

Ironworker (Generalist)

Level 3

Ironworker (Generalist)

Unit: C1 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 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:	<u>Percent of Unit Mark (%)</u>
1. Compare/contrast role-options and responsibilities of the supervising journeyperson.	%
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. %

- 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: C2 Rigging III

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit builds on Rigging II and provides the apprentice with additional knowledge about techniques for hoisting, lifting and rigging, and related aspects. The unit also focuses on the general procedures to rig materials and equipment, including rigging calculations for hoisting and hauling operations.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with hoisting, lifting and rigging.	10%
2. Identify equipment and accessories for rigging and hoisting, including their limitations and applications.	25%
a. Air film technology	
b. Hydraulic gantries	
c. Self-propelled modular units	
d. Strand jack technology	
e. Jacks and rollers	
3. Describe and demonstrate inspection, maintenance and storage procedures for hoisting, lifting and rigging.	5%
4. Perform rigging calculations for hoisting and hauling operations.	10%
a. Safe work loads	
b. Breaking strength	
c. Tension calculations	
d. Load weight determination	
e. Centre of gravity calculations	
5. Describe and demonstrate procedures to safely rig materials and equipment for hoisting and hauling.	50%
a. General procedures, including:	
• Determination of load weight, load type, and weight-distribution	
• Methods of communication	
• Placement of load	
• Pre-lift and post-lift inspections	
b. Specific hazards, precautions, and safe work practices	

- Procedures to ensure work area is safe for hoisting and lifting
 - Supervision of lift
- a. Sling configuration
 - b. Hardware selection
 - c. Load control
 - d. Safe practices
 - e. Hazard identification
 - f. Communication – hand signal and electronic
 - g. Applicable jurisdictional codes and regulations

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Unit: C3 Welding III

Level: Three

Duration: 28 hours

Theory: 14 hours

Practical: 14 hours

Overview:

This unit builds on Welding II and provides apprentices with improved knowledge of the equipment, accessories, and procedures associated with welding, gouging and plasma-arc cutting operations.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe and demonstrate advanced welding concepts and processes.	15%
a. Technical terminology	
b. Welding processes, including description of characteristics and applications	
• Shielded metal arc welding (SMAW)	
• Gas metal arc welding (GMAW)	
• Gas tungsten arc welding (GTAW)	
• Flux core arc welding (FCAW)	
• Stud welding	
• Arc-spot welding (ASW)	
• Carbon-arc gouging	
• Plasma-arc cutting	
c. Overview of types, welding positions, and their applications	
2. Describe and demonstrate application of industry standards.	5%
a. Codes and standards, including Canadian Welding Bureau (CWB)	
b. Interpreting welding/gouging information (including symbols and abbreviations) communicated via technical drawings	
3. Describe and demonstrate safe operation of advanced welding, gouging, and plasma-arc cutting processes.	20%
a. Identification of hazards and precautions.	
• Personal	
• Shop/facility	
• Equipment	
• Ventilation	
• Storage/handling	
b. Setup and adjustment, including current selection, gas types and flow rates:	
• SMAW	
• GMAW	
• GTAW	

- FCAW
- ASW
- Carbon-arc gouging
- Plasma-arc cutting
- c. Inspection and maintenance
 - SMAW
 - GMAW
 - GTAW
 - FCAW
 - ASW
 - Carbon-arc gouging
 - Plasma-arc cutting
- d. Process-related consumables and accessories.
 - SMAW
 - GMAW
 - GTAW
 - FCAW
 - ASW
 - Carbon-arc gouging
 - Plasma-arc cutting
- e. Inspection, maintenance, transport, and storage of equipment

4. Describe and demonstrate plasma-arc cutting practices. 30%

- a. Free-hand
 - Cutting
 - Beveling
 - Piercing
- b. Straight-edge guided
 - Cutting
 - Beveling
- c. Identify common faults
- d. Procedure to prevent and correct common faults

5. Describe and demonstrate arc-air gouging practices. 30%

- a. Electrode selection
- b. Pneumatic systems and safety
- c. Current settings
- d. Identify common faults
- e. Procedure to prevent and correct common faults

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Unit: C4 Work Planning II

Level: Three

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit builds on Work Planning I and provides the apprentice with advanced work planning concepts and procedures related to work planning.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify sources of information relevant to task planning.	10%
a. Documents	
b. Drawings	
c. Engineer of record	
d. Organizational structure	
e. Clients	
2. Describe procedures used to plan work tasks.	40%
a. Scheduling	
• Flowcharts	
• Milestone dates	
• Critical Path Analysis	
• Contractual obligations	
b. Equipment selection	
c. Material supply	
d. Human resource requirements	
3. Demonstrate procedures for organizing and storing tools, equipment, materials, and supplies on the jobsite.	50%
a. Pre-jobsite orientation	
• Identifying overhead obstruction/underground utilities	
• Establish laydown/storage area requirements	
• Power requirements and availability	
• Equipment selection/available access	
• Sequence of construction	
b. Scheduling	
• Flowcharts	
• Milestone dates	
• Critical Path Analysis	

- Contractual obligations
- c. Equipment selection
- d. Determine material supply
- e. Human resource requirements

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Unit: C5 Drawings III

Level: Three

Duration: 21 hours

Theory: 7 hours

Practical: 14 hours

Overview:

This unit builds on Drawings II and reviews fundamental principles of blueprint interpretation while introducing advanced technical drawings, types of drawings, application of drawing projects and advanced concepts associated with trade practice and interpretation drawings.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terms associated with technical drawings.	20%
2. Describe types of drawings and their applications. <ul style="list-style-type: none">a. Civil/site/plotb. Architecturalc. Mechanicald. Structurale. Shop/detail drawingsf. Sketchesg. Placement drawingsh. Ornamental drawings	20%
3. Describe and demonstrate drawing projections and views, including their application to trade practice. <ul style="list-style-type: none">a. Orthographicb. Obliquec. Isometricd. Sectione. Auxiliary	30%
4. Describe and demonstrate drawing interpretation to obtain dimensions from drawings. <ul style="list-style-type: none">a. Extract information<ul style="list-style-type: none">• Lines• Legend• Symbols and abbreviations• Title block• Notes and specifications	30%

- Tolerances/allowances
 - Bill of materials
 - Schedules
 - Scales
- b. Perform calculations

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Unit: C6 Cranes III: Electric Overhead-Travelling Cranes

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit builds on Cranes II and provides the apprentice with the knowledge about cranes, with specific focus on electric overhead-travelling cranes (EOTCs) and their applications and procedures.

Objectives and Content:	Percent of Unit Mark (%)
1. Describe electric overhead-travelling cranes (EOTCs) and their applications, including components, attachments and significant technical terminology.	50%
a. EOTC components, attachments, and accessories	
• Crane rails	
• End trucks	
• Wheels	
• Bridge girders	
• Hoist and trolleys	
• Rail stops	
• Load blocks	
• Cab	
• Bus bar	
b. Controls	
• Cab-operated	
• Remote-operated	
• Pendant	
2. Describe and demonstrate procedures for EOTC assembly and installation.	30%
a. Identifying and controlling hazardous/restricted work areas	
b. Order of operations	
c. Assembly/sub-assembly	
d. Crane way alignment	
e. Hoisting procedures	
f. Installation and testing of safety devices	
3. Describe and demonstrate procedure for communication for EOTC.	20%
a. Hand signals	
b. Electronic communications	
c. Audible/visual	

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Unit: C7 Structural-Steel III

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit builds on Structural-Steel II and provides the apprentice with the knowledge about pre-stressed concrete, and its characteristics, components and applications. The unit improves apprentices' knowledge of structural steel components and their characteristics, with particular reference to procedures, standards, and practices associated with erecting, dismantling, and removing these members.

Objectives and Content:

Percent of Unit Mark (%)

- | | |
|---|------------|
| 1. Define technical terminology associated with structural steel projects. | 15% |
| a. Primary steel | |
| • Girders | |
| • Spandrel beams | |
| • Columns | |
| b. Intermediate steel | |
| • Beams | |
| • Open web steel joist | |
| • Bracing (horizontal and vertical bracing systems) | |
| c. False work | |
| • Shoring | |
| • Cribbing | |
| • Towers | |
| d. Grating | |
| e. Floor plate | |
| f. Anchorage | |
| g. Truss forms and types | |
| h. Loading (dead and live) | |
| i. Structural detailing | |
| 2. Identify special hazards. | 5% |
| a. PPE | |
| • Hearing protection | |
| • Eye protection | |
| • Approved footwear | |
| • Hard hats | |

- b. Job hazard analysis
 - Identify potentially unsafe conditions
 - Take corrective actions and steps
 - c. Fire safety
 - Extinguishers
 - Muster points
 - Prevention
- 3. Interpret technical documents to identify special hazards and fulfill other technical requirements associated with erecting and dismantling structural-steel components. 10%**
- a. Identification and use of relevant codes, regulations, and standards
 - b. Shipping/receiving documents
 - c. Erection drawings
 - View identification
 - Elevations
 - Cutting planes
 - Weld symbols
 - Abbreviations
 - Detail drawings
 - d. Erection sequence
- 4. Demonstrate and apply information from technical drawings. 20%**
- a. Technical drawings and project specifications
 - b. Inspect structural steel and ensure compliance with project specifications and standards
 - c. Preventative maintenance requirements
- 5. Demonstrate and perform steel dismantling procedures. 25%**
- a. Demolition
 - Engineer survey
 - Assessment and planning outlines
 - Responsibilities
 - Control measures
 - Securing environmental hazards
 - Signage, hoarding, and barriers
 - Public protection
 - Asbestos abatement
 - Access and egress
 - Codes and specifications
 - Sequence of disassembly
- 6. Describe maintenance, repair, upgrading, troubleshooting practices. 25%**
- a. Composite Construction
 - b. Tolerances and Steel Work
 - c. Wind Towers
 - d. Floor Systems
 - e. Dynamic and Static Loading
 - f. Damping systems
 - g. Architectural requirements
 - h. Fire resistance/protection
 - i. Bracing/shear walls systems

- j. Span Capabilities
- k. Penetrations/service openings
- l. Shear connectors
- m Cellular/castellated beams
- n. Trusses
- o. Pre-stressed steel beams
- p. Bending moment
- q. Shear strength
- r. Seismic design
- s. Field fabrication practices
- t. Procedures for assessment

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Unit: C8 Pre-Engineered Structures II

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit builds on Pre-Engineered Structures I and provides the apprentice with the knowledge about pre-engineered building erection, including the technical requirements and major design-types. The unit also covers the best practices in pre-engineered building erection.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the rationale, technical requirements, and major design-types associated with the use of pre-engineered metal buildings.	30%
a. Terminology used in erection of pre-engineered metal buildings	
b. Major building characteristics, and preferred uses of pre-engineered structures including: <ul style="list-style-type: none">• Tapered-beam• Single-span rigid frame• Multi-span rigid frame• Lean-to• Standing seam roof systems	
2. Describe and demonstrate the use of pre-engineered building erection best practices.	70%
a. Special hazards, precautions and safe work-practices	
b. Identification and use of relevant codes, regulations, and standards	
c. Practical use of technical drawings and project specifications	
d. Planning and preparation	
e. Material storage and handling	
f. Layout (surveying)	
g. Sequence of erection (installation)	
h. Plumbing and alignment	
i. Roof and wall sheeting <ul style="list-style-type: none">• Accessories• Trim• Insulation	
j. Preventative maintenance and building assessment	
k. Decommissioning	
l. Removes and replaces components	

- m. Sequence of disassembly
- n. Field fabrication

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Unit: C9 Pre-Cast Concrete II

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit builds on Pre-Cast Concrete I and provides the apprentice with the knowledge about pre-cast concrete members, components and related terminology. The unit also covers safe work practices for precast construction and the procedures to finish, dismantle, and remove precast concrete members and components.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify precast concrete members, components, and significant technical terminology associated with their use.	30%
a. Precast concrete product terminology	
b. Identify precast concrete members, their applications, and characteristics	
• Panels (horizontal and vertical)	
• Beams	
• Girders	
• Columns	
• Single tees	
• Twin tees (double Tee)	
• Bearing piles	
2. Describe and demonstrate safe work practices associated with tilt-up construction.	20%
a. Special hazards and precautions, and safe work practices	
b. Interpreting codes and regulations	
c. Deriving information from technical drawings and specifications	
d. Bracing requirements	
3. Describe and demonstrate procedures to install, finish, dismantle, and remove concrete members and components on the jobsite.	50%
a. Tools/equipment selection	
b. Procedures for erecting and finishing precast components	
• Site preparation	
• Equipment set-up	
• Determination of weight(s)	
• Rigging	
• Materials handling	
• Lay-out (surveying)	
• Casting beds	

- Bond breakers and release agents
 - Connections
 - Aligning, leveling, and plumbing
 - Fastening (including welding and bolting)
 - Painting/corrosion control
 - Installing gaskets and sealants
 - Grouting
- c. Maintaining prescribed clearances and tolerances
- d. Procedures for dismantling and removing precast concrete members
- Sequence of operation
 - Establishing centre of gravity
 - Safe rigging practices
 - Identifying load transfer

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Unit: C10 Machinery and Equipment II

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit builds on Machinery and Equipment I and provides the apprentice with the knowledge about types of machinery and equipment, and their safe work practices, related technical documents, and installation/removal.

Objectives and Content:

**Percent of
Unit Mark (%)**

- | | |
|---|------------|
| 1. Describe the types of machinery and equipment and associated terminology. | 40% |
| a. Types and significant characteristics, including: | |
| • Storage tanks | |
| • Bins | |
| • Hoppers | |
| • Overhead conveyance (synchronous and asynchronous) | |
| b. Selection and use of tools and equipment required for installation/removal | |
| | |
| 2. Describe and demonstrate safe work practices including interpretation of technical documents. | 10% |
| a. Special hazards, precautions, and safe work practices | |
| b. Interpreting codes and regulations | |
| c. Deriving information from technical drawings and specifications | |
| | |
| 3. Describe and demonstrate procedures for installation and removal of machinery and equipment. | 50% |
| a. Installation and removal procedures | |
| • Communications methods (hand signals, radio contact, and two-way radio) | |
| • Moving/transporting | |
| • Storage | |
| • Assembly and erection | |
| • Leveling and alignment (surveying) | |
| • Commissioning | |
| • Preventative maintenance | |
| • Lockout/tagout (LOTO) procedures | |
| • Disassembly and safe removal practices (decommissioning) | |

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Unit: C11 Miscellaneous Ironwork II

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit builds on Miscellaneous Ironwork I and provides the apprentice with the knowledge about miscellaneous ironwork, including the characteristics, applications, codes, regulations and other related information. The unit also covers the procedures for fabricating, installing, finishing, and repairing miscellaneous ironwork.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify types of miscellaneous ironwork, including their characteristics, applications, and significant technical terminology.	30%
a. Door systems <ul style="list-style-type: none">• Rolling doors• Revolving doors• Sliding doors• Swing doors	
b. Anchorage systems <ul style="list-style-type: none">• Adhesive• Mechanical	
c. Concrete embeds	
d. Guardrail systems	
2. Interpret codes, regulations, and other technical sources.	20%
a. Codes and regulations	
b. Technical drawings and project specifications	
c. Identification of special hazards, precautions, and safe work procedures.	
3. Describe and demonstrate procedures for fabricating, installing, finishing, and repairing of miscellaneous ironwork.	50%
a. Proper selection and use of applicable tools	
b. Procedures for fabricating miscellaneous ironwork, including: <ul style="list-style-type: none">• Shop• Field	
c. Procedures for fabrication and installation of miscellaneous ironwork, including: <ul style="list-style-type: none">• Site preparation• Materials handling and transport• Layout (surveying)• Anchorage	

- Alignment
- Final finishing
- d. Procedures for finishing miscellaneous ironwork
 - Grinding
 - Painting
 - Filing
 - Polishing
- e. Procedures for repair and removal (decommissioning)

Ironworker (Generalist)

Unit: C12 Ornamental Ironwork

Level: Three

Duration: 42 hours

Theory: 28 hours

Practical: 14 hours

Overview:

This unit is designed to provide the apprentice with the knowledge about ornamental ironwork, including the characteristics, applications, codes, regulations and other related information. The unit then covers the procedures for fabricating, installing, finishing, and repairing ornamental ironwork.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify types of ornamental Ironwork, including the characteristics, applications, and significant technical terminology.	50%
a. Architectural stairwell	
b. Architectural railings	
c. Curtain walls	
d. Window walls	
e. Chain-link fencing	
2. Interpret codes, regulations, and other technical sources.	10%
a. Codes and regulations	
b. Technical drawings and project specifications	
c. Identification of special hazards, precautions, and safe work-procedures	
3. Describe and demonstrate procedures for fabricating, installing, finishing, and repairing/decommissioning of ornamental ironwork.	40%
a. Proper selection and use of applicable tools	
b. Procedures for fabricating ornamental ironwork, including:	
• Shop	
• Field	
c. Procedures for fabrication, installation, and maintenance of ornamental ironwork	
• Site preparation	
• Materials handling and transport	
• Layout (use of surveying equipment)	
• Anchorage	
• Sealants	
• Final finishing	
d. Procedures for finishing ornamental ironwork	
• Grinding	
• Painting	
• Filing	

- Polishing
 - Chemical/metal treatment
 - Electroplating/anodizing
- e. Procedure for removal and repair/decommissioning of ornamental ironwork

Ironworker (Generalist)

Unit: C13 Pre-Stressed Concrete: Bonded Post-Tensioning

Level: Three

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit is designed to provide the apprentice with the knowledge of bonded post-tensioning, and its characteristics, components and applications.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Define terminology associated with bonded post-tensioning systems.	20%
a. Multi-strand systems and related terms	
b. Push-through systems and related terms	
c. Pull-through systems and related terms	
d. Bar tendons and related terms	
2. Explain the purpose and effects of bonded post-tensioning systems.	10%
3. Describe the characteristics, components, and applications of bonded post-tensioning systems.	10%
a. Materials, components, and accessories, including their defining characteristics and applications	
• Tendons	
• Bursting steel	
• Anchorage	
• Conduits/ducts	
• Supports	
• Grout and grouting systems	
• Connectors	
• Stressing equipment	
• De-stressing equipment	
4. Interpret codes, regulations, and other technical documents that govern pre-stressed concrete practices.	10%
a. Special hazards and safe work practices associated with pre-stressed concrete	
• Restricted access to work zone	
• Structural failure	
• Equipment failure	
• Personal protective equipment (PPE)	

- b. Codes and regulations
 - Engineered products and specifications
 - Documentation/stressing records

5. Describe and demonstrate installation procedures for bonded post-tensioning systems. 30%

- a. Tools and equipment
 - Layout
 - Stressing equipment
 - Grouting equipment
- b. Safe work procedures
 - Setup
 - Operation
 - Dismantling
- c. Equipment inspection, maintenance and storage procedures
- d. Tendon placement
 - Layout profile
 - Place tendons and accessories
 - Install bursting steel and anchorage
 - Tendon anchorage
 - Protection of exposed tendons
 - Cut and couple tendons
 - Storage of grouting materials
 - Maintenance of grouting equipment
- e. Tendon stressing
 - Calculate required forces
 - Installation of stressing equipment
 - Securing anchorage
 - Depressurize and remove equipment
 - Elongation and gauge pressure

6. Demonstrate procedures for finishing tendons and for grouting tendons in bonded systems. 20%

- a. Grouting tendons
 - Verifying post-tensioning duct system integrity
 - Batching and mixing grout
 - Testing grout quality and composition
 - Injecting grout
 - Releasing trapped air and bleed water
 - Post-grouting samples and inspection
 - Sealing of grout inlets/outlets
 - Grout plans and contingency plans

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Unit: C14 Pre-Interprovincial Review

Level: Four

Duration: 35 hours

Theory: 35 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:	<u>Percent of Unit Mark (%)</u>
<p>1. Describe the significance, format and general content of Inter-Provincial (IP) Examinations for the trade of Ironworker (Generalist).</p> <p>a. Scope and aims of Inter-Provincial certification; value of certifications</p> <p>b. Obligations of candidates for Inter-Provincial certification</p> <ul style="list-style-type: none"> • Relevance of Inter-Provincial Examinations to current, accepted trade practices; industry-based provincial and national validation of test items • Supplemental Policy (retesting) • Confidentiality of examination content <p>c. Multiple-choice format (four-option) item format, Red Seal standards for acceptable test items</p> <p>d. Government materials relevant to the Inter-Provincial Examinations for apprentice Ironworkers (Generalist).</p> <ul style="list-style-type: none"> • National Occupational Analysis (NOA); prescribed scope of the skills and knowledge which comprise the trade • NOA "Pie-chart" and its relationship to content distribution of Provincial Examination items • Apprenticeship Manitoba Technical Training package. 	n/a
<p>2. Identify resources, strategies and other considerations for maximizing successful completion of written examinations.</p> <p>a. Personal preparedness</p> <ul style="list-style-type: none"> • Rest • Nutrition • Personal study regimen • Prior experience in test situations (e.g., Unit Tests) <p>c. Self-assessment, consultation and personal study plan</p> <ul style="list-style-type: none"> • Self-assessment of individual strengths/weaknesses in trade related skills and knowledge 	n/a

- Approved textbooks
- Study groups

- | | |
|---|------------|
| 3. Review program content regarding occupational skills. | n/a |
| 4. Review program content regarding rigging and hoisting. | n/a |
| 5. Review program content regarding cranes. | n/a |
| 6. Review program content regarding reinforcing. | n/a |
| 7. Review program content regarding pre-stresses/post-tensions. | n/a |
| 8. Review program content regarding erection, assembly and installation. | n/a |
| 9. Review program content regarding maintenance and upgrading. | n/a |
