Apprenticeship Manitoba

Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic: Common Core Level 1

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A1 Learning About Work

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

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

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

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

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 structure and scope of the Agricultural Equipment Technician, Heavy Duty Equipment Technician, and Truck and Transport Mechanic trades.	**n/a**

a. The Apprenticeship and Certification Act
   - Apprenticeship and Certification Board and Provincial Advisory Committees
   - General and specific trade regulation
   - Policies regarding attendance, evaluation procedures, conduct and progression requirements (Apprenticeship Manitoba, Training provider)

b. Uses of the National Occupational Analysis (NOA)
   - Technical training in-school curriculum
   - On-the-job record book of hours (Manitoba blue book)
   - Examinations (level placement tests, final certification examinations)

c. Opportunities and future career options

- Generalists and specialists. The move toward specialization is well known to modern tradespeople. Some prefer to specialize and others want to do it all. Supervisory positions require a broad scope.
- Lead hands and other immediate supervisors. Apprentices need to know how to become a lead-hand as much as they need to know the benefits and pit-falls of leadership between management and shop floor workers.
- Geographic mobility. What does it mean to a construction/industrial worker to have to travel to find work? Are there more opportunities if they do? What are they? What are the drawbacks to being away from home for several weeks at a time?
- Job hierarchies and innovations. What trade specific special training opportunities are available in your trade? Is there travel involved? Is there an opportunity to move up the ladder on a work crew as opposed to staying in the shop?

2. Describe two levels of workplace competency. **n/a**

a. Job competencies related to workplace culture
   - Knowledge of workplace equipment and materials
   - Skills and techniques

b. Social competencies related to workplace culture
   - Frame of reference for evaluation workplace events
   - Language of work
   - Workplace belief systems
   - Rules and meanings
   - Multiculturalism and equity in the workplace

3. Describe accommodation for apprentices with disabilities. **n/a**

a. Technical training
   - Requirements
   - Roles and responsibilities
   - Services and information required by persons with disabilities

b. On-the-job
   - Requirements
   - Roles and responsibilities
   - Services and information required by persons with disabilities

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A2 Trade Safety Awareness

Level: One

Duration: 7 hours

Theory: 7 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 trade apprenticeship training both in school and on-the-job. Unit content is supplemented throughout Technical Training by trade-specific information about trade 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. Instead, a 'Pass/Fail" grade will be recorded for the unit in its entirety.**

Objectives and Content:	**Percent of Unit Mark (%)**
1. Identify safety and health requirements.	**n/a**
a. Overview of The Workplace Safety and Health Act ("the 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: Canadian Standards Association (CSA), American National Standards Institute (ANSI) and guidelines	

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 electrical safety. **n/a**

a. Effects of electric current on the human body
b. Three factors that affect the severity of an electric shock
c. The effects of arc and blast on the human body and equipment
d. Work with energized equipment

4. Identify fire safety. **n/a**

a. Types of fires
b. Types of fire fighting equipment
c. Classifications of fire extinguishers (A, B and C)
d. Location of fire extinguishers and fire exits
e. Fire alarms and drills

5. Identify ergonomics. **n/a**

a. Definition of ergonomics and conditions that may affect the body
   - Working postures
   - Repetition
   - Force
   - Lifting (simple safety procedures and precautions related to material handling procedures on how to lift carry and put down a load)
   - Tools
   - Identify tool and safety equipment
   - Causes of hand tool accidents
   - Equipment

6. 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

7. Hazard of confined space entry: **n/a**

a. Identification of a confined space
b. Hazards of a confined space
   - Physical
   - Biological
c. Working in a confined space
d. Emergency response plan
e. Self contained breathing apparatus (SCBA)

8. Identify First Aid/CPR: **n/a**

a. Overview of First Aid Regulation
b. Obligations of employers regarding First Aid
   - Who is certified to provide First Aid?
   - What to do while waiting for help?
   - Where is 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 (eg. Workers Compensation claims)
d. Describe basic Cardiopulmonary Resuscitation (CPR) requirements and techniques
   - How do you get certified?
   - Scope and limits of CPR intervention (include varieties of CPR certification)

9. Identify the safety requirements as they apply to WHMIS with emphasis on: **n/a**

a. WHMIS is a system
b. Provincial Regulation under The Workplace Safety and Health Act
   - Each province has a WHMIS regulation
c. Federal Hazardous Products Act
d. WHMIS generic training:
   - WHMIS defined and the format used to convey information about hazardous materials in the workplace
   - Information found on supplier and workplace labeling using WHMIS
   - Hazardous materials in accordance with WHMIS
   - Compliance with government safety standards and regulations
e. Description of WHMIS (include varieties of WHMIS Certification)
   - Typology of WHMIS labels, symbols, and classifications
   - Scope and use of Materials Safety Data Sheets (MSDS)

10. Identifying and controlling hazards: **n/a**

a. Basic control measures (injury prevention)
b. Safe work procedures
c. Explanation on the importance of industrial housekeeping
d. Employer responsibilities
e. How and where to store materials
f. Safety measures related to walkways, stairs and floor openings
g. Explanation of how to protect the worker and others when working in traffic paths

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A3 Tools and Equipment

Level: One
Duration: 28 hours
Theory: 7 hours
Practical: 21 hours

Overview:

This unit is designed to provide the apprentice with knowledge about workshop practices and materials when working with today's agricultural, heavy duty and truck and transport equipment. Beginning with the terminology associated with workshop practices and materials, the unit covers major types of tools and equipment that is used and principles of their use. Finally, the unit covers procedures related to starting, moving and shutting down machinery.

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

1. Define terminology associated with workshop practices and materials. **35%**

a. Tools and equipment
b. Hoisting and lifting
c. Moving machinery
d. Materials
   - Aluminum
   - Steel
   - Cast iron
   - Brass
   - Copper
   - Plastics/composites
e. Fasteners and sealants
   - Gaskets
   - Seals
   - Sealing compounds
   - Nuts/bolts/screws
   - Tubes/hoses/fittings/clamps
f. Bearings
   - Friction-type
   - Non friction-type

2. Describe and identify tools and equipment. **25%**

a. Hand tools
b. Measuring tools
c. Power tools

d. Shop equipment

3. Explain and demonstrate the principles of use of workshop tools and equipment. 25%

a. Tools and equipment
   - Hand tools
   - Measuring tools
   - Cleaning tools

b. Materials
   - Aluminum
   - Steel
   - Cast iron
   - Brass
   - Copper
   - Plastics/composites

c. Fasteners and sealants
   - Gaskets
   - Seals
   - Sealing compounds
   - Nuts/bolts/screws
   - Tubes/hoses/fittings/clamps

4. Describe the procedures used to start, move and shutdown machinery. 15%

a. Lock out/tag out

b. Situational awareness

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A4 Trade Communications, Documents and Computer Skills

Level: One

Duration: 21 hours

Theory: 21 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about trade related communications, documents and computer skills when working with today's agricultural, heavy duty and truck and transport equipment. The unit covers the role of effective communication and methods of professional communication. It also covers the identification codes found on vehicles and vehicle components. Finally, the unit provides knowledge on both general organization and basic retrieval strategies for trade-related documents, and trade-related computer skills.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe the importance of effective communication. a. Customers b. Co-workers c. Related professionals d. Journeyperson/apprentice	**10%**
2. Describe and demonstrate the methods of professional communication. a. Phone b. Email c. Instant messaging/texting d. Fax e. Other methods of communication	**10%**
3. Locate and interpret identification codes found on the vehicle and vehicle components. a. Vehicle Identification Numbers (VINs) b. Serial numbers • Vehicle ID • Part ID • Model ID	**5%**
4. Identify and interpret types of service related documents. a. Work orders b. Schematics and service information	**25%**

c. Technical service bulletins (TSB)
d. Preventive maintenance schedules
e. Parts lists
f. Time estimates
g. Component specifications, OEM vs. provincial (safety inspections)

5. Describe general organization and basic retrieval strategies for trade-related documents. **25%**

a. Service bulletins
b. Tech bulletins
c. Service manuals
d. Other publications
e. Online resources, including Learning Management Systems (LMSs)

6. Demonstrate trade-related computer skills. **25%**

a. Basic computer skills
   - Application programs
   - Common computer commands
   - File management tasks (create and organize)
b. Internet searching skills for trade-related research
   - Search engines via Universal Resource Locator (URL) addresses
   - Key word search
   - Filtering results

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A5 Engine Principles

Level: One

Duration: 35 hours

Theory: 7 hours

Practical: 28 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about engine principles when working with today's agricultural, heavy duty and truck and transport equipment, including principles and theories of engine operation and major engine components.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with engine principles.	**30%**
2. Explain the principles and theories of engine operation. a. Basic combustion principles b. Two-stroke cycle c. Four-stroke cycle d. Compression ignition e. Spark ignition	**30%**
3. Identify types and classifications of engines and describe their applications. a. Diesel b. Gasoline c. Liquid-cooled d. Air-cooled	**10%**
4. Identify major engine components and describe their purpose and operation. a. Cooling b. Lubrication c. Diesel fuel supply systems d. Intake and exhaust e. Starting aids f. Base engine components • Cylinder block and head • Valve train • Pistons and connecting rods • Crankshaft	**30%**

g. Emission components

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A6 Electrical Fundamentals

Level: One

Duration: 70 hours

Theory: 14 hours

Practical: 56 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about electrical systems when working with today's agricultural, heavy duty and truck and transport equipment. The unit covers the principles of electrical systems, electricity and electronics. The unit also covers schematics and symbols, and the maintenance and testing of batteries.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with electrical systems. a. Electricity, electronics and magnetism b. Batteries c. Lighting circuits, wiring harnesses, gauges and accessories	**15%**
2. Identify hazards and describe safe work practices pertaining to electrical systems. a. Electricity, electronics and magnetism b. Batteries c. Lighting circuits, wiring harnesses, gauges and accessories	**10%**
3. Identify and describe tools and equipment used to service and repair electrical systems. a. Laptop b. Scanners c. Multimeters/amp clamps d. Battery load testers	**10%**
4. Explain and apply the principles of electrical systems and electricity. a. Magnetism b. Ohm's Law c. Voltage potential d. Current flow e. Resistance f. Conductors g. Insulators	**10%**

5. Identify conventional electrical system components. **10%**

a. Batteries
b. Lighting
c. Circuit protection
d. Relays, switches and solenoids
e. Motors and actuators
f. Gauges

6. Identify electronic system components. **5%**

a. Semi-conductors
b. Capacitors
c. Resistors

7. Interpret schematics and symbols. **15%**

a. Conventional electrical systems
b. Electronic components

8. Describe and maintain batteries. **15%**

a. Types of batteries
b. Testing and evaluating battery condition
   - Specific gravity
   - Load testing
   - Capacitance
c. Charging and boosting procedures
d. Hook up procedures for 12V/24V

9. Perform basic tests to service and repair electrical systems. **10%**

b. Charging and starting systems
c. Lighting circuits, wiring harnesses, gauges and accessories

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A7 Braking Systems and Wheel-End Safety

Level: One

Duration: 35 hours

Theory: 12 hours

Practical: 23 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about brake systems and wheel-end safety when working with today's agricultural, heavy duty and truck and transport equipment. The unit begins by covering terminology and safe work practices for brake systems and wheels. The unit then covers the tools and equipment used when servicing and repairing vehicle brake systems and wheels. Finally, the unit covers the brake system components, tires, rims and wheels, and servicing procedures for hydraulic and electric braking systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with the braking system and wheel-end. a. Hydraulic b. Electric c. Air d. Tires e. Rims f. Wheels	**5%**
2. Identify hazards and describe safe work practices pertaining to the brake system and wheel-end. a. Hydraulic b. Electric c. Air d. Tires e. Rims f. Wheels	**5%**
3. Identify and describe tools and equipment used to service and repair vehicle brake systems, tires, rims and wheels. a. Hydraulic b. Electric c. Air	**5%**

4. Identify types of tires, rim and wheels, and describe their characteristics and applications. **10%**

a. On-road
   - Radial
   - Bias-ply
   - Tube
   - Tubeless

b. Off-road
   - Loaded
   - Non-loaded

c. Codes and regulations
   - Jurisdictional requirements

d. Rims and wheels
   - Hub pilot
   - Stud pilot
   - Spoke wheel
   - Multi-piece

5. Explain the types and principles of vehicle brake systems. **15%**

a. Hydraulic/pneumatic-related formula
b. Coefficient of friction
c. Stopping distance calculations
d. Drum
e. Disc
f. Wedge

6. Identify the following hydraulic brake system components and describe their purpose and operation. **15%**

a. Master cylinder
b. Brake booster
c. Foundation brake (disc and drum)
d. Hydraulic brake valves, cylinders and switches
e. Hydraulic ABS system components

7. Describe vehicle hydraulic brake system components and demonstrate service procedures. **15%**

a. System components
b. Service procedures
   - Bleeding
   - Inspection
   - Adjustment

8. Describe vehicle electric brake system components and demonstrate service procedures. **10%**

a. System components
b. Service procedures
   - Inspection
   - Adjustment

9. Describe vehicle basic air brake system components and demonstrate service procedures. **10%**

a. System components
b. Service procedures

- Inspection
- Adjustment

10. Describe the procedures used to service, inspect and maintain tires, rims and wheels. **10%**

a. System components
   - Remove and install
   - Repair tires
   - Balance
   - Torque and re-torque

b. Hub inspection
   - Wheel bearings
   - Wheel hub seals

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A8 Hoisting and Lifting

Level: One

Duration: 7 hours

Theory: 2 hours

Practical: 5 hours

Overview:

This unit of instruction is designed to provide the agricultural equipment technician, heavy duty equipment technician, and truck and transport mechanic apprentice with the working knowledge required to effectively and safely use proper lifting techniques and equipment as defined by broad occupational health and safety standards.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with hoisting and lifting.	**45%**
2. Describe towing, lifting and hoisting equipment and their procedures. a. Hoisting and lifting equipment, including their limitations. b. Safety practices, hand signals communications, and maintenance of hoisting and lifting equipment. c. Towing, transporting and coasting precautions. d. Hoisting and lifting equipment construction, grading, sizing and limits. e. Selection and inspection of correct equipment for rigging typical loads. f. Hoisting and lifting equipment including slings, ropes, and chains.	**55%**

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A9 Basic Hydraulic Systems

Level: One

Duration: 21 hours

Theory: 7 hours

Practical: 14 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about hydraulic systems when working with today's agricultural, heavy duty and truck and transport equipment. The unit begins by covering terminology and safe work practices for hydraulic systems. The unit then covers the tools and equipment used when servicing and repairing hydraulic systems. Finally, the unit covers the hydraulic systems and components, and their inspection, diagnosis and servicing procedures.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with hydraulic/hydrostatic systems and system components.	**10%**
2. Identify hazards and describe safe work practices pertaining to hydraulic/hydrostatic systems. a. Hydraulic system and hydraulic system components b. Hydraulic fittings, piping, tubing, hoses c. Reservoirs, coolers, and filters	**10%**
3. Identify and describe tools and equipment used to service and repair hydraulic/hydrostatic systems. a. Hydraulic system and hydraulic system components b. Hydraulic fittings, piping, tubing, hoses c. Reservoirs, coolers, and filters	**10%**
4. Explain the principles and theories of hydraulics/hydrostatics. a. Pascal's law b. Bernoulli's principle c. Units of measure d. Formulae and their applications	**10%**
5. Identify hydraulic/hydrostatic system components and interpret hydraulic/hydrostatic-related symbols. a. Schematics b. Pumps	**20%**

- Positive displacement
- Non-positive displacement
- Fixed displacement
- Variable displacement
- Charge pump

c. Actuators
- Linear
- Rotary

d. Valves
- Pressure
- Directional
- Flow control

e. Reservoirs, coolers, and accumulators
f. Fluids and filters
g. Fittings, piping, tubing and hoses
h. Motors

6. Describe and demonstrate procedures used to inspect, diagnose and maintain hydraulic/hydrostatic systems. 20%

a. Hydraulic system and hydraulic system components
b. Hydraulic fittings, piping, tubing, hoses
c. Reservoirs, coolers, and filters

7. Describe and demonstrate servicing procedures for hydraulic/hydrostatic systems. 20%

a. Hydraulic system and hydraulic system components
b. Hydraulic fittings, piping, tubing, hoses

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A10 Frames, Suspensions, and Structural Components

Level: One

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about frames, suspension systems and structural (cab) components when working with today's agricultural, heavy duty and truck and transport equipment. The unit begins by covering terminology and safe work practices for frames, suspension systems, and cab components. The unit then covers the tools and equipment used when servicing and repairing frames, suspension systems, and cab components. Finally, the unit covers the procedures used to inspect, diagnose and maintain and service frames, suspension systems, cab components, and their related components.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with frames, front and rear axles, suspension systems, and cab components.	**10%**
2. Identify hazards and describe safe work practices pertaining to frames, front and rear axles, suspension systems, and cab components.	**5%**
3. Identify and describe tools and equipment used to service and repair frames, front and rear axles, and suspension systems.	**5%**
4. Describe the operation of frames, front and rear axles, and suspension systems.	**15%**
5. Identify the following frame, suspension system, and cab components, and describe their purpose and operation. a. Frames • Cross members b. Front and rear axles • Single • Multi • Solid ("I" beam) c. Suspension systems • Spring (steel and composite) • Air • Rubber block d. Interior cab • Pedals	**15%**

- Seats
- Restraints
- Windows and windshields

e. Exterior cab
- Wipers
- Mirrors
- Door handles
- Steps
- Latches and cables
- Proximity/backup alarms
- Roll-over protective structure (ROPS)

6. Describe and demonstrate procedures used to inspect, diagnose and maintain: 25%

a. Frames
- Cross members
- Alignment

b. Front and rear axles
- Single
- Multi
- Solid (“I” beam)

c. Suspension systems
- Spring (steel and composite)
- Air
- Rubber block

d. Tracks and track frames

e. Hitches and couplers

7. Describe and demonstrate servicing procedures for systems: 15%

a. Frames
- Cross members
- Welding and reinforcement

b. Front and rear axles
- Single
- Multi
- Solid (“I” beam)

c. Suspension systems
- Spring (steel and composite)
- Air
- Rubber block

d. Tracks and track frames

e. Hitches and couplers

8. Describe and demonstrate servicing procedures for cab components. 10%

a. Interior
- Pedals
- Seats
- Restraints
- Windows and windshields

b. Exterior
- Wipers
- Mirrors

- Door handles
- Steps
- Latches and cables
- Proximity/backup alarms
- Roll-over protective structure (ROPS)

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Apprenticeship Manitoba

Agricultural Equipment Technician/Heavy Duty Equipment Technician/Truck and Transport Mechanic

Unit: A11 HVAC and Environmental Controls I

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about heating, ventilation and air conditioning (HVAC) systems when working with today's agricultural equipment. The unit covers terminology and safe work practices for HVAC systems.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with heating, ventilation and air conditioning (HVAC) systems and system components.	**50%**
2. Identify hazards and describe safe work practices pertaining to HVAC systems. a. Air conditioning, including: • Refrigerants • High pressure gas safety (nitrogen testing) b. Heating system	**50%**

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Apprenticeship Manitoba

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Unit: A12 Welding I

Level: One

Duration: 28 hours

Theory: 7 hours

Practical: 21 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about welding (heating and cutting) when working with today's agricultural, heavy duty and truck and transport equipment. The unit begins with terminology, hazards and safe work practices related to heating, cutting and welding. The unit covers oxy-fuel types of welding and cutting equipment and their principles of operation.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Define terminology associated with cutting, heating and welding. a. Oxyacetylene b. Metallurgy	**10%**
2. Identify hazards and describe safe work practices pertaining to cutting, heating and welding. a. Personal b. Shop/facility • Awareness of surroundings c. Equipment/vehicle d. Ventilation e. Oxyacetylene equipment	**10%**
3. Identify and describe the types of oxyacetylene cutting, heating and welding equipment	**10%**
4. Explain and demonstrate the principles of operation of oxyacetylene cutting, heating and welding equipment.	**10%**
5. Demonstrate and perform the following processes using oxyacetylene equipment. a. Cutting b. Heating c. Welding and/or brazing	**60%**

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