Plumber
Level 1
Plumber

Unit: A1 Introduction To Your Apprenticeship

Level: One

Duration: 7 hours
  Theory: 7 hours
  Practical: 0 hours

Overview:

Jobsite learning and teaching have long been fundamental to Plumber trade-practice, including its safety, health, and environmental implications. The chance to gain maximum benefit from workplace trade learning can be shaped by such complex factors as production schedules and jobsite politics. As adult trade-learners, Plumber apprentices at all levels of skill-development are encouraged to use their eyes, ears, prior knowledge, and interpersonal skills to encourage journeypersons to teach as well as to supervise them. This requires understanding the trade’s dynamics, including the roles and responsibilities that order jobsite activity. Unit content outlines the trade’s skill-requirements and long-term career possibilities. It includes suggestions about trade-related learning styles strategies. It also introduces the concept of skills stewardship, stressing the obligations that apprentices incur in learning from journeypersons to ‘pay it forward’ by assisting other newcomers who will follow them into the trade. The unit’s purpose is to provide this essential information about learning to learn as a Manitoba Plumber apprentice. Elsewhere in technical training, senior apprentices explore the importance of learning to teach in trade workplaces – a central function of Plumber journeywork.

Objectives and Content:

1. Describe the structure and scope of the trade.
   a. Historical background, including apprentice experiences
   b. Structure/scope of the trade
      • International and national characteristics
      • Important features of practicing the trade in Manitoba
      • Trade and construction industry organizations
      • Generalists and specialists
      • Lead hands and other immediate supervisors
      • Geographic mobility
      • Job hierarchies and innovations

2. Describe the Manitoba Plumber Apprenticeship Program.
   a. Concept and significance of skills stewardship
      • To the trade
      • To apprentices
      • To journeypersons
      • To employers

Percent of Objectives and Content: Unit Mark (%)

<table>
<thead>
<tr>
<th>Objective</th>
<th>Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe the structure and scope of the trade.</td>
<td>30%</td>
</tr>
<tr>
<td>2. Describe the Manitoba Plumber Apprenticeship Program.</td>
<td>40%</td>
</tr>
</tbody>
</table>
b. Practical Training: on-site component of program
   • Roles/responsibilities of employer and journeyperson(s)
   • Roles/responsibilities of Apprenticeship Training Coordinator
   • Roles/responsibilities of apprentice, including record-keeping re: job experience

c. Technical Training: off-site component of program
   • Roles/responsibilities of instructors (including Related'-area faculty)
   • Roles/responsibilities of apprentices

d. Attendance requirements

e. Progression requirements

f. Reporting of grades

g. Other (as may be specified by instructor)

3. **Describe special opportunities and challenges re: Plumber training.**  
   30%
   a. Adapting personal learning goals to program contexts
      • Principles of adult learning (including importance of self-direction)
      • Description/recognition of learning and teaching styles
      • Significance of work culture and interpersonal skills re: trade-learning
      • Integrating Technical Training and Practical Training content
      • Possibilities and perils of peer learning
      • Budgeting and other necessary personal arrangements
      • Identifying sources of support (e.g., upgrading trade-related math skills)

   b. On-site learning challenges and opportunities
      • Significance of jobsite supervision roles and teaching styles (e.g., journey-level skills-coach vs. mentor)
      • Communication with journeypersons and employers
      • Coverage of prescribed tasks/subtasks that define the scope of trade, and the content of the certification exam administered to apprentices who are completing their program
      • Getting help and fixing mistakes
      • Maintaining personal record of trade-learning challenges/achievements (e.g., a learning journal, and/or a personal training plan, if possible, discussed with employers and others supporting the apprenticeship journey to certification)

   c. In-school opportunities/challenges
      • Personal arrangements that support progress in technical training
      • “Baggage-handling” – self-assessing potential impacts of previous experiences (favourable/unfavourable) on current learning; availability of supports
      • Techniques for note-taking, record-keeping, and review
      • Relations with instructors (including ‘Related’-area faculty)
      • College resources (library, support services, etc.)

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Gasfitter B

Unit: A2 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 Insulator apprenticeship training both in school and on-the-job. Unit content is supplemented throughout technical training by trade-specific information about Insulator 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:

1. Identify safety and health requirements. n/a
   a. Overview of The Workplace Safety and Health Act
      • Rights and responsibilities of employees under the Act
      • Rights and responsibilities of employers under the Act
      • Rights and responsibilities of supervisors under the Act
   b. Fourteen (14) regulations
   c. Codes of practice
   d. Guidelines
   e. Right to refuse
      • Explanation of right to refuse process
      • Rights and responsibilities of employees
      • Rights and responsibilities of employers
      • Rights and responsibilities of supervisors under the Act

2. Identify personal protective equipment (PPE) and procedures. n/a
   a. Employer and employee responsibilities as related to personal protective equipment.
   b. Standards: ANSI (U.S.A. standards), etc.
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 regulations pertinent to care and cleanliness in the working area. n/a

4. Identify the regulations relevant to the safe use of chemicals. n/a

5. Identify regulations governing the use of scaffolding. n/a

6. Identify regulations governing the use of ladders and related equipment. n/a

7. 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

8. Hazard recognition and control. n/a

a. Safe work practices

b. Basic risk assessment

c. Injury prevention and control measures

d. Identification of hazards involved in pneumatic tool use and explanation of how to guard against them

e. Refrigerants

f. Toxic chemical (non-refrigerant)

g. High pressure fluids

9. 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)

10. **Identify first aid/CPR.**
   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 first aid kit?
   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.)
      - What is it?
      - 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)

11. **Identify the safety requirements as they apply to WHMIS with emphasis on:**
   a. WHMIS is a system
   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 labelling 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 (MSDS)

12. **Identifying and controlling hazards.**
   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

13. **Describe the safe storage of stock equipment in service vehicles.**

14. **Discuss transportation of dangerous goods.**

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Plumber

Unit: A3 Hoisting and Lifting and Rigging

Level: One
Duration: 30 hours
Theory: 20 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.
- Describe and demonstrate calculations required when performing hoisting and lifting operations.

Objectives and Content:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define terminology associated with hoisting, lifting and rigging.</td>
<td>4.7%</td>
</tr>
<tr>
<td>2. Identify hazards and describe safe work practices pertaining to hoisting, lifting and rigging.</td>
<td>4.7%</td>
</tr>
<tr>
<td>3. Identify codes and regulations pertaining to hoisting, lifting and rigging.</td>
<td>4.7%</td>
</tr>
<tr>
<td>4. Identify types of rigging equipment and accessories and describe their limitations, applications and procedures for use.</td>
<td>4.7%</td>
</tr>
<tr>
<td>5. Identify types of hoisting and lifting equipment and accessories and describe their applications and procedures for use.</td>
<td>4.7%</td>
</tr>
<tr>
<td>6. Describe the procedures used to inspect, maintain and store hoisting, lifting and rigging equipment.</td>
<td>4.7%</td>
</tr>
<tr>
<td>7. Identify types of knots, hitches and bends and describe their applications and the procedures used to tie them.</td>
<td>4.7%</td>
</tr>
<tr>
<td>8. Describe the procedures used to rig material/equipment for lifting.</td>
<td>4.7%</td>
</tr>
<tr>
<td>9. Describe the procedures used to ensure the work area is safe for lifting.</td>
<td>4.7%</td>
</tr>
<tr>
<td>a. supervision of lift</td>
<td></td>
</tr>
<tr>
<td>b. securing work area</td>
<td></td>
</tr>
<tr>
<td>c. communication</td>
<td></td>
</tr>
<tr>
<td>10. Identify and describe procedures used to communicate during hoisting, lifting and rigging operations.</td>
<td>4.7%</td>
</tr>
</tbody>
</table>
a. hand signals
b. electronic communications
c. audible/visual

11. Explain sling angle when preparing for hoisting and lifting operations. 4.7%

12. Identify the factors to consider when selecting rigging equipment.
   a. load characteristics
   b. environment
   c. safety factor 4.7%

13. Describe the procedures used for attaching rigging equipment to the load. 4.7%

14. Describe the procedures used to perform a lift.
   a. load determination
   b. communication methods
   c. pre-lift checks
   d. placement of load
   e. post-lift inspection 4.9%

15. Demonstrate the procedures used to perform hoisting and lifting operations. 17%

16. Demonstrate calculations required when performing hoisting and lifting operations. 17%
### Plumber

**Unit:** A4 Tools and Equipment  
**Level:** One  
**Duration:** 14 hours  
  - Theory: 14 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 gasfitting-project settings. The principles and practical methods introduced here are pursued in greater depth and complexity throughout technical training.

<table>
<thead>
<tr>
<th>Objectives and Content</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe use, selection, and maintenance of safety gear and personal protective equipment by plumbers.</td>
<td>5%</td>
</tr>
<tr>
<td>2. Demonstrate basic techniques for use, selection, and maintenance of safety gear and personal protective equipment by plumbers.</td>
<td>5%</td>
</tr>
<tr>
<td>3. Describe use, selection, and maintenance of hand tools by plumbers.</td>
<td>9%</td>
</tr>
<tr>
<td>4. Demonstrate basic techniques for hand-tool selection, use, and maintenance.</td>
<td>9%</td>
</tr>
<tr>
<td>5. Describe the selection, use, and maintenance of power tools/equipment.</td>
<td>5%</td>
</tr>
<tr>
<td>6. Demonstrate basic techniques for the selection, use, and maintenance of power tools/equipment.</td>
<td>9%</td>
</tr>
<tr>
<td>7. Describe the selection, use, and maintenance of technical instruments, and testers, and other tools and equipment as specified by the instructor.</td>
<td>5%</td>
</tr>
<tr>
<td>8. Demonstrate basic techniques for the selection, use, and maintenance of technical instruments, testers, and other tools and equipment as specified by the instructor.</td>
<td>10%</td>
</tr>
<tr>
<td>9. Describe the selection, use, and maintenance of soldering tools and equipment.</td>
<td>10%</td>
</tr>
<tr>
<td>10. Demonstrate basic techniques for selection, use, and maintenance of soldering tools and equipment.</td>
<td>11%</td>
</tr>
<tr>
<td>11. Describe the selection, use, and maintenance of steel welding tools and equipment.</td>
<td>11%</td>
</tr>
<tr>
<td>12. Demonstrate basic techniques for selection, use, and maintenance of steel welding.</td>
<td>11%</td>
</tr>
</tbody>
</table>
Plumber

Unit: A5 Mathematics I

Level: One
Duration: 30 hours
Theory: 30 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.

Objectives and Content:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify and describe metric (s.i.) and imperial weights and measures, decimals and fractions, terms prefixes and relationships.</td>
<td>10%</td>
</tr>
<tr>
<td>2. Identify and describe formulas and formula transposition.</td>
<td>7%</td>
</tr>
<tr>
<td>3. Identify and describe the square root, perimeter and circumference.</td>
<td>7%</td>
</tr>
<tr>
<td>4. Identify and describe areas of rectangles, circles, triangles, trapezoids and surface areas.</td>
<td>10%</td>
</tr>
<tr>
<td>5. Identify and describe volumes of rectangular, cylindrical and irregular objects.</td>
<td>10%</td>
</tr>
<tr>
<td>6. Identify and describe Pythagoras’s theorem.</td>
<td>8%</td>
</tr>
<tr>
<td>7. Identify and describe special right angle triangles.</td>
<td>10%</td>
</tr>
<tr>
<td>a. 45°</td>
<td></td>
</tr>
<tr>
<td>b. 30° - 60°</td>
<td></td>
</tr>
<tr>
<td>c. 22-1/2°</td>
<td></td>
</tr>
<tr>
<td>8. Identify and describe grade.</td>
<td>10%</td>
</tr>
<tr>
<td>a. Simple</td>
<td></td>
</tr>
<tr>
<td>b. Percentage</td>
<td></td>
</tr>
<tr>
<td>c. cm/m</td>
<td></td>
</tr>
<tr>
<td>9. Identify and describe density, relative density and pressure in liquids and gases (kpa) as well as Charle’s. and Boyle’s gas laws.</td>
<td>10%</td>
</tr>
<tr>
<td>10. Identify and describe parallel offsets.</td>
<td>8%</td>
</tr>
<tr>
<td>11. Identify and describe simple percentage, mark-up, net profit, gross profit.</td>
<td>10%</td>
</tr>
</tbody>
</table>
Plumber

Unit: A6 Access Equipment

Level: One
Duration: 11 hours
Theory: 7 hours
Practical: 4 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:

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%

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Plumber

Unit: A7 Electricity, Science and Computers

Level: One
Duration: 40 hours
Theory: 33 hours
Practical: 7 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:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define terminology associated with electricity as related to the trade.</td>
<td>5%</td>
</tr>
<tr>
<td>2. Identify hazards and describe safe work practices pertaining to electricity.</td>
<td>5%</td>
</tr>
<tr>
<td>3. Interpret electrical related information found on drawings and specifications.</td>
<td>3%</td>
</tr>
<tr>
<td>4. Identify tools and equipment used to test electrical circuits and describe their applications and procedures for use.</td>
<td>5%</td>
</tr>
<tr>
<td>5. Explain Ohm’s law and describe its applications and associated calculations.</td>
<td>5%</td>
</tr>
<tr>
<td>6. Identify types of current and describe their characteristics and applications.</td>
<td>5%</td>
</tr>
<tr>
<td>7. Identify types of electrical circuits and describe their characteristics, operation and applications.</td>
<td>5%</td>
</tr>
<tr>
<td>8. Identify types of electrical equipment and components and describe their characteristics, operation and applications.</td>
<td>5%</td>
</tr>
<tr>
<td>9. Describe with respect to sciences metals and alloys.</td>
<td>5%</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>b. Identify the most common metals</td>
<td></td>
</tr>
<tr>
<td>c. Identify the most common alloys</td>
<td></td>
</tr>
<tr>
<td>d. Define cost effectiveness</td>
<td></td>
</tr>
<tr>
<td>e. Identify and describe properties of metals</td>
<td></td>
</tr>
<tr>
<td>f. Identify and describe problems in linear expansion</td>
<td></td>
</tr>
<tr>
<td>g. Identify and describe bi-metal strip and its uses</td>
<td></td>
</tr>
</tbody>
</table>
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
o. Identify and describe corrosion resistant materials

10. **Describe with respect to sciences hydrodynamics, hydrostatics and pneumatics.** 5%
   a. Define hydrodynamics, hydrostatics, pneumatics, fluids, viscosity, adhesion, cohesion, capillary action, relative density, pressure (psi, psia, pascals, head).
   b. Total pressure, transmission of pressure, vacuum, partial vacuum, siphon, manometer, buoyancy, laminar flow, turbulent flow, pitot tube, velocity head, venturi, Bernoulli’s theorem, hydraulic ram, water hammer, cavitation.
   c. Identify and describe plumbing systems
d. Identify and describe flow of liquids and gases
e. Identify and describe pressurized systems
f. Identify and describe hydraulic jacks and presses
g. Identify and describe thrust blocks
h. Identify and describe air chambers
i. Identify and describe pumps
j. Identify and describe siphons
k. Identify and describe velocity head
l. Identify and describe bourdon type pressure gauge
m. Identify and describe uses of buoyancy
o. Identify and describe conversion of fps to gpm and gpm to fps, m/s to i/s and i/s to m/s
p. Identify and describe flow in venturis
q. Identify and describe Bernoulli’s theorem applied
r. Identify and describe Charle’s. and Boyle’s gas laws

11. **Describe heat load calculations, fan laws and pumps.** 5%
12. **Describe basic computer technology and its broad applications in the plumber trade.** 5%
13. **Describe basic computer technology in its specific applications to one’s everyday duties as a plumber.** 5%
14. **Describe basic computer technology in its specific applications to one’s everyday duties as a plumber.** 5%
a. DOS
b. Windows
c. NT
d. Others
15. **Describe requirements for loading software and for file management.** 5%
16. **Describe internet access software.** 5%
17. **Describe requirements for configuring ports for communication between a computer and devices.** 5%
18. **Describe requirements for troubleshooting communication problems from a hardware and software perspective, with regard to proper cabling (modem/null...** 2%
modem), bit parity, and BAUD rates, and so on.

19. Use operating systems for computer file management. 3%

20. Set up/configure computer environments. 3%
   a. DOS
   b. Windows
   c. NT
   d. Others

21. Use various computer operating systems. 3%
   a. DOS
   b. Windows
   c. NT
   d. Others

22. Load software and use proper file management techniques. 3%

23. Use internet access software. 3%

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Plumber

Unit: A8 Drawings

Level: One

Duration: 30 hours
  Theory: 15 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:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define terminology associated with drawings and sketches.</td>
<td>6%</td>
</tr>
<tr>
<td>2. Describe metric and imperial systems of measurement and the procedures used to perform conversions.</td>
<td>6%</td>
</tr>
<tr>
<td>3. Identify the types of drawings and describe their applications.</td>
<td>6%</td>
</tr>
<tr>
<td>a. civil/site</td>
<td></td>
</tr>
<tr>
<td>b. architectural</td>
<td></td>
</tr>
<tr>
<td>c. mechanical</td>
<td></td>
</tr>
<tr>
<td>d. structural</td>
<td></td>
</tr>
<tr>
<td>e. electrical</td>
<td></td>
</tr>
<tr>
<td>f. shop drawings</td>
<td></td>
</tr>
<tr>
<td>g. sketches</td>
<td></td>
</tr>
<tr>
<td>4. Identify types of symbols and describe their characteristics and applications.</td>
<td>6%</td>
</tr>
<tr>
<td>5. Identify drawing projections and views and describe their applications.</td>
<td>6%</td>
</tr>
<tr>
<td>a. change orders</td>
<td></td>
</tr>
<tr>
<td>b. addendums</td>
<td></td>
</tr>
<tr>
<td>c. as-builts</td>
<td></td>
</tr>
<tr>
<td>d. specifications</td>
<td></td>
</tr>
<tr>
<td>6. Identify drawing projections and views and describe their applications.</td>
<td>6%</td>
</tr>
<tr>
<td>a. Projections (orthographic, oblique, isometric)</td>
<td></td>
</tr>
</tbody>
</table>
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. noted 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%

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Apprenticeship Manitoba
Plumber

Unit: A9 Fuel Brazing and Cutting

Level: One
Duration: 12 hours
   Theory: 12 hours
   Practical: 5 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:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent of Unit Mark (%)</td>
</tr>
<tr>
<td>1.</td>
<td>Define terminology associated with fuel brazing and cutting.</td>
</tr>
<tr>
<td>2.</td>
<td>Identify hazards and describe safe work practices pertaining to fuel brazing and cutting.</td>
</tr>
<tr>
<td></td>
<td>a. personal</td>
</tr>
<tr>
<td></td>
<td>b. workplace</td>
</tr>
<tr>
<td>3.</td>
<td>Interpret codes and regulations pertaining to fuel brazing and cutting.</td>
</tr>
<tr>
<td>4.</td>
<td>Identify types of fuel brazing and cutting equipment and describe their components and applications.</td>
</tr>
<tr>
<td></td>
<td>a. air-propane</td>
</tr>
<tr>
<td></td>
<td>b. air-acetylene</td>
</tr>
<tr>
<td></td>
<td>c. oxy-propane</td>
</tr>
<tr>
<td></td>
<td>d. oxy-acetylene</td>
</tr>
<tr>
<td>5.</td>
<td>Identify fuel brazing and cutting equipment accessories and describe their applications and procedures for use.</td>
</tr>
<tr>
<td>6.</td>
<td>Describe the procedures used to set-up, adjust and shut-down fuel cutting and brazing equipment.</td>
</tr>
<tr>
<td>7.</td>
<td>Describe the procedures used to cut materials using fuel cutting equipment.</td>
</tr>
<tr>
<td>8.</td>
<td>Identify cutting faults and describe the procedures to prevent and correct them.</td>
</tr>
<tr>
<td>9.</td>
<td>Describe the procedures used to braze materials using fuel brazing equipment.</td>
</tr>
<tr>
<td>10.</td>
<td>Describe the procedures used to inspect and maintain fuel cutting and brazing equipment.</td>
</tr>
<tr>
<td>11.</td>
<td>Describe the procedures used to transport and store fuel cutting and brazing equipment.</td>
</tr>
</tbody>
</table>
12. Demonstrate the procedures used to cut and braze materials using fuel brazing and cutting equipment.  

***
Plumber

Unit: A10 Pipe, Tube and Tubing and Fundamentals

Level: One
Duration: 11 hours
   Theory: 5 hours
   Practical: 6 hours

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

Objectives and Content:

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. fiberglass

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

5. Perform calculations to determine pipe, tube and tubing measurements.  
a. run and branch  
b. fitting allowances  
c. Offsets including travel, rise and run, rolling, equal spread, unequal spread

6. Demonstrate pipe, tube and tubing applications.
Plumber

Unit: A11 Plastic Piping

Level: One

Duration: 11 hours
- Theory: 5 hours
- Practical: 6 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: Percent of Unit Mark (%)

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.**  
   a. run and branch  
   b. fitting allowances  
   c. offsets  
   3%

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.**  
   a. heat fusion welding  
   b. threading  
   c. solvent welding  
   d. compression fittings  
   e. mechanical joints  
   3%

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

Unit: A12 Copper Tube and Tubing

Level: One

Duration: 11 hours
   Theory: 5 hours
   Practical: 6 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:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define terminology associated with copper tube and tubing.</td>
<td>3%</td>
</tr>
<tr>
<td>2. Identify hazards and describe safe work practices pertaining to copper tube and tubing.</td>
<td>3%</td>
</tr>
<tr>
<td>3. Interpret codes and regulations pertaining to copper tube and tubing.</td>
<td>3%</td>
</tr>
<tr>
<td>4. Interpret information pertaining to copper tube and tubing found on drawings and specifications.</td>
<td>3%</td>
</tr>
<tr>
<td>5. Describe the identification systems and methods for copper tube and tubing.</td>
<td>3%</td>
</tr>
<tr>
<td>6. Identify tools and equipment relating to copper tube and tubing and describe their applications and procedures for use.</td>
<td>3%</td>
</tr>
<tr>
<td>7. Identify copper tube and tubing systems and describe their characteristics and applications.</td>
<td>3%</td>
</tr>
<tr>
<td>8. Identify types of copper tube and tubing and describe their properties and characteristics.</td>
<td>3%</td>
</tr>
<tr>
<td>9. Identify fittings used with copper tube and tubing and describe their purpose and applications.</td>
<td>3%</td>
</tr>
<tr>
<td>10. Identify copper tube and tubing accessories and describe their purpose and applications.</td>
<td>3%</td>
</tr>
</tbody>
</table>
   a. supports
   b. hangers
   c. sleeves
11. Explain the systems of measurement for copper tube and tubing.
   a. dimension
   b. length
   c. wall thickness/schedule

12. Describe the procedures used to measure copper tube and tubing.

13. Perform calculations to determine copper tube and tubing measurements.
   a. run and branch
   b. fitting allowances
   c. offsets

14. Describe the procedures used to inspect copper tube and tubing.

15. Identify the methods used to cut copper tube and tubing and describe their associated procedures.

16. Describe the procedures used to bend copper tube and tubing.

17. Identify the methods used to join copper tube and tubing and describe their associated procedures.
   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.

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

***
## Plumber

**Unit:** A13 Steel Piping  
**Level:** One  
**Duration:** 11 hours  
  - Theory: 5 hours  
  - Practical: 6 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:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define terminology associated with steel piping.</td>
<td>3%</td>
</tr>
<tr>
<td>2. Identify hazards and describe safe work practices pertaining to steel piping.</td>
<td>3%</td>
</tr>
<tr>
<td>3. Interpret codes and regulations pertaining to steel piping.</td>
<td>3%</td>
</tr>
<tr>
<td>4. Interpret information pertaining to steel piping found on drawings and specifications.</td>
<td>3%</td>
</tr>
<tr>
<td>5. Describe the identification systems and methods for steel piping.</td>
<td>3%</td>
</tr>
<tr>
<td>6. Identify tools and equipment relating to steel piping and describe their applications and procedures for use.</td>
<td>3%</td>
</tr>
<tr>
<td>7. Identify steel piping systems and describe their characteristics and applications.</td>
<td>3%</td>
</tr>
<tr>
<td>8. Identify types of steel piping and describe their properties and characteristics.</td>
<td>3%</td>
</tr>
<tr>
<td>a. carbon steel</td>
<td></td>
</tr>
<tr>
<td>b. galvanized</td>
<td></td>
</tr>
<tr>
<td>c. stainless steel</td>
<td></td>
</tr>
<tr>
<td>9. Identify fittings used with steel piping and describe their purpose and applications.</td>
<td>3%</td>
</tr>
<tr>
<td>10. Identify steel piping accessories and describe their purpose and applications.</td>
<td>3%</td>
</tr>
<tr>
<td>a. supports</td>
<td></td>
</tr>
<tr>
<td>b. hangers</td>
<td></td>
</tr>
<tr>
<td>c. sleeves</td>
<td></td>
</tr>
<tr>
<td>11. Explain the systems of measurement for steel piping.</td>
<td>3%</td>
</tr>
</tbody>
</table>
12. Describe the procedures used to measure steel piping.  
   a. dimension  
   b. length  
   c. wall thickness/schedule  
   d. grades.

13. Perform calculations to determine steel piping measurements.  
   a. run and branch  
   b. fitting allowances  
   c. offsets

14. Describe the procedures used to inspect steel piping.  
   a. quality control requirements

15. Identify the methods used to cut steel piping and describe their associated procedures.

16. Identify the methods used to join steel piping and describe their associated procedures.  
   a. threading and grooving  
   b. welding  
   c. flanging  
   d. mechanical joints

17. Describe the procedures used to install fittings and accessories for steel piping.

18. Demonstrate the procedures used to measure, cut and join steel piping.  
   49%

***
Plumber

Unit: A14 Cast Iron Piping

Level: One
Duration: 5 hours
Theory: 3 hours
Practical: 2 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:

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

Percent of Objectives and Content: Unit Mark (%)

Net of 35%
b. length
  c. wall thickness/schedule

12. Describe the procedures used to measure cast iron. 3%

13. Perform calculations to determine cast iron measurements.
  a. run and branch
  b. fitting allowances
  c. offsets
  3%

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.
  a. mechanical joints
  b. hub and spigot
  3%

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

Unit: A15 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:

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. 6%
   a. soil
   b. ductile
   c. duriron
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. 6%
    a. supports
    b. hangers
    c. sleeves
11. **Explain the systems of measurement for glass piping.**
   a. dimension
   b. length
   c. wall thickness/schedule

12. **Describe the procedures used to measure glass piping.**

13. **Perform calculations to determine glass piping measurements.**
   a. run and branch
   b. fitting allowances
   c. offsets

14. **Describe the procedures used to inspect glass piping.**

15. **Identify the methods used to cut glass piping and describe their associated procedures.**

16. **Identify the methods used to join glass piping and describe their associated procedures.**
   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.**
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:

1. Define terminology associated with asbestos-cement.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

2. Identify hazards and describe safe work practices pertaining to asbestos-cement piping.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

3. Interpret codes and regulations pertaining to asbestos-cement piping.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

4. Interpret information pertaining to asbestos-cement piping found on drawings and specifications.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

5. Describe the identification systems and methods for asbestos-cement piping.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

6. Identify tools and equipment relating to asbestos-cement piping and describe their applications and procedures for use.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

7. Identify asbestos-cement piping systems and describe their characteristics and applications.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

8. Identify types of asbestos-cement piping and describe their properties and characteristics.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

9. Identify fittings used with asbestos-cement piping and describe their purpose and applications.  
   Percent of Objectives and Content: Unit Mark (%) = 4%

10. Identify asbestos-cement piping accessories and describe their purpose and applications.  
    a. supports  
    b. hangers  
    c. sleeves  
   Percent of Objectives and Content: Unit Mark (%) = 4%
11. Explain the systems of measurement for asbestos-cement piping.
   a. dimension
   b. length
   c. wall thickness/schedule

12. Describe the procedures used to measure asbestos-cement piping.

13. Perform calculations to determine asbestos-cement piping measurements.
   a. run and branch
   b. fitting allowances
   c. offsets

14. Describe the procedures used to inspect asbestos-cement piping.

15. Identify the methods used to cut asbestos-cement piping and describe their associated procedures.

16. Identify the methods used to join asbestos-cement piping and describe their associated procedures.
   a. mechanical joints
   b. hub and spigot

17. Describe the procedures used to install fittings and accessories for asbestos-cement piping.

18. Demonstrate the procedures used to measure, cut and join asbestos-cement piping.
Plumber

Unit: A17 Residential Sanitary Drainage System

Level: One

Duration: 50 hours
  Theory: 35 hours
  Practical: 15 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:

<table>
<thead>
<tr>
<th>Number</th>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Define terminology associated with residential sanitary drainage.</td>
<td>4%</td>
</tr>
<tr>
<td>2.</td>
<td>Identify hazards and describe safe work practices pertaining to residential sanitary drainage system.</td>
<td>4%</td>
</tr>
<tr>
<td>3.</td>
<td>Interpret codes and regulations pertaining to residential sanitary drainage systems.</td>
<td>4%</td>
</tr>
<tr>
<td>a.</td>
<td>dimension</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>length</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Interpret information pertaining to residential sanitary drainage systems found on drawings and specifications.</td>
<td>4%</td>
</tr>
<tr>
<td>5.</td>
<td>Identify tools and equipment relating to residential sanitary drainage systems and describe their applications and procedures for use.</td>
<td>4%</td>
</tr>
<tr>
<td>6.</td>
<td>Explain the purpose of residential sanitary drainage systems</td>
<td>4%</td>
</tr>
<tr>
<td>7.</td>
<td>Identify the methods of back flow protection used in residential sanitary drainage systems.</td>
<td>4%</td>
</tr>
<tr>
<td>a.</td>
<td>back water valves</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>gate valves</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Identify types of residential sanitary drainage systems and describe their properties and characteristics.</td>
<td>4%</td>
</tr>
<tr>
<td>9.</td>
<td>Identify residential sanitary drainage system components and describe their purpose and applications.</td>
<td>4%</td>
</tr>
<tr>
<td>a.</td>
<td>piping</td>
<td></td>
</tr>
</tbody>
</table>
b. fixtures
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

10. **Identify the factors to consider when sizing residential sanitary drainage system components.**
   a. hydraulic load
   b. code requirements

11. **Describe the procedures used to determine hydraulic load on a residential sanitary drainage system.**

12. **Describe the procedures used to install residential sanitary drainage system components in trenches.**
   a. safety considerations
   b. support
   c. protection

13. **Determine and transfer grade, percent of grade and elevation for piping in residential sanitary drainage systems.**

14. **Describe the procedures used to grade piping for residential sanitary drainage systems.**

15. **Describe the procedures used to rough-in/install residential sanitary drainage systems.**

16. **Describe the procedures used to protect residential sanitary drainage systems.**

17. **Describe the procedures used to maintain and repair residential sanitary drainage systems.**

18. **Describe the procedures used to test and troubleshoot residential sanitary drainage systems.**

19. **Demonstrate the procedures used to determine and transfer grade and elevation measurements for residential sanitary drainage systems and the procedures used to layout, install, maintain, repair, test and troubleshoot residential sanitary drainage systems.**

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Plumber

Unit: A18 Residential Venting Systems

Level: One
Duration: 50 hours
   Theory: 35 hours
   Practical: 15 hours

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

Objectives and Content:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percent of Unit Mark (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define terminology associated with residential venting systems.</td>
<td>4%</td>
</tr>
<tr>
<td>2. Identify hazards and describe safe work practices pertaining to residential venting systems.</td>
<td>4%</td>
</tr>
<tr>
<td>3. Interpret codes and regulations pertaining to residential venting systems.</td>
<td>4%</td>
</tr>
<tr>
<td>4. Interpret information pertaining to residential venting systems found on drawings and specifications.</td>
<td>4%</td>
</tr>
<tr>
<td>5. Identify tools and equipment relating to residential venting systems and describe their applications and procedures for use.</td>
<td>4%</td>
</tr>
<tr>
<td>6. Identify types of residential venting systems and describe their characteristics and applications.</td>
<td>4%</td>
</tr>
<tr>
<td>a. stack vent</td>
<td></td>
</tr>
<tr>
<td>b. individual vent</td>
<td></td>
</tr>
<tr>
<td>c. branch vent</td>
<td></td>
</tr>
<tr>
<td>d. dual vent</td>
<td></td>
</tr>
<tr>
<td>e. vent header</td>
<td></td>
</tr>
<tr>
<td>f. continuous vent</td>
<td></td>
</tr>
<tr>
<td>g. wet vent</td>
<td></td>
</tr>
<tr>
<td>h. relief vent</td>
<td></td>
</tr>
<tr>
<td>i. circuit vent</td>
<td></td>
</tr>
<tr>
<td>j. air admittance valve</td>
<td></td>
</tr>
<tr>
<td>7. Identify residential venting system components and describe their purpose and applications.</td>
<td>4%</td>
</tr>
</tbody>
</table>
a. piping
b. fixtures
c. traps
d. cleanouts
e. joints and connections
f. fire stopping

8. Identify the factors to consider when sizing residential venting systems.

9. Describe the procedures used to determine hydraulic load on a residential venting system. 4%

10. Describe the procedures used to rough-in/install residential venting systems 4%

11. Describe the procedures used to protect residential venting systems. 4%

12. Describe the procedures used to maintain and repair residential venting systems. 4%

13. Describe the procedures used to test and troubleshoot residential venting systems. 4%

14. Demonstrate the procedures used to layout, install, maintain, repair, test and troubleshoot residential venting systems. 30%

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