Plumber
Level 4

Apprenticeship Manitoba

Plumber

Unit: **D1 Journeyperson Trainer**

Level: Four

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

Level 1 in-school technical training offers an entry-level orientation to the challenges of apprenticeship training as it relates to the development of core tasks and skill requirements, as well as social competencies. This unit introduces senior apprentices to the responsibilities of workplace training that they will assume as supervising journeypersons. Most trades have a rich tradition of refreshing and sharing their trade skills from one generation of trade practitioner to the next. This unit orients senior apprentices to some of the practical and conceptual tools that can enable them to contribute to this trade heritage when they become certified journeypersons and, ultimately, journeyperson trainers.

The journeyperson's obligation to assist entry-level apprentices to develop skills and knowledge is complex and challenging. It involves safety considerations, employer expectations, provincial regulations, as well as the tradition of skills stewardship that links modern practice with the long history of workplace teaching and learning that defines the apprenticeable trades. The ability to offer timely and appropriate support to apprentices is itself an important area of trade learning. This unit presents material intended to help refine this ability through reflection and discussion by senior apprentices, and discussion with their in-school instructor and journeyperson trainer.

This content reflects Manitoba and Canadian standards prescribed for journeyperson-level supervisory capabilities, as well as key topics in current research on the importance of workplace training in apprenticeship systems. These detailed descriptors represent suggested focal points or guidelines for potentially worthwhile exploration and are neither mandatory nor exhaustive.

Objectives and Content: **Percent of Unit Mark (%)**

1. **Compare/contrast role-options and responsibilities of the supervising journeyperson.** **50%**
   a. Implicit vs. explicit standards and content: training goals are/are not codified; assessment measures are/are not used
   b. Accountability for results: e.g. journeyperson is/is not required to prepare performance evaluation that could affect apprentice's employability or wage-rate, etc.
   c. Long-term vs. short-term supervision assignments – e.g., considerable latitude/little latitude for apprentice to learn from mistakes
   d. Formally vs. informally structured – e.g. supervision assignment is part of a prescribed cycle of assignments involving coordination among multiple journeypersons; apprentice is trained according to an individual training plan negotiated with employer
   e. Types of supervisory role options and what is implied by each:
      - Journeyperson Trainer (JT) role: often initiated by someone other than apprentice, and limited to a particular skill set, task, or production requirement

- Mentor role: often initiated by apprentices, and relatively open-ended regarding content, duration, etc.
- Peer role: typically involves individual upgrading or cross-training of one journeyperson by another; can include senior apprentice assisting less-experienced trade learner
- Coordinator role: often a senior-level journeyperson appointed by an organization to assume responsibilities for monitoring progression of groups of apprentices
- Other roles: may be improvised by journeyperson, such as combination or multiple roles of the above

2. Describe and demonstrate common requirements about providing journeyperson level supervision. **50%**

a. Apprenticeship learning adapted to journeyperson supervision assignments and a journeyperson perspective
   - Application of adult education concepts to trades teaching and learning (e.g. responsibilities and expectations of senior-level apprentices)
   - Practical significance of 'styles' of adult learning and teaching
   - Helping senior-level apprentices integrate in-school technical training and on-the-job practical training experiences
   - Providing help and guidance about new tasks and skills
   - Providing help and guidance about fixing mistakes
   - Learning and teaching "the ropes" – socialization of apprentice within a community of trade practice (e.g. how to borrow a tool, interrupt a journeyperson, and seek advice of experienced co-workers)
   - Coverage and documentation of prescribed tasks and subtasks where applicable.
   - Discuss the limits of the journeyperson trainers' own responsibilities and competence (e.g. scope, willingness to train, etc.)
   - Benefits of maintaining a personal record of achievements, ideas, and needs as a journeyperson trainer (e.g. resume, portfolio, training credentials, logbook, etc.)

b. Individual reflection and guided group discussion about personal experiences of workplace learning as an apprentice
   - Identification of best and worst practices of journeyperson trainer
   - Identification of workplace and other factors that can contribute to good and bad trades teaching/learning experiences
   - Development of professional standards and work ethics about responsibility to share one's knowledge and skill with others in the workplace (e.g., use/misuse of humour, rigour, discretion, craft-pride, etc.)
   - Qualities of a good journeyperson trainer
   - Components of workplace journeyperson training
   - Processes and recommended practices re: journeyperson training
   - Troubleshooting problems re: supervision assignments

c. Role of assessment in supervising, coaching, or guiding other people to learn or improve their skills (e.g. formative and summative evaluation), and how this might contribute to how the journeyperson-level supervision task is approached in future

d. Compare and contrast discussion results with current knowledge and resources about workplace training methods as they apply to journeyperson-level supervision assignments

e. Other (as may be specified by instructor)

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Unit: **D2 Sewage Treatment Systems**

Level: Four

Duration: 28 hours

Theory: 21 hours

Practical: 7 hours

Overview:

This unit of instruction is designed to provide the apprentice with knowledge and skills about private sewage disposal systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with private sewage disposal systems. a. Refer to Plumber Red Seal Occupational Standard (RSOS).	**5%**
2. Identify hazards and describe safe work practices pertaining to private sewage disposal systems. a. Health hazards b. Environmental hazards	**10%**
3. Interpret information pertaining to private sewage disposal systems. a. Codes b. Regulations c. Local by-laws d. Other	**10%**
4. Identify tools and equipment relating to private sewage disposal systems and describe their applications and procedures for use.	**10%**
5. Identify types of private sewage disposal system components and describe their characteristics, purpose and applications. a. Septic tank b. Disposal field c. Lift pumps d. Holding tanks e. Bio filter	**20%**
6. Identify the factors to consider when planning and installing private sewage disposal systems a. Location • System position • Clearances	**10%**

- Relation to water table

b. Soil conditions/properties
   - Percolation test
   - Soil Test

7. Identify the factors to consider when sizing private sewage disposal system components. **10%**

8. Describe and demonstrate the procedures used for private sewage disposal systems. **25%**

a. Size
b. Install
c. Maintenance
d. Troubleshoot
e. Repair
f. Test

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Apprenticeship Manitoba

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Unit: **D3 Private Water Pressure Systems**

Level: Four

Duration: 35 hours

Theory: 21 hours

Practical: 14 Hours

Overview:

This unit of instruction is designed to provide the apprentice with knowledge and skills about private water pressure systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with private water pressure systems. a. Refer to Plumber Red Seal Occupational Standard (RSOS).	**5%**
2. Identify hazards and describe safe work practices pertaining to private water pressure systems.	**5%**
3. Interpret information pertaining to private water pressure systems. a. Codes b. Regulations c. Drawings d. Specifications	**5%**
4. Identify tools and equipment relating to private water pressure systems and describe their applications and procedures for use.	**5%**
5. Describe the procedures to plan layout and size piping and components for private water pressure systems. a. Daily water requirements b. Water source supply capabilities c. Water supply quality d. Pump sizing, pressure and flow rate e. Pressure tank sizing f. Two-pump systems	**30%**
6. Describe the procedures to install piping and components for private water pressure systems. a. Pressure Tank • Bladder type • Standard galvanized • Diaphragm pressure tank • Elastic cell • Mascontrol	**25%**

b. Air volume control
c. Pressure switch
d. Pressure relief valve
e. Foot valve
f. Tank tee
g. Head, pressure, friction loss and flow rate

7. Describe and demonstrate the procedures used for private water pressure systems. 25%

a. Size
b. Install
c. Test
d. Maintenance
e. Troubleshoot
f. Repair

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Apprenticeship Manitoba

Plumber

Unit: **D4 Water Treatment Systems**

Level: Four
Duration: 35 hours
Theory: 21 hours
Practical: 14 hours

Overview:

This unit of instruction is designed to provide the apprentice with knowledge and skills about water treatment systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with water treatment systems. a. Refer to Plumber Red Seal Occupational Standard (RSOS).	**5%**
2. Identify hazards and describe safe work practices pertaining to water treatment systems.	**5%**
3. Interpret information pertaining to water treatment systems. a. Codes b. Regulations c. Drawings d. Specifications	**10%**
4. Identify tools and equipment relating to water treatment systems and describe their applications and procedures for use.	**10%**
5. Identify and describe types of water tests, their procedures, characteristics and causes. a. Hardness b. Minerals c. Contamination/pollution d. pH e. Taste/odour f. Turbidity	**10%**
6. Interpret results of water tests to determine water treatment requirements.	**10%**
7. Identify methods of water treatment and components, and describe their applications and operation, and characteristics. a. Filters b. Softeners	**10%**

c. Purifiers
d. Chemical feeders
e. Sterilizers
f. Reverse osmosis
g. De-ionizers
h. Neutralizers
i. Distillers
j. UV disinfection

8. Describe and demonstrate the procedures used for water treatment systems and components. **40%**

a. Size
b. Install
c. Test
d. Protect
e. Maintenance
f. Troubleshoot
g. Repair

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Apprenticeship Manitoba

Plumber

Unit: **D5 Process Piping**

Level: Four

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the apprentice with knowledge and skills about process piping.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with process piping. a. Refer to Plumber Red Seal Occupational Standard (RSOS).	**5%**
2. Identify hazards and describe safe work practices pertaining to process piping.	**5%**
3. Describe the installation procedures for process piping. a. Install piping b. Install equipment and components c. Test process piping	**90%**

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Apprenticeship Manitoba

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Unit: **D6 Specialized Systems II**

Level: Four

Duration: 28 hours

Theory: 28 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the apprentice with knowledge and skills about specialized systems with a focus on fuel systems and medical gas systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with specialized systems. a. Fuel oil systems b. Medical gas c. Refer to Plumber Red Seal Occupational Standard (RSOS).	**10%**
2. Identify hazards and describe safe work practices pertaining to specialized systems. a. Fuel oil systems b. Medical gas	**10%**
3. Describe piping, equipment and components, testing and servicing for specialized systems with a focus on fuel systems.	**10%**
4. Interpret information pertaining to medical gas systems. a. Codes b. Regulations c. Drawings d. Specifications e. Vacuum f. Vacuum pumps g. Diameter Index Safety System (DISS) h. Pin Index Safety System (PISS)	**15%**
5. Identify tools and equipment relating to medical gas systems and describe their applications and procedures for use.	**10%**
6. Identify types of medical gases, system equipment, components and accessories and describe their applications and operation and their characteristics. a. Oxygen b. Nitrogen	**15%**

c. Nitrous oxide/aesthetic
d. Medical air
e. Vacuum
f. Vacuum pumps
g. Medical air compressors
h Piping
i. Valves
j. Alarms
k. Sensors
l. Oxygen concentrators

7. Identify the considerations for selecting components and accessories for medical gas systems. **15%**

8. Describe the procedures used for medical gas systems. **15%**

a. Install
b. Test
c. Protect
d. Maintenance
e. Troubleshoot
f. Repair

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Unit: **D7 Electrical Schematics and Troubleshooting for Hydronics and Plumbing Systems**

Level: Four

Duration: 28 hours

Theory: 21 hours

Practical: 7 hours

Overview:

This unit of instruction is designed to provide the apprentice with knowledge and skills about electrical schematics and troubleshooting, hydronics and plumbing systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with electrical schematics for hydronics and plumbing systems. a. Refer to Plumber Red Seal Occupational Standard (RSOS).	**5%**
2. Identify hazards and describe safe work practices pertaining to electrical schematics for hydronics and plumbing systems.	**5%**
3. Identify sources of information to interpret electrical schematics. a. Pumps and related equipment b. Plumbing systems c. Hydronic systems	**40%**
4. Describe troubleshooting considerations for determining electrical related issues. a. Pumps and related equipment b. Plumbing systems c. Hydronic systems	**40%**
5. Demonstrate the procedures used for electrical issues related to pumps, hydronic and plumbing systems. a. Maintenance b. Troubleshooting	**10%**

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Apprenticeship Manitoba

Plumber

Unit: **D8 Gas Piping Systems**

Level: Four

Duration: 28 hours

Theory:	28	hours
Practical:	0	hours

Overview:

This unit of instruction is designed to provide the apprentice with knowledge and skills about gas piping systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with gas piping systems.	**5%**
a. Refer to Plumber Red Seal Occupational Standard (RSOS).	
2. Identify hazards and describe safe work practices pertaining to gas piping systems.	**5%**
a. Handling	
b. Storage	
c. Transportation of gas cylinders	
3. Interpret information pertaining to gas piping systems.	**10%**
a. Codes	
b. Regulations	
c. Drawings	
d. Specifications	
e. Jurisdictional certification requirements	
4. Identify tools and equipment relating to gas piping systems and describe their applications and procedures for use.	**10%**
5. Describe the properties and characteristics of gases used in gas piping systems.	**10%**
a. Physical characteristics	
b Composition	
c. Toxicity	
d. Specific gravity	
e. Heating value	
f. Flame temperature and speed	
g. Limits of flammability	
h Ignition temperature	
i. Combustion process	

6. Identify types of gas piping systems and describe their characteristics and applications. **10%**

a. Natural gas
   - Liquefied
   - Compressed

b. Liquefied petroleum gas

c. Petroleum

d. Inert gas

7. Identify gas piping system components and describe their purpose and operation. **10%**

8. Identify the factors to consider for determining pipe sizing in gas piping systems. **10%**

9. Describe the procedures used for gas piping system components. **30%**

a. Install

b. Test

c. Maintenance

d. Troubleshoot

e. Repair

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Apprenticeship Manitoba

Plumber

Unit: **D9 Low Pressure Steam Systems**

Level: Four

Duration: 21 hours

Theory: 21 hours

Practical: 0 hours

Overview:

This unit of instruction is designed to provide the apprentice with knowledge and skills about advanced low pressure steam systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with low pressure steam systems. a. Refer to Plumber Red Seal Occupational Standard (RSOS). b. Other	**5%**
2. Identify hazards and describe safe work practices pertaining to low pressure steam systems.	**5%**
3. Interpret information pertaining to low pressure steam systems. a. Drawings b. Specifications c. Codes d. Regulations e. Other	**20%**
4. Identify tools and equipment relating to low pressure steam systems and describe their applications and procedures for use.	**10%**
5. Identify types of low-pressure steam systems and describe their characteristics and applications. a. Heating b. Process	**20%**
6. Identify low pressure steam system components and describe their purpose and operation. a. Boilers b. Piping c. Connections d. Steam traps • Mechanical • Thermostatic	**20%**

- Thermodynamic

e. Pumps
f. Heat transfer equipment

7. Identify types of low-pressure steam system controls and describe their purpose and operation. **20%**

a. Valves
   - Pressure relief/safety
   - Pressure reducing
   - Boiler stop
   - Blow off
b. Steam pressure gauges
c. Glass water column
d. Fusible plugs
e. Feed water
f. Low water cut-off

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Apprenticeship Manitoba

Plumber

Unit: **D10 Pre-Interprovincial Exam Review**

Level: Four

Duration: 56 hours

Theory: 56 hours

Practical: 0 hours

Overview:

This unit offers senior apprentices a systematic review of skills and knowledge required to pass the Inter-Provincial Examination. It promotes a purposeful personal synthesis between on-the-job learning and the content of in-school technical training. The unit includes information about the significance of Provincial certification and the features of the Provincial Examination.

Note: No percentage-weightings for test purposes are prescribed for this unit's objectives. Instead, a 'Pass/Fail" grade will be recorded for the unit in its entirety.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe the significance, format and general content of Inter-Provincial (IP) Examinations for the trade of Plumber. a. Scope and aims of Interprovincial (Red Seal) certification; value of certifications b. Obligations of candidates for Interprovincial (Red Seal) certification • Relevance of Interprovincial (Red Seal) Examinations to current, accepted trade practices; industry-based provincial and national validation of test items • Supplemental Policy (retesting) • Confidentiality of examination content c. Multiple-choice format (four-option) item format, Red Seal standards for acceptable test items d. Government materials relevant to the Interprovincial Examinations for apprentice Plumbers • Red Seal Occupational Standard (RSOS) – for Plumber; prescribed scope of the skills and knowledge which comprise the trade • RSOS "Pie-chart" and its relationship to content distribution of Interprovincial Examination items • Red Seal Examination Breakdown • Red Seal Self-Assessment Guide • Apprenticeship Manitoba Technical Training package	**n/a**
2. Identify resources, strategies and other considerations for maximizing successful completion of written examinations. a. Personal preparedness • Rest • Nutrition • Personal study regimen	**n/a**

- Prior experience in test situations (e.g., Unit Tests)

b. Self-assessment, consultation and personal study plan
   - Self-assessment of individual strengths/weaknesses in trade related skills and knowledge
   - Approved textbooks
   - Study groups

3.	**Review program content regarding the major work activity of performs common occupational skills**.	**n/a**
4.	**Review program content regarding the major work activity of prepares and assembles tube, tubing and pipe.**	**n/a**
5.	**Review program content regarding the major work activity of installs, tests and services sewers, sewage treatment systems and drainage, waste, vents (DWV) systems.**	**n/a**
6.	**Review program content regarding the major work activity of installs, tests and services water service and distribution.**	**n/a**
7.	**Review program content regarding the major work activity of installs, tests and services fixtures, appliances and water treatment systems.**	**n/a**
8.	**Review program content regarding the major work activity of installs, tests and services low-pressure steam and hydronic systems.**	**n/a**
9.	**Review program content regarding the major work activity of installs, tests and services specialized systems.**	**n/a**

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