

Railway Car Technician (RCT) Level 1

Railway Car Technician (RCT)

Unit: A1 Orientation I: The Structure and Scope of RCT Trade Learning

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

Jobsite learning and teaching have long been fundamental to RCT trade-practice, including its safety, health, and environmental implications. The chance to gain maximum benefit from workplace trade learning can be shaped by such complex factors as production schedules and jobsite politics. As adult trade-learners, RCT apprentices at all levels of skill-development are encouraged to use their eyes, ears, prior knowledge, and interpersonal skills to encourage journeypersons to teach as well as to supervise them. This requires understanding the trade's dynamics, including the roles and responsibilities that order jobsite activity. Unit content outlines the trade's skill-requirements and long-term career possibilities. It includes suggestions about trade-related learning styles/strategies. It also introduces the concept of skills stewardship, stressing the obligations that apprentices incur in learning from journeypersons to 'pay it forward' by assisting other newcomers who will follow them into the trade. The unit's purpose is to provide this essential information about learning to learn as a Manitoba RCT apprentice. Elsewhere in technical training, senior apprentices explore the importance of learning to teach in trade workplaces – a central function of RCT journeywork.

Objectives and Content:

**Percent of
Unit Mark (%)**

1. Describe the structure and scope of the trade.

30%

- a. Historical background, including apprentice experiences
- b. Structure/scope of the trade
 - International and national characteristics
 - Important features of practicing the trade in Manitoba
 - Trade and construction industry organizations
 - Generalists and specialists
 - Lead hands and other immediate supervisors
 - Geographic mobility
 - Job hierarchies and innovations

2. Describe the RCT Apprenticeship program.

30%

- a. Concept and significance of skills stewardship
 - To the trade
 - To apprentices
 - To journeypersons
 - To employers

- b. Practical training: on-site component of program
 - Roles/responsibilities of employer and journeyperson(s)
 - Roles/responsibilities of Apprenticeship Training Coordinator
 - Roles/responsibilities of apprentice, including record-keeping re: job experience
- c. Technical training: off-site component of program
 - Roles/responsibilities of instructors (including 'Related'-area faculty)
 - Roles/responsibilities of apprentices
- d. Attendance requirements
- e. Progression requirements
- f. Reporting of grades
- g. Other (as may be specified by instructor)

3. Describe special opportunities and challenges re: RCT training.

40%

- a. Adapting personal learning goals to program contexts
 - Principles of adult learning (including importance of self-direction)
 - Description/recognition of learning and teaching styles
 - Significance of work culture and interpersonal skills re: trade-learning
 - Integrating technical training and practical training content
 - Possibilities and perils of peer learning
 - Budgeting and other necessary personal arrangements
 - Identifying sources of support (e.g., upgrading trade-related math skills)
- b. On-site learning challenges and opportunities
 - Significance of jobsite supervision roles and teaching styles (e.g., journey-level skills-coach vs. mentor)
 - Communication with journeypersons and employers
 - Coverage of prescribed tasks/subtasks that define the scope of trade, and the content of the certification exam administered to apprentices who are completing their program
 - Getting help and fixing mistakes
 - Maintaining personal record of trade-learning challenges/achievements (e.g., a learning journal, and/or a personal training plan, if possible, discussed with employers and others supporting the apprenticeship journey to certification)
- c. In-school opportunities/challenges
 - Personal arrangements that support progress in technical training
 - "Baggage-handling" – self-assessing potential impacts of previous experiences (favourable/unfavourable) on current learning; availability of supports
 - Techniques for note-taking, record-keeping, and review
 - Relations with instructors (including 'Related'-area faculty)
 - College resources (library, support services, etc.)

Railway Car Technician (RCT)

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 Insulator apprenticeship training both in school and on-the-job. Unit content is supplemented throughout technical training by trade-specific information about RCT 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
 - 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: ANSI (U.S.A. standards), etc.

- 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 regulations pertinent to care and cleanliness in the working area. | n/a |
| 4. | Identify the regulations relevant to the safe use of chemicals. | n/a |
| 5. | Identify regulations governing the use of scaffolding. | n/a |
| 6. | Identify regulations governing the use of ladders and related equipment. | n/a |
| 7. | Identify ergonomics. | n/a |
| a. | Definition of ergonomics and conditions that may affect the body <ul style="list-style-type: none"> • Working postures • Repetition • Force • Lifting • Tools • Identify tool and safety equipment • Causes of hand tool accidents • equipment | |
| 8. | Hazard recognition and control. | |
| a. | Safe work practices | n/a |
| 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 | |
| e. | Refrigerants | |
| f. | Toxic chemical (non-refrigerant) | |
| g. | High pressure fluids | |

- 9. Hazard of confined space entry.** n/a
- a. Identification of a confined space
 - b. Hazards of a confined space (including physical and biological hazards)
 - c. Working in a confined space
 - d. Emergency response plan
 - e. Self-contained breathing apparatus (SCBA)
- 10. 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 (e.g., Workers Compensation claims)
 - d. Describe basic CPR requirements and techniques
 - How do you get certified?
 - Scope and limits of CPR intervention (include varieties of CPR certification)
- 11. Identify the safety requirements as they apply to WHMIS with emphasis on:** n/a
- a. WHMIS is a system
 - b. Provincial regulation under the 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)
- 12. 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

13. Describe the safe storage of stock equipment in service vehicles. n/a

14. Discuss transportation of dangerous goods. n/a

Railway Car Technician (RCT)

Unit: A3 RCT Trade Standards and the Regulatory Environment

Level: One

Duration: 21 hours

Theory: 21 hours

Practical: 0 hours

This unit of instruction offers an RCT-tradeworker perspective on the major practical significance of government-level regulations and associated industry standards as codified to help ensure the safe, productive functioning of the railway-transport sector and its workplaces.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the scope and significant components of the RCT Trade's regulatory environment, including legislated and nongovernmental standards.	10%
2. Describe federal and other governmental components of the RCT trade's regulatory environment (e.g., Transport Canada requirements) with particular reference to their practical significance for RCT tradework.	10%
3. Describe nongovernmental components of the RCT trade's regulatory environment e.g., AAR rules rulebook sections with particular reference to their practical significance for RCT tradework.	10%
4. Describe/demonstrate detailed procedure(s) for identifying, retrieving interpreting, applying, generating, and reporting information about RCT work assignments from technical regulatory sources as specified by the instructor.	30%
5. Complete the regulation-use skills demonstration project per instructor specifications.	40%

Railway Car Technician (RCT)

Unit: B1 RCT Trade-Math Applications: A Refresher

Level: One

Duration: 14 hours

Theory: 7 hours

Practical: 7 hours

Overview:

This unit of instruction is intended to help make the world of numbers and shapes work for, rather than against, the RCT apprentice. Content includes a brief review of basic math concepts and operations, but its major focus concerns applications in actual trade practice. Apprentices will extend their trade-math skills elsewhere in technical training – for example, in preparing project estimates and layouts. The unit also includes up-to-date information about ‘math anxiety,’ and how it can be overcome. **Note:** *Although this unit includes a review of math basics, and provides some tools for building skill and confidence in applying them, it is not a remedial math course. Unit content assumes a prior familiarity with math basics. Apprentices who might require upgrading in this area are strongly encouraged to consult with their Apprenticeship Training Coordinator and/or their Instructor early in the program to identify suitable options and resources for math-skills upgrading where appropriate.*

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the practical importance of math disciplines to the RCT trade.	30%
a. Definition and scope of relevant math disciplines	
b. Detailed examples	
• Plane geometry and calculating rates of coverage by materials (e.g., railway car paint)	
• Ratio/proportion and technical drawing to scale	
• Other (specified by instructor)	
c. Time-sheets, wages, and personal budgeting	
d. Engineering of tools and equipment	
e. Manufacture and packaging of materials and products	
f. Trade documents	
g. Standards, codes, tolerances, and other specifications	
h. Computer technology/applications	
i. Design/technical drawing	
j. Estimation and bidding	
k. Project planning and monitoring	
l. Materials procurement, inventory, and optimization	
m. Machinery and equipment set-up	
n. Measurement and lay-out	
o. Temperatures, pressures, and other measured: properties of materials and tools	
p. Customer relations/perceptions (e.g., schedules, timetables, etc.)	
q. Business management	

- 2. Describe 'math anxiety' and its remedies. 5%**
- a. Definition
 - b. Recognition
 - c. Options, resources, and techniques for overcoming math anxiety
 - d. Other common problems
 - Importance of personal awareness of math strengths/learning needs
 - Importance of early resolution during term of apprenticeship
 - Options/resources for remedial math instruction and other assistance
- 3. Review general math concepts and use of electronic calculator. 15%**
- a. Basic operations
 - Addition
 - Subtraction
 - Multiplication
 - Division
 - Order of operations
 - Fractions and decimals
 - b. Ratio and proportion
 - c. Percentage calculations
 - d. Constructing/solving simple equations
 - e. Trigonometry functions
 - f. Units of measure
 - Imperial
 - Metric (SI)
 - Conversion factors
 - g. Calculator use
 - Basic operation keys/functions
 - Percentage keys/functions
 - Trig keys/functions
 - Keys/functions re: memory and constants
- 4. Perform trade-related calculations as specified by instructor. 50%**
- a. Linear measurement
 - Rectangular/triangular dimensions
 - Radius/diameter/circumference
 - b. Area and volume
 - Squares/rectangles
 - Triangles
 - Circles/cylinders
 - Irregular shapes
 - c. Ratio/proportion
 - Ratios
 - Percentages
 - Rates
 - SI/Metric Units (including conversions)

Railway Car Technician (RCT)

Unit: B2 RCT-Trade Computer Applications

Level: One

Duration: 7 hours

Theory: 5 hours

Practical: 7 hours

Overview:

This unit of instruction offers RCT general skills and knowledge required to benefit from computer technology as it currently applies to the trade, and equally important, to enrich their foundation for further learning which technological change will make necessary during their careers as 21st-century tradespeople.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe basic computer components and their functions.	10%
2. Perform basic word-processing operations.	10%
3. Describe Internet and system components.	10%
4. Perform Web searches using various search engines.	10%
5. Send/receive e-mail messages.	10%
6. Identify methods/resources for ongoing, self-directed learning re: personal knowledge of RCT trade-related computer applications.	50%

Railway Car Technician (RCT)

Unit: B3 Introduction to Technical Drawing for RCT Projects

Level: One

Duration: 35 hours

Theory: 21 hours

Practical: 14 hours

Overview:

This unit offers entry-level a prescriptive and hands-on encounter with the major work-conventions, tools, materials, and applications which make technical drawing an indispensable discipline for RCT-trade work-planning, problem-solving, and communications. The unit is a foundation for further trade-learning to help enable the fluent use of RCT blueprints and project specifications involving highly varied practical requirements.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe/demonstrate selection of technical drawing tools and materials, with some reference to the advent of electronic tools and platforms for generating, storing, retrieving, and using trade information.	10%
2. Describe and demonstrate basic conventions and standards re: preparation of technical drawings including line weights, welding symbols and scales, etc.	30%
3. Describe/demonstrate the use of technical drawing as a design, communications, and problem-solving technology, with particular reference to its practical applications in the RCT trade.	30%
4. Demonstrate the use of technical-drawing tools and materials to complete a basic drafting assignment per instructor specifications.	30%

Railway Car Technician (RCT)

Unit: C1 Using RCT Tools, Equipment, and Materials: An Overview

Level: One

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit offers an entry-level overview of the remarkably elaborate tool-kit and correspondingly rich tool-use requirements broadly associated with RCT tradework. The unit helps apprentices to identify and chart trade-learning pathways through other, more-specialized opportunities in technical training. These include such disciplines as metal fabrication, welding, woodworking, pipefitting, and – of special importance – the use, selection, and calibration of prescribed gauges and measuring instruments per national and international railway-sector requirements.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe/demonstrate selection, use and maintenance of safety/First Aid equipment including and personal protective equipment (PPE) per the RCT trade’s general/specific operational requirements.	10%
2. Describe/demonstrate selection, use and maintenance of diagnostic and measuring tools (including AAR-/other prescribed gauges) per the RCT trade’s general/specific operational requirements.	15%
3. Describe/demonstrate selection, use and maintenance of electric, pneumatic, and hydraulic, and hand-operated tools per the RCT trade’s general/specific operational requirements.	15%
4. Describe/demonstrate selection, use and maintenance of stationary tools per the RCT trade’s general/specific operational requirements.	15%
5. Describe/demonstrate selection, use and maintenance of cutting- and welding-tools per the RCT trade’s general/specific operational requirements.	15%
6. Describe selection and use of materials (metal/nonmetal; other), fasteners, adhesives, sealants, gaskets, etc. per the RCT trade’s general/specific operational requirements.	15%
7. Describe/demonstrate selection, use and maintenance of materials-handling, lifting-, staging-, and access-tools per the RCT trade’s general/specific operational requirements.	15%

Railway Car Technician (RCT)

Unit: C2 RCT Metalwork and Woodwork Practices

Level: One

Duration: 35 hours

Theory: 21 hours

Practical: 14 hours

Overview:

This unit offers entry-level instruction in basic metalworking and woodworking practices as they pertain to the work of Railway Car Technicians.

Objectives and Content:

Unit Mark (%)

- | | |
|--|-----|
| 1. Describe standards, procedures, main contexts, and special hazards/precautions associated with RCT work-assignments requiring metalwork and woodwork proficiency. | 20% |
| 2. Describe/demonstrate the tools, equipment, materials, and techniques required to perform the metalwork and woodwork practices of the RCT trade in general. | 20% |
| 3. Describe/demonstrate metalwork and pipefitting procedures required to complete particular railway-car projects as specified by the instructor. | 20% |
| 4. Complete the RCT metalwork and woodwork demonstration project per instructor specifications and grading-criteria. | 40% |

Railway Car Technician (RCT)

Unit: C3 RCT Welding and Cutting Practices

Level: One

Duration: 84 hours

Theory: 42 hours

Practical: 42 hours

Overview:

This unit of instruction offers is a gateway course to help consolidate and develop the RCT apprentice's familiarity with the several distinct varieties of welding practice required in trade practice.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe standards, procedures, main contexts, and special hazards/precautions associated with RCT work-assignments requiring welding and cutting proficiency, metal poisoning, flash injuries, carpal tunnel syndrome, PPE selection, etc.	20%
2. Describe/demonstrate the tools, equipment, materials, and techniques required to perform the RCT-trade welding in general, including SMAW, GMAW, FCAW, and associated processes.	20%
3. Describe/demonstrate the tools, equipment, materials, and techniques required to perform the RCT-trade cutting in general, including oxyacetylene, plasma, and associated processes.	10%
4. Complete the RCT welding and cutting skills demonstration project per instructor specifications and grading-criteria.	50%

Railway Car Technician (RCT)

Unit: E1 Railway-Car Air Brakes

Level: One

Duration: 35 hours

Theory: 28 hours

Practical: 7 hours

Overview:

This unit of instruction offer intermediate level training in the procedures required to measure, diagnose, and service railway-car air brakes.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Identify/describe RCT work-requirements concerning air-brakes as these pertain to the broader structure/function of railway-car air-brake brake systems/components.	15%
2. Describe special hazards/precautions, including mandated testing/inspection protocols, re: RCT work-assignments to diagnose and service railway-car air-brake systems/components.	20%
3. Describe/demonstrate standards and procedures, including special tests and use of diagnostic information, for diagnosing and servicing railway-car air-brake systems/ components.	35%
4. Describe/demonstrate AAR standards and procedures, including application of manufacturer specifications, for servicing such air-brake system consumables as shoes, hoses, pins, chains, rods, etc.	10%
5. Complete the railway-car air brake competencies demonstration project, with particular reference to, single-car air test, measurement, and use of the Knorr Wheel-Slide protection device per instructor-provided specifications.	20%

Railway Car Technician (RCT)

Unit: H1 Railway-Car Hoisting Practices

Level: One

Duration: 21 hours

Theory: 21 hours

Practical: 0 hours

Overview:

This unit of instruction offers senior level training re: practices prescribed for completing railway-car hoisting operations in accordance with applicable regulations and operational protocols.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe standards, procedures, main contexts, and special hazards/precautions associated with RCT work-assignments requiring proficiency in the operation of mobile as well as stationary/overhead hoisting equipment.	30%
2. Describe the tools, equipment, materials, and techniques required to perform the craning and hoisting practices of the RCT trade in general.	30%
3. Describe craning and hoisting procedures required to complete particular railway-car projects as specified by the instructor.	40%

Railway Car Technician (RCT)

Unit: H2 Certified Car Inspector (CCI) Qualification

Level: One

Duration: 35 hours

Theory: 28 hours

Practical: 7 hours

Overview:

This unit of instruction prepares entry-level apprentices to achieve qualification as Certified Car Inspectors which they require to access the full range of opportunities and resources prescribed for their training.

Objectives and Content:

**Percent of
Unit Mark (%)**

- | | |
|---|-----|
| 1. Explain the significance and substance of CCI qualification as it relates to the RCT-trade's practical responsibilities within railway-sector regulatory and corporate environments. | 40% |
| 2. Describe/demonstrate government-mandated CCI inspection criteria/methods, procedures, and responsibilities in general, and in relation to a variety of instructor-specified situations and operational settings. | 20% |
| 3. Describe/demonstrate CCI protocols for monitoring and reporting violations, in general, and in relation to a variety of instructor-specified situations and operational settings. | 10% |
| 4. Describe/demonstrate procedure for CCI participation in joint inspection procedure(s) to identify defects/remedies in general, and in relation to a variety of instructor-specified situations and operational settings. | 10% |
| 5. Complete formal requirements for the CCI Qualification. | 20% |
