

# Refrigeration and Air Conditioning Mechanic (Residential) Level 3

## Refrigeration and Air Conditioning Mechanic (Residential)

**Unit:** C1 Residential HVAC Estimation and Coordination

**Level:** Three

**Duration:** 14 hours

Theory: 7 hours

Practical: 7 hours

### Overview:

This unit is designed to provide the apprentice with the knowledge and skills of residential heating, ventilation and air-conditioning (HVAC) estimation and coordination. Beginning with terminology, apprentices will interpret codes, blueprints, drawings and specifications, as well as equipment and service documents pertaining to residential estimation and coordination. Apprentices will apply this knowledge by performing a residential HVAC job estimate using technical and working documents. Finally, apprentices will interpret technical and working drawings and develop a plan to coordinate the performance of a residential HVAC project.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Review terminology associated with residential heating ventilation and air-conditioning (HVAC) estimation and coordination.</b>	<b>10%</b>
<b>2. Identify safety documentation and describe safe work practices associated with residential HVAC estimation and coordination.</b>	<b>5%</b>
<b>3. Interpret codes and specifications pertaining to residential HVAC estimation and coordination.</b>	<b>10%</b>
<b>4. Review technical and working documents.</b> a. Equipment and service documents b. Drawings, blueprints and specifications	<b>25%</b>
<b>5. Demonstrate and perform a residential HVAC job estimate using technical and working documents.</b> a. Residential	<b>30%</b>
<b>6. Interpret technical and working drawings and develop a plan to coordinate the performance of a residential HVAC project.</b> a. Materials b. Equipment c. Site considerations d. Installation e. Commissioning f. Labour	<b>20%</b>

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## Refrigeration and Air Conditioning Mechanic (Residential)

**Unit:** C2 Residential HVAC Systems Installation

**Level:** Three

**Duration:** 49 hours

Theory: 36 hours

Practical: 13 hours

### Overview:

This unit is designed to provide the apprentice with knowledge and skills of residential HVAC systems installation. Beginning with terminology review, hazards, and safe work practices, the unit will include jurisdictional codes and manufactures' specifications pertaining to residential HVAC systems installation. Topics include: residential HVAC concepts and processes, system components, their characteristics and applications. Apprentices will identify and describe circulating pumps and fluid dynamics associated with residential HVAC equipment. Apprentices will also describe and demonstrate residential HVAC systems installation procedures. Finally, apprentices will perform installation of residential HVAC systems.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Review terminology associated with residential HVAC Systems Installation.</b>	<b>5%</b>
a. Concepts	
• Temperature	
• Heat	
• Mass and weight	
• Density	
• Specific gravity	
• Specific volume	
• Pressure	
<b>2. Identify hazards and describe safe work practices pertaining to residential HVAC systems installation.</b>	<b>5%</b>
<b>3. Interpret jurisdictional codes and manufacturers' specifications pertaining to residential HVAC systems installation.</b>	<b>5%</b>
<b>4. Identify and describe residential HVAC concepts and processes.</b>	<b>15%</b>
a. Heating systems	
• Electrical	
• Gas	
• Hydronic	
• Oil	
b. Psychrometric processes	
• Cooling	
• Evaporative cooling	

- Humidification
  - Heating and humidification
  - Heating
  - Heating and dehumidification
  - Dehumidification
  - Cooling and dehumidification
- c. Air quality, air circulation and ventilation
- 5. Identify and describe residential HVAC system components and their characteristics and applications. 15%**
- a. Compressors
- Reciprocating
  - Scroll
  - Rotary
- b. Electrical circuits
- Series
  - Parallel
  - Series-parallel
  - Conductor ampacity rating
- c. Air movement components
- Fans (axial, radial)
  - Mechanical drives (belt, direct)
- 6. Identify and describe circulating pumps and fluid dynamics associated with residential HVAC equipment. 15%**
- a. Terminology
- b. Types of circulating pumps
- c. Circulating pump components
- d. Circulating pump selection
- System parameters
  - Pump curves
  - Circuit configurations
- e. Circuit troubleshooting
- Potential problems of air in system
  - Procedures to purge air from an open or closed system
- 7. Describe and demonstrate residential HVAC systems installation procedures. 15%**
- a. Determine residential HVAC system parameters
- b. Determine residential HVAC loads
- Calculations
- c. Determine residential HVAC heat gain and heat loss
- Calculations
- 8. Perform installation of residential HVAC systems. 25%**
- a. Verify system parameters and requirements
- b. Material take-off
- c. Place equipment
- Components
  - Accessories

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## Refrigeration and Air Conditioning Mechanic (Residential)

**Unit:** C3 Residential HVAC Control Systems

**Level:** Three

**Duration:** 73 hours

Theory: 50 hours

Practical: 23 hours

### Overview:

This unit is designed to provide the apprentice with knowledge and skills of residential HVAC control systems. Beginning with terminology, the unit will interpret information pertaining to residential HVAC electronic controls and control systems found on drawings, specifications, service manuals, codes and regulations. Topics will include: tools and equipment used to start up residential HVAC control systems and set operating parameters, operation of residential HVAC control systems, devices and their components. Apprentices will describe the procedures used to verify basic electrical control circuit systems and components using schematic wiring diagrams. Apprentices will also describe and demonstrate the procedures used to perform basic diagnosis, calibrate components and adjust parameter set points of electronic controls. Finally, apprentices will perform installation of residential control systems and their components with start-up checks for residential HVAC control systems and set operating parameters.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
1. Define terminology associated with residential HVAC control systems and their components.	5%
2. Identify types of tools and equipment used to start up residential HVAC control systems and to set operating parameters.	5%
3. Identify the types and explain the purpose and operation of residential HVAC control systems, devices and their components, and describe their characteristics and applications.	10%
a. Electrical	
b. Mechanical	
c. Electronic	
d. Integrated control circuits	
4. Interpret information pertaining to residential HVAC electronic controls and control systems found on drawings, specifications, service manuals, codes and regulations.	10%
5. Describe the procedures to start up and commission residential HVAC control systems and to verify and set operating parameters.	15%
6. Describe the procedures to verify basic electrical control circuit systems and components using schematic wiring diagrams.	10%

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|-----------|---|------------|
| <b>7.</b> | <b>Describe and demonstrate the procedures to perform a basic diagnosis, calibrate components and adjust parameter set points of electronic controls.</b> | <b>15%</b> |
| <b>8.</b> | <b>Perform installation of residential control systems and their components.</b>  | <b>15%</b> |
| <b>9.</b> | <b>Perform start-up checks for residential HVAC control systems and set operating parameters</b>  | <b>15%</b> |

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## Refrigeration and Air Conditioning Mechanic (Residential)

**Unit:** C4 Residential HVAC Systems Commissioning and Service

**Level:** Three

**Duration:** 42 hours

Theory: 26 hours

Practical: 16 hours

### Overview:

This unit is designed to provide the apprentice with knowledge and skills of residential HVAC systems commissioning and service. Beginning with terminology, hazards and safe work practices, the unit will interpret codes, regulations and information pertaining to HVAC systems service. Topics include: HVAC systems, components, accessories and their characteristics and applications. Apprentices will identify and describe tools and equipment used for checking and completing HVAC system charge, as well as their applications and procedures for use. Apprentices will also describe and demonstrate HVAC systems commissioning and service procedures. Finally, apprentices will perform HVAC systems service on various types of HVAC equipment.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Identify types of residential HVAC systems, components, accessories and describe their characteristics and applications.</b>	<b>5%</b>
a. Electrical components	
b. Heat pump systems	
c. Air movement/indoor air quality (IAQ)	
<b>2. Identify tools and equipment used for checking residential HVAC system equipment, components, accessories, as well as completing residential HVAC system charge and describing their applications and procedures for use.</b>	<b>5%</b>
<b>3. Describe the procedures to install residential HVAC systems.</b>	<b>5%</b>
<b>4. Interpret information pertaining to residential HVAC systems found in drawings, wiring diagrams, manufacturers' literature and schematic diagrams.</b>	<b>5%</b>
<b>5. Describe the sequence of operation prior to start-up.</b>	<b>10%</b>
<b>6. Describe the methods used to determine the charge of a residential HVAC system.</b>	<b>10%</b>
a. Measuring superheat and sub-cooling	
b. Weighing critical charge	
c. Interpreting charge charts	
d. Checking sight glass	
<b>7. Interpret codes and regulations pertaining to residential HVAC equipment, components and accessories.</b>	<b>5%</b>

- 8. Describe the factors to perform a residential HVAC system start-up. 10%**
- a. Phasing
  - b. Voltage imbalance and amperage
  - c. Refrigerant charge adjustments
  - d. Oil levels
  - e. Operating pressures and temperatures
  - f. System control adjustments
  - g. Manufacturers' recommendations
  - h. Liquid or air requirements
- 9. Describe and demonstrate documentation procedures to start up and commission residential HVAC systems. 5%**
- 10. Describe and demonstrate the procedures to test and adjust components. 10%**
- a. Blowers
  - b. Fans
  - c. Pumps
  - d. Compressors
  - e. Motors
  - f. Dampers
  - g. Temperature/pressure controls
  - h. Valves
  - i. Safety components
- 11. Perform systems service on various types of residential HVAC equipment. 30%**
- a. Pre-start-up check
  - b. Start-up
  - c. Primary and secondary component set up
  - d. Commission
  - e. Troubleshoot
  - f. Repair

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## Refrigeration and Air Conditioning Mechanic (Residential)

**Unit:** C5 Residential HVAC Motors

**Level:** Three

**Duration:** 21 hours

Theory: 15 hours

Practical: 6 hours

### Overview:

This unit is designed to provide the apprentice with knowledge and skills of residential HVAC motors. Beginning with terminology, the unit will explain the principles of multi-phase motor operation and residential motor controls. Topics include: types of starting devices for residential HVAC multi-phase motors, wiring configuration and operation, as well as motor failure causes and remedies. Apprentices will identify and describe various systems and controllers used to change speed and rotation of residential HVAC multi-phase motors. Apprentices will also describe the procedures used to install single and multi-phase residential HVAC motors, controls and components. Finally, apprentices will describe and demonstrate the procedures to troubleshoot and maintain or replace single and multi-phase residential HVAC motors and their controls and components.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
1. Define terminology associated with residential HVAC multi-phase motors and motor controls.	5%
2. Explain the principles of multi-phase motor operation.	5%
3. Identify types of starting devices for residential HVAC multi-phase motors and describe their characteristics, wiring configuration and operation.	15%
4. Identify single and multi-phase residential HVAC motor failures and describe their causes and remedies. a. Electrical b. Mechanical c. Inverter systems	15%
5. Identify and describe various systems and controllers used to change speed and rotation of residential HVAC multi-phase motors.	10%
6. Describe the procedures to install single and multi-phase residential HVAC motors, controls and components.	15%
7. Describe and demonstrate the procedures to troubleshoot, maintain or replace single and multi-phase residential HVAC motors and their controls and components.	35%

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## **Refrigeration and Air Conditioning Mechanic (Residential)**

**Unit: C6 Residential HVAC Duct Systems**

**Level:** Three

**Duration:** 28 hours

Theory: 16 hours

Practical: 12 hours

### **Overview:**

This unit is designed to provide the apprentice with knowledge and skills of residential HVAC duct systems. Beginning with terminology, hazards, and safe work practices, the unit will interpret codes and regulations pertaining to residential HVAC duct systems. Topics include: duct system tools, equipment components and their applications and procedures for use. Apprentices will identify and describe duct system design principles, considerations and techniques. Apprentices will also describe and demonstrate duct system procedures for residential HVAC equipment, components and accessories. Finally, apprentices will perform the procedures to plan, install, maintain and troubleshoot duct systems and their components, to develop patterns using simple layout, and to balance air systems.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Define terminology associated with residential HVAC duct systems and design.</b>	<b>5%</b>
a. Duct systems	
b. Air measurement and system balancing	
c. Duct system design	
d. Simple layout	
<b>2. Identify hazards and describe safe work practices pertaining to residential HVAC duct systems.</b>	<b>5%</b>
<b>3. Identify and interpret codes and regulations pertaining to residential HVAC duct systems.</b>	<b>5%</b>
<b>4. Identify types of tools and equipment and describe their applications and procedures for use.</b>	<b>15%</b>
a. Types of tools	
• Layout	
• Fabrication	
• Installation	
• Monitoring and air measurement	
b. Duct systems	
• Basic patterns	
c. Components	
• Fittings	
• Transitions	

- 5. Identify and describe duct system design principles, considerations and techniques. 15%**
- a. Air movement and air quality management
    - Conditions affecting air properties
  - b. Duct systems factors
    - Design
    - Sizing
    - Layout
- 6. Describe and demonstrate duct system procedures for residential HVAC equipment, components and accessories. 35%**
- a. Plan
    - Develop simple layout patterns
  - b. Duct system calculations
    - Simple layout
    - System air balancing
  - c. Fabricate
    - Basic Fittings
  - d. Install
    - Balance air systems
  - e. Maintain and adjust
  - f. Troubleshoot
    - Potential Problems
    - Potential causes
  - g. Repair
- 7. Perform the procedures to plan, install and maintain residential duct systems. 20%**
- a. Develop simple layout patterns
  - b. Fabricate components
  - c. Install components
  - d. Balance air systems

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## Refrigeration and Air Conditioning Mechanic (Residential)

**Unit:** C7 Residential HVAC Heat Pump Retrofit

**Level:** Three

**Duration:** 28 hours

Theory: 21 hours

Practical: 7 hours

### Overview:

This unit is designed to provide the apprentice with the knowledge and skills for retrofitting existing residential HVAC equipment with heat pump technologies. Beginning with terminology, hazards, and safe work practices, the unit will include interpreting manufactures' equipment specifications to meet various residential HVAC applications. Topics will include analyzing existing residential HVAC systems to identify energy efficiencies of a new residential HVAC heat pump system. Apprentices will describe and demonstrate the procedures to install new energy efficient residential HVAC equipment and controls for heat pump systems as well as retrofit and commission the system. Finally, apprentices will perform the procedures to analyze existing equipment and identify energy efficiencies with residential heat pump retrofits so the correct equipment can be matched with the customer application.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Define terminology associated with retrofitting residential HVAC heat pump retrofit.</b>	<b>5%</b>
a. Heat pump technology	
• Air to air	
• Liquid to air	
• Liquid to liquid	
• Air to liquid	
<b>2. Identify hazards and safe work practices pertaining to retrofitting residential HVAC heat pump retrofit.</b>	<b>5%</b>
a. Environmental	
b. Modification and removal of existing systems	
<b>3. Interpret jurisdictional codes and manufactures' specifications pertaining to retrofitting residential HVAC heat pump retrofit.</b>	<b>5%</b>
a. Electrical requirements	
b. Heat pump equipment requirements	
c. Cold climate heat pump applications	
<b>4. Identify and analyze existing HVAC systems and determine energy efficiencies of a new residential HVAC heat pump system.</b>	<b>15%</b>
a. Existing system challenges	
b. Opportunities for energy efficiency	

- c. Federal and Provincial grants
- d. Emerging HVAC heat pump technology
- e. Whole system replacement vs targeted matched unit replacement
- f. Supplementing existing equipment
- g. Equipment selection and application considerations

**5. Describe the procedures to install new energy efficient residential HVAC equipment and controls for heat pump systems. 35%**

- a. Replace or adapt fossil-fuel equipment to heat pumps
- b. Add heat pumps to supplement existing systems
  - Centrally ducted
  - Unitary product (wall units)
- c. Adapt ductwork for heat pump systems
  - Determine airflow limitations and restrictions in existing ducting systems
  - Calculate new requirements for ductwork to match heat pump air flow
  - Possible equipment re-location
- d. Optimize controls for high-efficiency heat pump systems
  - Advance control settings / thermostats
  - Select equipment parameters and adjust set points

**6. Describe and demonstrate the procedures to retrofit and commission residential HVAC heat pump systems. 20%**

- a. Commission heat pump retrofits
  - Equipment
  - Components
  - Accessories
- b. Post-installation maintenance on high-efficiency heat pump systems

**7. Perform the procedures to analyze existing equipment and identify energy efficiencies with heat pump retrofits. 15%**

- a. Determine existing energy efficiency
- b. Provide a customer recommendation
- c. Add heat pumps to supplement existing systems
- d. Adapt ductwork for heat pump systems
- e. Optimize controls for high-efficiency heat pump systems
- f. Commission heat pump retrofits

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## **Refrigeration and Air Conditioning Mechanic (Residential)**

**Unit:** C8 Gas Code III

**Level:** Three

**Duration:** 25 hours

Theory: 20 hours

Practical: 5 hours

### **Overview:**

Upon completion of this unit of instruction the apprentice will demonstrate knowledge of Gasfitter requirements, including propane. This unit is a review and continuation of B9 *Gas Code II* in Level Two.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
1. Describe propane code B149.2.	35%
2. Describe propane fundamentals.	10%
3. Describe propane fundamentals as applied.	25%
4. Describe B149.1 section 7.	20%
5. Describe Manitoba gas notices.	10%

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## Refrigeration and Air Conditioning Mechanic (Residential)

**Unit:** C9 Journeyperson Trainer

**Level:** Three

**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, skill requirements, and 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 (%)**

- |   |            |
|---|------------|
| <b>1. Compare/contrast role-options and responsibilities of the supervising journeyperson.</b>  | <b>50%</b> |
| 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 apprentice, 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 for new tasks and skills
  - Providing help and guidance for 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 ethic regarding one's responsibility to share one's knowledge and skills 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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## Refrigeration and Air Conditioning Mechanic (Residential)

**Unit:** C10 Pre-Provincial Exam Review

**Level:** Three

**Duration:** 28 hours

Theory: 28 hours

Practical: 0 hours

### Overview:

This unit offers senior apprentices a systematic review of skills and knowledge required to pass the 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.**

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Describe the significance, format and general content of Provincial Examinations for the trade of Refrigeration and Air Conditioning Mechanic (Residential).</b></p> <ul style="list-style-type: none"> <li>a. Scope and aims of Provincial certification; value of certifications</li> <li>b. Obligations of candidates for Provincial certification               <ul style="list-style-type: none"> <li>• Relevance of Provincial Examinations to current, accepted trade practices; industry-based provincial validation of test items</li> <li>• Supplemental Policy (retesting)</li> <li>• Confidentiality of examination content</li> </ul> </li> <li>c. Multiple-choice format (four-option) item format, Red Seal standards for acceptable test items</li> <li>d. Government materials relevant to the Provincial Examinations for apprentice Refrigeration and Air Conditioning Mechanics (Residential)               <ul style="list-style-type: none"> <li>• Provincial Occupational Standard (POS) – for RACM (Residential); prescribed scope of the skills and knowledge which comprise the trade</li> <li>• POS "Pie-chart" and its relationship to content distribution of Interprovincial Examination items</li> <li>• Provincial Examination Breakdown</li> <li>• Apprenticeship Manitoba Technical Training package</li> </ul> </li> </ul>	n/a
<p><b>2. Identify resources, strategies and other considerations for maximizing successful completion of written examinations.</b></p> <ul style="list-style-type: none"> <li>a. Personal preparedness               <ul style="list-style-type: none"> <li>• Rest</li> <li>• Nutrition</li> <li>• Personal study regimen</li> <li>• Prior experience in test situations (e.g., Unit Tests)</li> </ul> </li> </ul>	n/a

- 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 common occupational skills.** n/a
  4. **Review program content regarding the major work activity of routine trade activities.** n/a
  5. **Review program content regarding the major work activity of plans installation of residential HVAC systems.** n/a
  6. **Review program content regarding the major work activity of residential HVAC installation.** n/a
  7. **Review program content regarding the major work activity of residential HVAC commissioning.** n/a
  8. **Review program content regarding the major work activity of residential HVAC maintenance and service.** n/a

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