Apprenticeship Manitoba

Manitoba

Plumber
Level 2

Rev. Oct. 2018

Apprenticeship Manitoba

Plumber

UNIT: B1 ROUTINE TRADE ACTIVITIES II

Subunit: B1a Routine Trade Activities II

Level: Two

Duration: 5 hours

Theory: 5 hours

Practical: 0 hours

Overview:

The unit's purpose is to provide Level 2 information about routine trade practices in the Plumber trade.

Objectives and Content:	**Percent of Unit Mark (%)**	
1. Protects piping systems, equipment and structure from damage.	**30%**	45%
2. Installs fire stopping devices and materials.	**70%**	

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Apprenticeship Manitoba

Plumber

Subunit: B1b Commissioning

Level: Two

Duration: 10 hours

Theory: 10 hours

Practical: 0 hours

Overview:

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

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with commissioning.	**10%**
2. Identify hazards and describe safe work practices pertaining to commissioning.	**5%**
3. Identify sources of information pertaining to commissioning. a. Specifications b. Codes and regulations c. Operation and maintenance manuals d. Quality assurance/quality control documentation e. As-built drawings	**30%**
4. Identify tools and equipment relating to commissioning and describe their applications and procedures for use.	**10%**
5. Identify systems and equipment that require commissioning.	**15%**
6. Describe the procedures used to commission systems. a. Mark and label system: valve tags, equipment labelling, pipe identification b. Operator training c. Coordinate system start-up	**30%**

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Apprenticeship Manitoba

Plumber

UNIT: B2 PLUMBING FIXTURES AND APPLIANCES

Subunit: B2a Residential Plumbing Fixtures and Accessories

Level: Two

Duration: 20 hours

Theory: 10 hours

Practical: 10 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of Residential Plumbing Fixtures and Accessories.

Objectives and Content:		**Percent of Unit Mark (%)**
1.	**Define terminology associated with residential plumbing fixtures and accessories.**	**6%**
2.	**Identify hazards and describe safe work practices pertaining to residential plumbing fixtures and accessories.**	**6%**
3.	**Interpret codes and regulations pertaining to residential plumbing fixtures and accessories.**	**6%**
4.	**Interpret information pertaining to residential plumbing fixtures and accessories found on drawings and specifications.**	**6%**
5.	**Identify tools and equipment relating to residential plumbing fixtures and accessories and describe their applications and procedures for use.**	**6%**
6.	**Identify types of residential plumbing fixtures and describe their characteristics and applications.**	**5%**
7.	**Identify types of residential plumbing fixture supports and describe their characteristics and applications.**	**5%**
8.	**Identify residential plumbing accessories and describe their characteristics and applications.**	**5%**
9.	**Describe the procedures used to install residential plumbing fixtures, supports and accessories.**	**5%**
10.	**Describe the procedures used to maintain and repair residential plumbing fixtures and accessories.**	**5%**

11.	**Describe the procedures used to test and repair residential plumbing fixtures and accessories.**	**5%**
12.	**Demonstrate of the procedures used to install, maintain, repair, test and troubleshoot residential plumbing fixtures and accessories.**	**40%**

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Apprenticeship Manitoba

Plumber

Subunit: B2b Appliances

Level: Two

Duration: 22 hours

Theory: 12 hours

Practical: 10 hours

Overview:

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

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with appliances.	**4%**
2. Identify hazards and describe safe work practices pertaining to appliances.	**4%**
3. Interpret codes and regulations pertaining to appliances.	**4%**
4. Interpret information pertaining to appliances found on drawings and specifications.	**4%**
5. Identify tools and equipment relating to appliances and describe their applications and procedures for use.	**4%**
6. Identify types of appliances and describe their characteristics and applications. a. Residential b. Commercial c. Institutional	**11%**
7. Describe the procedures used to rough-in and install appliances.	**4%**
8. Describe the procedures used to protect appliances.	**4%**
9. Describe the procedures used to maintain appliances.	**4%**
10. Describe the procedures used to repair plumbing related appliance problems.	**4%**
11. Describe the procedures used to coordinate non-plumbing related repair of appliances.	**4%**
12. Describe the procedures used to test and troubleshoot appliances.	**4%**
13. Demonstrate the procedures used to install, maintain, repair, test and troubleshoot appliances.	**45%**

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Apprenticeship Manitoba

Plumber

Subunit: B2c Piping Valves I

Level: Two
Duration: 13 hours
Theory: 10 hours
Practical: 3 hours

Overview:

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

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with piping valves.	**10%**
2. Identify hazards and describe safe work practices pertaining to piping valves.	**10%**
3. Interpret codes, regulations and standards pertaining to piping valves.	**20%**
4. Interpret information found on drawings and specifications pertaining to piping valves.	**10%**
5. Identify tools and equipment relating to piping valves and describe their applications and procedures for use.	**10%**
6. Identify and demonstrate types of piping valves and describe their characteristics, operation and applications. a. Gate b. Globe c. Ball d. Plug e. Butterfly f. Check g. Relief h. Pop safety i. Pressure reducing j. Float operated k. Diaphragm l. Mixing	**40%**

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Apprenticeship Manitoba

Plumber

Subunit: B2d Hot Water Storage Tanks and Heaters

Level: Two
Duration: 17 hours
Theory: 10 hours
Practical: 7 hours

Overview:

Plumbers require a good, practical grasp of hot water storage tanks and heaters. This unit of instruction is the program gateway to further learning about these topics.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with hot water storage tanks and heaters.	**3%**
2. Identify hazards and describe safe work practices pertaining to hot water storage tanks and heaters.	**3%**
3. Interpret codes and regulations pertaining to hot water storage tanks and heaters.	**3%**
4. Interpret information pertaining to hot water storage tanks and heaters found on drawings and specifications.	**3%**
5. Identify tools and equipment relating to hot water storage tanks and heaters and describe their applications and procedures for use.	**3%**
6. Identify types of hot water storage tanks and describe their characteristics and applications.	**3%**
7. Identify hot water storage tank components and describe their purpose and operation. a. Vacuum relief b. Temperature/pressure relief valve c. Expansion tanks d. Drain pans	**3%**
8. Identify types of hot water heaters and describe their characteristics and applications. a. Direct b. Indirect	**3%**
9. Identify heat sources for hot water heaters and describe their characteristics and applications. a. Oil	**3%**

b. Gas
c. Electric
d. Solar
e. Solid fuel
f. Steam

10.	**Identify hot water heater components and describe their purpose and operation.**	**3%**
11.	**Identify the factors to consider for sizing hot water storage tanks and heaters, their components and equipment.**	**3%**
12.	**Describe the procedures used to size hot water storage tanks and heaters, their components and equipment.**	**3%**
13.	**Describe the procedures used to install hot water tanks and their components.**	**3%**
14.	**Describe the procedures used to protect hot water tanks and their components.**	**3%**
15.	**Describe the procedures used to maintain and repair hot water tanks and their components.**	**3%**
16.	**Describe the procedures used to test and troubleshoot hot water tanks and their components.**	**3%**
17.	**Describe the procedures used to install hot water heaters and their components.**	**3%**
18.	**Describe the procedures used to protect hot water heaters and their components.**	**3%**
19.	**Describe the procedures used to maintain and repair hot water heaters and their components.**	**3%**
20.	**Describe the procedures used to test and troubleshoot hot water heaters and their components.**	**3%**
21.	**Demonstrate the procedures used to install, maintain, repair, test and troubleshoot hot water storage tanks and heaters.**	**40%**

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Apprenticeship Manitoba

Plumber

Subunit: B2e Commercial/Institutional Plumbing Fixtures and Accessories

Level: Two

Duration: 17 hours

Theory: 10 hours

Practical: 7 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of commercial/institutional plumbing fixtures and accessories.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with commercial/institutional plumbing fixtures and accessories.	**5%**
2. Identify hazards and describe safe work practices pertaining to commercial/institutional plumbing fixtures and accessories.	**5%**
3. Interpret codes and regulations pertaining to commercial/institutional plumbing fixtures and accessories: barrier-free design.	**5%**
4. Interpret information pertaining to commercial/institutional plumbing fixtures and accessories found on drawings and specifications.	**5%**
5. Identify tools and equipment relating to commercial/institutional plumbing fixtures and accessories and describe their applications and procedures for use.	**5%**
6. Identify types of commercial/institutional plumbing fixtures and describe their characteristics and applications.	**5%**
7. Identify types of commercial/institutional plumbing fixture supports and describe their characteristics and applications.	**4%**
8. Identify commercial/institutional plumbing accessories and describe their characteristics and applications.	**4%**
9. Describe the procedures used to install commercial/institutional plumbing fixtures, supports and accessories.	**4%**
10. Describe the procedures used to maintain and repair commercial/institutional plumbing fixtures and accessories.	**4%**
11. Describe the procedures used to test and troubleshoot commercial/institutional plumbing fixtures and accessories.	**4%**

12. Demonstrate the procedures used to install, maintain, repair, test and troubleshoot commercial/institutional plumbing fixtures and accessories. 50%

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Apprenticeship Manitoba

Plumber

UNIT: B3 INTERIOR DRAINAGE, WASTE AND VENT SYSTEMS II

Subunit: B3a Residential Sanitary Drainage, Waste and Vent Systems II

Level: Two

Duration: 35 hours

Theory: 20 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:	**Percent of Unit Mark (%)**
1. Define terminology associated with residential sanitary drainage & venting systems.	**5%**
2. Identify hazards and describe safe work practices pertaining to residential sanitary drainage and venting systems.	**5%**
3. Interpret codes and regulations pertaining to residential sanitary drainage and venting systems. a. Dimensions b. Length	**20%**
4. Interpret information pertaining to residential sanitary drainage and venting systems found on drawings and specifications.	**5%**
5. Identify tools and equipment relating to residential DWV systems and describe their applications and use.	**5%**
6. Explain the purpose of residential DWV systems.	**2%**
7. Identify the methods of back flow protection used in residential sanitary drainage systems. a. Back water valves b. Gate valves	**3%**
8. Identify types of residential DWV systems and describe their properties and characteristics.	**10%**
9. Identify and demonstrate residential DWV components and describe their purpose and applications.	**20%**

a. Piping
b. Vents (continuous, branch, wet, circuit vent, additional circuit, relief, stack vent, vent stack, vent header)
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 DWV system components. **25%**

a. Hydraulic load
b. Code requirements

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Apprenticeship Manitoba

Plumber

UNIT: B4 HYDRONIC SYSTEMS

Subunit: B4a Piping Valves II

Level: Two

Duration: 12 hours

Theory: 10 hours

Practical: 2 hours

Overview:

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

Objectives and Content:	**Percent of Unit Mark (%)**
1. Identify types of valve actuators and describe their purpose. a. Electric b. Pneumatic c. Manual	**10%**
2. Explain piping valve rating systems. a. Pressure b. Temperature	**10%**
3. Identify the methods used to join piping valves and describe their associated procedures.	**5%**
4. Describe the procedures used to install piping valves.	**5%**
5. Describe the procedures used to maintain and repair piping valves.	**25%**
6. Describe the procedures used to test and troubleshoot piping valves.	**20%**
7. Demonstrate the procedures used to install, maintain, repair, test and troubleshoot piping valves.	**25%**

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Apprenticeship Manitoba

Plumber

Subunit: B4b Hydronic System Control

Level: Two

Duration: 40 hours

Theory: 30 hours

Practical: 10 hours

Overview:

Plumbers require a good, practical grasp of hydronic system control. This unit of instruction is the program gateway to further learning about these topics.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with hydronic system control.	**6%**
2. Identify hazards and describe safe work practices pertaining to hydronic system control.	**6%**
3. Interpret codes and regulations pertaining to hydronic system control.	**6%**
4. Interpret information pertaining to hydronic system control found on drawings and specifications.	**6%**
5. Identify tools and equipment relating to hydronic system controls and describe their applications and procedures for use.	**6%**
6. Identify types of hydronic system controls and describe their characteristics, applications and operation. a. Operating and temperature controls b. Safety controls	**6%**
7. Identify hydronic system control components and describe their purpose and operation.	**6%**
8. Describe the procedures used to install hydronic system control components.	**6%**
9. Describe the procedures used to protect hydronic system control components.	**6%**
10. Describe the procedures used to set and adjust hydronic system control components.	**6%**
11. Describe the procedures used to maintain and repair hydronic system control components.	**6%**
12. Describe the procedures used to test and troubleshoot hydronic system control components.	**6%**

13. Demonstrate the procedures used to install, maintain, repair, test and troubleshoot hydronic system control. 28%

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Apprenticeship Manitoba

Plumber

UNIT: B5 MATHEMATICS AND SCIENCE II

Subunit B5a Mathematics and Science II

Level: Two
Duration: 35 hours
Theory: 35 hours
Practical: 0 hours

Overview:

This unit of instruction is designed to provide the Plumber apprentice with the basic knowledge and understanding of intermediate Mathematics. Upon completion of this unit of instruction apprentices will also be able to show understanding of science fundamentals related to plumber situations which includes electricity

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe by reviewing level one contents relating to elevations and grades.	**6%**
2. Describe rolling offsets.	**6%**
3. Describe jumper offsets.	**6%**
4. Describe special case of 45° offset.	**6%**
5. Describe water pressure: head and force.	**6%**
6. Describe air pressure and air chambers.	**5%**
7. Describe ratio of pipe capacities.	**5%**
8. Describe ratio and proportion.	**5%**
9. Describe by reviewing any problem contents.	**5%**
10. Describe with respect to sciences hydrodynamics, hydrostatics and pneumatics. 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	**40%**

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
n. Identify and describe conversion of fps to gpm and gpm to fps, m/s to i/s and i/s to m/s
o. Identify and describe flow in venturis
p. Identify and describe Bernoulli's theorem applied
q. Identify and describe Charle's and Boyle's gas laws

11. Describe heat load calculations, fan laws and pumps. 10%

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Apprenticeship Manitoba

Plumber

UNIT: B6 FUNDAMENTALS OF ELECTRICAL APPLIANCES AND CONTROLS

Subunit: B6a Fundamentals of Electrical Appliances and Controls

Level: Two

Duration: 45 hours

Theory: 25 hours

Practical: 20 hours

Overview:

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

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define electrical terminology associated with electrical controls and appliances.	**4%**
2. Identify hazards and describe safe work practices pertaining to electrical controls and appliances	**4%**
3. Interpret codes and regulations pertaining to electrical controls and appliances.	**4%**
4. Interpret information pertaining to appliances found on drawings and specifications.	**4%**
5. Identify tools and equipment relating to electrical controls and appliances, and describe their applications and procedures for use.	**10%**
6. Identify types of electrical controls and appliances and describe their characteristics and applications. a. Residential b. Commercial c. Institutional	**15%**
7. Describe the procedures used to protect electrical controls and appliances.	**4%**
8. Describe the procedures used to test and troubleshoot electrical controls and appliances	**15%**
9. Demonstrate the procedures used to install, maintain, repair, test and troubleshoot electrical controls and appliances.	**40%**

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Apprenticeship Manitoba

Plumber

UNIT: B7 GAS CODE II

Subunit: B7a Gas Code II

Level: Two
Duration: 44 hours
Theory: 35 hours
Practical: 9 hours

Overview:

Plumbers require a good, practical grasp of intermediate level gas code content.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe B 149.1 Section 8. a. Air supply b. Gas venting	**80%**
2. Demonstrate air supply and gas venting as applied.	**20%**

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