping and describe their associated procedures. 5%**
- 16. Identify the methods used to join asbestos-cement piping and describe their associated procedures. 5%**
- a. Mechanical joints
 - b. Hub and spigot
- 17. Describe the procedures used to install fittings and accessories for asbestos-cement piping. 5%**
- 18. Describe the procedures used to measure asbestos-cement piping. 5%**
- 19. Describe the procedures used to cut asbestos-cement piping. 5%**
- 20. Describe the procedures used to join asbestos-cement piping. 5%**

Plumber

UNIT: A6 TUBE, TUBING, PIPE (Join)

Subunit: A6a Pipe, Tube and Tubing, and Fundamentals Practical

Level: One

Duration: 5 hours

Theory: 0 hours

Practical: 5 hours

Overview:

Upon completion of this unit of instruction apprentices will be able to demonstrate pipe, tube and tubing, and fundamentals related to practical plumber situations.

Objectives and Content:

Percent of Unit Mark (%)

1. Demonstrate pipe, tube and tubing applications.

100%

Plumber

Subunit: A6a Plastic Piping

Level: One

Duration: 5 hours

Theory: 0 hours

Practical: 5 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with practical knowledge and understanding of plastic piping. After completing this unit, apprentices will be able to learn, amongst other skills, the following objectives.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Demonstrate the procedures used to measure, cut and join plastic piping.	100%

Plumber

Subunit: A6a Copper Tube and Tubing

Level: One

Duration: 5 hours

Theory: 0 hours

Practical: 5 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the practical knowledge and understanding of copper tube and tubing.

Objectives and Content:

Percent of Unit Mark (%)

1. **Demonstrate the procedures used to measure, cut and join copper tube and tubing.**

100%

Plumber

Subunit: A6a Steel Piping

Level: One

Duration: 5 hours

Theory: 0 hours

Practical: 5 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the practical knowledge and understanding of steel piping.

Objectives and Content:

Percent of Unit Mark (%)

1. Demonstrate the procedures used to measure, cut and join steel piping.

100%

Plumber

Subunit: A6a Cast Iron Piping

Level: One

Duration: 4 hours

Theory: 0 hours

Practical: 4 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the practical knowledge and understanding of cast iron piping.

Objectives and Content:

Percent of Unit Mark (%)

1. Demonstrate the procedures used to measure, cut and join cast iron.

100%

Plumber

Subunit: A6a Glass Piping

Level: One

Duration: 5 hours

Theory: 0 hours

Practical: 5 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the practical knowledge and understanding of glass piping.

Objectives and Content:

Percent of Unit Mark (%)

1. **The apprentice-learner will perform procedures used to install fittings and accessories for glass piping on-the-job.**

100%

Plumber

UNIT: A7 INTERIOR DRAINAGE, WASTE AND VENT SYSTEMS I

Subunit: A7a Residential Sanitary Drainage, Waste and Vent Systems I

Level: One

Duration: 70 hours

Theory: 50 hours

Practical: 20 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of a residential sanitary drainage system.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with residential sanitary drainage.	5%
2. Identify hazards and describe safe work practices pertaining to residential sanitary drainage system.	5%
3. Interpret codes and regulations pertaining to residential sanitary drainage systems. a. Dimension b. Length	20%
4. Interpret information pertaining to residential sanitary drainage systems found on drawings and specifications.	5%
5. Identify tools and equipment relating to residential sanitary drainage systems and describe their applications and procedures for use.	5%
6. Identify the methods of back flow protection used in residential sanitary drainage systems. a. Back water valves b. Gate valves	5%
7. Identify types of residential sanitary drainage systems and describe their properties and characteristics.	5%
8. Identify residential sanitary drainage system components and describe their purpose and applications. a. Piping b. Fixtures	15%

- c. Drains
- d. Traps
- e. Cleanouts
- f. Joints and connections
- g. Backwater valves
- h. Fire stopping
- i. Sewage sumps
- j. Macerating toilet system
- k. Expansion joints

9. Identify the factors to consider when sizing residential sanitary drainage system components. 15%

- a. Hydraulic load
- b. Code requirements
- c. Future loads when sizing piping close to or at next size up on the chart.

10. Demonstrate residential, sanitary, drainage and venting systems. 20%

Plumber

UNIT: A8 MATHEMATICS AND SCIENCE I

Subunit A8a Mathematics and Science I

Level: One

Duration: 50 hours

Theory: 50 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber Apprentice with the knowledge of the imperial and metric systems, formulas and formula transposition, areas and volumes, elevations and grades, densities and pressures and offsets and percentages. With respect to sciences, you will learn about metals and alloys.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify and describe metric (S.I.) and imperial weights and measures, decimals and fractions, terms prefixes and relationships.	5%
2. Identify and describe formulas and formula transposition.	10%
3. Identify and describe the square root, perimeter and circumference.	5%
4. Identify and describe areas of rectangles, circles, triangles, trapezoids and surface areas.	5%
5. Identify and describe volumes of rectangular, cylindrical and irregular objects.	10%
6. Identify and describe Pythagoras's theorem.	5%
7. Identify and describe special right angle triangles.	10%
a. 45°	
b. 30° - 60°	
c. 22-1/2°	
8. Identify and describe grade.	10%
a. Simple	
b. Percentage	
c. cm/m	
d. in/ft	

- | | |
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| 9. Identify and describe density, relative density and pressure in liquids and gases (kpa) as well as Charle's and Boyle's gas laws. | 10% |
| 10. Identify and describe parallel offsets. | 10% |
| 11. Identify and describe simple percentage, mark-up, net profit, gross profit. | 10% |
| 12. Describe with respect to sciences metals and alloys. | 10% |
- a. Define metals, alloys, conduction, melting point, specific heat, linear expansion, ductility, shear strength, tensile strength, compressive strength, working (safe) strength, malleable, ferrous, and non-ferrous, anneal, harden, temper.
 - b. Identify the most common metals
 - c. Identify the most common alloys
 - d. Define cost effectiveness
 - e. Identify and describe properties of metals
 - f. Identify and describe problems in linear expansion
 - g. Identify and describe bi-metal strip and its uses
 - h. Identify and describe various solder
 - i. Identify and describe wrought iron
 - j. Identify and describe corrosion (oxidation): chemical and electrochemical
 - k. Identify and describe methods in preventing corrosion
 - l. Identify and describe galvanic series
 - m. Identify and describe factors aiding corrosion
 - n. Identify and describe corrosion resistant materials

Plumber

UNIT: A9 INTRO TO BASIC ELECTRICITY

Subunit A9a Intro to Basic Electricity

Level: One

Duration: 35 hours

Theory: 25 hours

Practical: 10 hours

Overview:

Plumbers require a good, practical grasp of electricity, science and computers. This unit of instruction is the program gateway to further learning about these topics.

Objectives and Content:

**Percent of
Unit Mark (%)**

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|--|-----|
| 1. Define terminology associated with electricity as related to the trade. | 5% |
| 2. Identify hazards and describe safe work practices pertaining to electricity. | 5% |
| 3. Interpret electrical related information found on drawings and specifications. | 15% |
| 4. Identify tools and equipment used to test electrical circuits and describe their applications and procedures for use. | 15% |
| 5. Explain Ohm's law and describe its applications and associated calculations. | 10% |
| 6. Identify types of current and describe their characteristics and applications. | 10% |
| 7. Identify types of electrical circuits and describe their characteristics, operation and applications. | 20% |
| a. Identify and explain electron theory | |
| b. Identify and explain basic series circuits | |
| c. Identify and explain parallel circuit | |
| d. Identify and explain mill voltage | |
| e. Identify and explain 24 volt circuit | |
| f. Identify and explain 110 volt circuit | |
| g. Identify and explain open and closed circuits (controls) | |
| h. Identify and explain relay circuit | |
| i. Identify and explain voltage drops in circuit | |
| 8. Identify and demonstrate types of electrical equipment and components and describe their characteristics, operation and applications. | 20% |
| a. Identify and explain thermopile and thermocouple | |

- b. Identify and explain transformer
- c. Identify and explain thermostats
- d. Identify and explain safety controls
- e. Identify and explain connectors and connections
- f. Identify and explain wire sizes and types
- g. Identify and explain meters
- h. Identify and explain Code requirements
- i. Identify and explain motors

Plumber

Unit: A10 GAS CODE I

Subunit: A10a Gas Code I

Level: One

Duration: 20 hours

Theory: 20 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of gas code. After completing this unit, apprentices will be able to learn the following objectives and content, amongst other skills, to:

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with gas code.	10%
2. Identify hazards and describe safe work practices pertaining to gas code	10%
3. Interpret codes and regulations pertaining to gas.	10%
4. Interpret information pertaining to gas found on drawings and specifications..	10%
5. Describe the identification systems and methods for gas.	10%
6. Identify tools and equipment relating to gas and describe their applications and procedures for use.	10%
7. Identify gas systems and describe their characteristics and applications..	10%
8. Identify types of gas and describe their properties and characteristics.	10%
9. Explain the systems of measurement for gas.	10%
10. Describe the procedures used to install fittings and accessories for steel piping.	10%
