

APPRENTICESHIP & CERTIFICATION

Study Guide Ironworker (Generalist)




Newfoundland
Labrador

Apprenticeship and Certification

Study Guide

Ironworker (Generalist)

(Based on 2015 NOA)

Government of Newfoundland and Labrador
Department of Advanced Education, Skills and Labour
Apprenticeship and Trades Certification Division

Version 6
March 2019

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Introduction

This Study Guide has been developed by the Newfoundland and Labrador Department of Advanced Education, Skills and Labour, Apprenticeship and Trades Certification Division, to assist apprentices and trade qualifiers as they prepare to write the Interprovincial (IP) Red Seal Exam. IP Exams are available for all Red Seal trades. For a list of Interprovincial trades please refer to the Department of Advanced Education, Skills and Labour website:

<https://www.ed.gov.nl.ca/app/trades.html>

Some of the specific goals of this guide are:

- ⇒ to help you understand the skills and knowledge that might be covered on the exam
- ⇒ to help you identify your strengths and weaknesses
- ⇒ to provide organization and structure for a course of study
- ⇒ to provide a list of resources to help you with your study plan
- ⇒ to support and supplement the teaching and learning process

This study guide outlines the theoretical portion of the program. The intent is not to replace technical training provided under the guidance of instructors. Rather, it is a tool to be used in conjunction with formal training.



Exam Process

Before the Exam

You must contact the nearest Apprenticeship and Trades Certification Divisional office to make request to write the IP Red Seal exam (*See Appendix A for a list of regional offices*). Upon approval, the Apprenticeship Program Officer (APO) will notify you of your eligibility to write the exam, and provide you with scheduling information. If you require special accommodations due to a disability or language barrier, please contact your regional office for information on applying for this service.

During the Exam

You must bring:

- personal identification such as a photo or signature ID or valid Newfoundland and Labrador driver's license
- your notification letter

The following will be provided:

- a calculator (*see Appendix B for calculator information*)
- all other items required such as pencils, scrap paper, etc.

Important Note:

Personal cell phones, calculators, or other electronic equipment are NOT allowed into the exam room. If you do bring them, they will be stored away and returned to you when you have completed the exam.

After the Exam

Results will be mailed to you approximately seven to ten days after completion of the exam. All necessary instructions and information will be provided in the results letter.

The percentage mark you obtained will be provided. You will also be given a section by section breakdown, showing how many questions were in each section, as well as the number of questions in each section you completed successfully.

If you are successful in obtaining a 70% or more on your exam, you will be issued a Newfoundland and Labrador Certificate of Qualification with a Red Seal endorsement.

Exam Format

All IP Red Seal exams are written in multiple-choice format. Each exam has between 100 and 150 questions. A multiple choice question consists of a stem (a complete question) followed by four options (A, B, C, D). The stem contains all the information necessary to answer the question. The options consist of the one correct answer and three “distracters.” Distracters are incorrect. (See Appendix C for a sample answer sheet).

IP Red Seal exams contain three types of questions:

Level 1 Knowledge and Recall

Questions at this level test your ability to recall and understand definitions, facts, and principles.

Level 2 Procedural and Application

Questions at this level test your ability to apply your knowledge of procedures to a new situation.

Level 3 Critical Thinking

Questions at this level test your ability to interpret data, solve problems and arrive at valid conclusions.

Level 1 Examples:

1. What needs to be done with damaged slings?
 - A. Destroy them.
 - B. Repair them.
 - C. Downgrade them.
 - D. Continue to use them with caution.



2. What is lubricated and aligned before the erection of the main jib?

- A. Turntable.
- B. Trolley.
- C. Pendants.
- D. Bridles.



3. Where is the identification of a tower crane found?

- A. In the operator's cab.
- B. On all major components.
- C. At the base of the tower.
- D. In the manufacturers' manual.



Level 2 Examples:

1. What would be the total for the grid line numbers $50^{\circ} 50$ minutes plus $48^{\circ} 40$ minutes?

- A. $98^{\circ} 90$ minutes.
- B. $99^{\circ} 30$ minutes.
- C. $100^{\circ} 88$ minutes
- D. $188^{\circ} 0$ minutes.



2. If when installing a set of stairs, it takes 4 ironworkers 3 hours to complete a job, how many hours will it take 3 ironworkers to complete the same job?
- A. 3 hours.
 - B. 4 hours.
 - C. 6 hours.
 - D. 12 hours.



3. What is the proper sequence prior to disconnecting the conveyor chain from an existing system?
- A. Disengage the take-up, check the elevations and secure the chain.
 - B. Disengage the drive, remove the pins and secure the chain.
 - C. Remove the chain pins, check and secure the take-up.
 - D. Remove the drive chain, check the take-up and remove the pins.



Level 3 Examples:

1. How many 20 ft. sections of tower weighing 3400 lb. each can be hoisted and placed inside an elevator shaft at the same time with a crane capacity of 5 tons, a building height of 210 ft. and an under-hook height of 273 ft.?
- A. 2.
 - B. 3.
 - C. 4.
 - D. 5.



2. Which colors of the color code represent a reinforcing steel bar 5280 mm in length??

- A. Dark blue, pink, light blue, red.
- B. Dark blue, red, light blue, pink.
- C. Light blue, red, dark blue, pink.
- D. Light blue, pink, dark blue, red.



3. What is the final force on a 15 mm strand of post-tensioning cable?

- A. 10 kN.
- B. 147 kN.
- C. 157 kN.
- D. 190 kN.



Source of Questions:

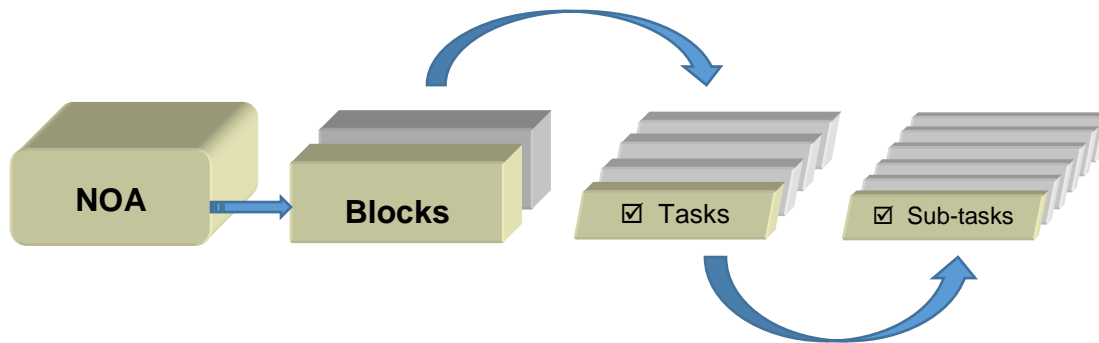
<http://www.red-seal.ca/s.1mpl.2.2x.1mQ.5.2st.3.4ns-eng.html?tid=132>

Exam Content

Understanding the *National Occupational Analysis (NOA)*

The NOA is a document used for Red Seal trades that describes the knowledge, skills and abilities required by a fully competent tradesperson working in that trade. The content for the IP Red Seal exam is based on the NOA. The NOA is an excellent tool to use as you study for the Red Seal exam. NOAs can be found at <http://www.red-seal.ca/>.

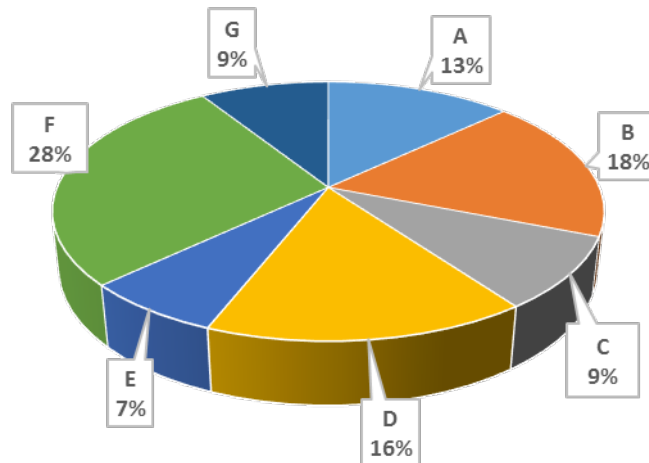
NOA material is organized into major content areas called **BLOCKS**. The blocks are further broken down into **TASKS** and **SUB-TASKS**.



NOA Pie Chart

The NOA Pie Chart presents the block percentages in the form of a pie chart which tells you the approximate number of questions from each block. For example, **13%** of the questions on the **Ironworker (Generalist)** Exam will be based on Block A.

IRONWORKER (GENERALIST)



Block Titles			
Block A	Occupational Skills	Block E	Pre-Stresses/Post-Tensions
Block B	Rigging and Hoisting	Block F	Erection, Assembly and Installation
Block C	Cranes	Block G	Maintenance and Upgrading
Block D	Reinforcing		

Exam Breakdown

The **Ironworker (Generalist)** exam currently has 120 questions. The following table shows a breakdown of the number of questions that come from each NOA block. It is important to note that the exact number of questions can change at any time. When you are ready to write your exam, you may contact your regional office to verify the number of questions (See Appendix A).

		# of Questions
Block A	Occupational Skills	15
Task 1	Interprets occupational documentation	
Task 2	Communicates in the workplace	
Task 3	Uses and maintains tools and equipment	
Task 4	Organizes work	
Block B	Rigging and Hoisting	22
Task 5	Selects rigging equipment	
Task 6	Uses hoisting and lifting equipment	
Block C	Cranes	11
Task 7	Select, assemble and erect cranes and components	
Task 8	Disassembles cranes	
Block D	Reinforcing	19
Task 9	Fabricates on-site	
Task 10	Installs reinforcing material	
Block E	Pre-Stresses/Post-Tensions	8
Task 11	Places pre-stressed/post-tensioning systems	
Task 12	Stresses tendons	
Task 13	Grouts tendons	
Block F	Erection, Assembly and Installation	34
Task 14	Installs primary and secondary structural members	
Task 15	Installs ornamental components and systems	
Task 16	Installs conveyors, machinery and equipment	
Block G	Maintenance and Upgrading	11
Task 17	Repairs components	
Task 18	Dismantles and removes structural, mechanical and miscellaneous components	
	Total	120

NOA Sub-tasks

The following *NOA Task Profile Checklist* outlines the blocks, tasks and sub-tasks for your trade. The IP Red Seal exam is written to test your knowledge and abilities regarding the sub-tasks in the NOA. This chart can be used to review your current knowledge. You can review by placing a checkmark (✓) next to those you understand fully.

Place your focus on those you do not understand and study them until you are comfortable with the material. Think of possible questions in that particular content area.

The NOA also contains a list of “supporting knowledge and abilities” for each sub-task. They are the skills and knowledge you must have to perform a sub-task. The supporting knowledge and abilities identified under each sub-task will be very helpful as you review. The list can be found in the NOA for your trade.

**Task Profile Checklist
Based on 2015 NOA
Ironworker (Generalist)**

Block A: Occupational Skills

Task 1: Interprets occupational documentation

Sub-Tasks

- Interprets drawings and specifications.
- Interprets standards, regulations and procedures.

Task 2: Communicates in the workplace

Sub-Tasks

- Communicates with co-workers.
- Communicates with other.
- Communicates with apprentices.
- Uses hand signals.
- Communicates electronically.

Task 3: Uses and maintains tools and equipment

Sub-Tasks

- Uses hand tools and measuring equipment.
- Uses power tools.
- Uses bending tools and equipment.
- Uses powder-actuated tools.
- Uses aerial work platforms.
- Uses ladders.
- Uses scaffolding.
- Uses personal protective equipment (PPE).
- Uses surveying equipment.
- Uses welding equipment.
- Uses thermal and oxy-fuel cutting equipment.

Task 4: Organizes work

Sub-Tasks

- Organizes materials and supplies.
- Marks layouts.
- Maintains safe work environment.
- Assesses site hazards.
- Plans work tasks.

Block B: Rigging and Hoisting

Task 5: Selects rigging equipment

Sub-Tasks

- Matches load to lift capability.
- Inspects rigging equipment.
- Maintains rigging equipment.

Task 6: Uses hoisting and lifting equipment

Sub-Tasks

- Uses hoisting equipment.
- Uses lifting equipment.
- Attaches rigging to load.

Block C: Cranes

Task 7: Select, assemble and erect cranes and components

Sub-Tasks

- Assesses crane site limitations.
- Determines crane position.
- Prepares bases.
- Erects cranes and components.

Task 8: Disassembles cranes

Sub-Tasks

- Disassembles crane components.
- Prepares crane for transport.

Block D: Reinforcing

Task 9: Fabricates on-site

Sub-Tasks

- Cuts material.
- Bends material.

Task 10: Installs reinforcing material

Sub-Tasks

- Places reinforcing material.
- Ties material.

Block E: Pre-Stresses/Post-Tensions

Task 11: Places pre-stressed/post-tensioning systems

Sub-Tasks

- Lays out profile.
- Places tendons and accessories.
- Installs bursting steel and anchorages.
- Connects tendons to anchors.
- Protects exposed tendons.

Task 12: Stresses tendons

Sub-Tasks

- Sets up stressing equipment.
- Tensions tendons.
- Cuts and caps tendons.
- Removes stressing equipment.
- De-stresses tendons.

Task 13: Grouts tendons

Sub-Tasks

- Sets up grouting equipment.
- Installs grouts.

Block F: Erection, Assembly And Installation

Task 14: Installs primary and secondary structural members

- Sub-Tasks**
- Erects false work.
 - Attaches structural members.
 - Levels, plumbs and aligns structural members.
 - Completes installation of structural members.

Task 15: Installs ornamental components and systems

- Sub-Tasks**
- Installs curtain walls and window walls.
 - Installs miscellaneous components.

Task 16: Installs conveyors, machinery and equipment

- Sub-Tasks**
- Installs material handling systems.
 - Aligns material handling systems.
 - Places machinery and equipment.

Block G: Maintenance and Upgrading

Task 17: Repairs components

- Sub-Tasks**
- Assesses current condition of components.
 - Field-fabricates components.
 - Replaces components.
 - Performs preventative maintenance.

Task 18: Dismantles and removes structural, mechanical and miscellaneous components

- Sub-Tasks**
- Ensures decommissioning of structure or components.
 - Plans sequence of disassembly.
 - Removes components.

Create a Study Plan

As you prepare for your exam, it is important to plan a schedule. The following two tables will help you stay on track.

The first table is a **“Weekly Study Plan.”** In this table list the areas you will focus your study for each day. You should include items you need to review as well as items you need to study. Remember, more time will be needed for study in areas you find difficult, whereas you may only require review in areas you are more familiar with. As you work through the NOA sub-task list you can start to fill in this table.

The second table is a **“Study Time Table.”** It is important to create a study schedule where you determine the best days of the week and times of day for you to study.

Print several copies of these tables and fill out for each week of study. It is important to stick to your study schedule.

Weekly Study Plan for Week of: _____

	Area of Study 1	Area of Study 2	Area of Study 3	Area of Study 4	Area of Study 5	Area of Study 6
Mon.						
Tues.						
Wed.						
Thu.						
Fri.						
Sat.						
Sun.						

Study Time Table for Week of: _____

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8:00 AM - 9:00 AM							
9:00 AM - 10:00 AM							
10:00 AM - 11:00 AM							
11:00 AM - 12:00 Noon							
12:00 Noon - 1:00 PM							
1:00 PM - 2:00 PM							
2:00 PM - 3:00 PM							
3:00 PM - 4:00 PM							
4:00 PM - 5:00 PM							
5:00 PM - 6:00 PM							
6:00 PM - 7:00 PM							
7:00 PM - 8:00 PM							

Resources - Websites

Study information can be drawn from a variety of sources. A sample list of study materials (websites and books) is provided below. These and other helpful resources may be found in a local college bookstore, on the internet, or at your place of employment. You may also be able to borrow them from an apprentice or journey person in your trade.

Study Strategies and Exam Preparation Guide

The *Study Strategies & Exam Preparation Guide* is meant to be used in conjunction with this study guide. It provides direction and information on such areas as study habits, test preparation and test taking techniques.

Exam Preparation Guide: https://www.aesl.gov.nl.ca/app/publications/exam_prep_guide.pdf

Plan of Training (POT)

A *Provincial Plan of Training* details the full scope of learning for a particular occupation, including both technical training competencies and industry experiences necessary to write an IP Red Seal exam (and complete the requirements for Red Seal Certification), or to write a provincial examination. The Plan of Training is based on the NOA.

POT Website: <https://www.aesl.gov.nl.ca/app/plans.html>

Red Seal Website

National Occupational Analysis - The NOA is a document used for Red Seal trades that describes the knowledge and abilities required by a fully competent tradesperson working in that trade. The content for the IP exam is based on the NOA.

Red Seal Website: <http://www.red-seal.ca/>

Ironworker PRACTICE Exam

This is **NOT** an IP exam. This is a practice exam provided by the Inter-provincial Standards Red Seal Program. It was developed using similar question types to that of a Red Seal exam. The exam is intended to be used for self-assessment in preparation for writing an IP Exam.

Sample questions can be found at: www.red-seal.ca/s.1mpl.2.2x.1mQ.5.2st.3.4ns-eng.html?tid=132

Glossary of Terms

The Red Seal website also lists a Glossary of Terms which will be helpful in preparing for your IP exam:

http://www.red-seal.ca/trades/ironwork_gen/2015n.4.1_1ppb_gl.4ss.1ry-eng.html

Acronyms

The Red Seal website also lists Acronyms which will be helpful in preparing for your IP exam:

http://www.red-seal.ca/trades/ironwork_gen/2015n.4.1_1ppc_1cr.4nym-eng.html

List of Tools and Equipment

The Red Seal website also shows a list of Tools and Equipment which will be helpful in preparing for your IP exam:

http://www.red-seal.ca/trades/ironwork_gen/2015n.4.1_1pp.1_t.4.4ls-eng.html

Resources – Book List

The books listed below are sorted according to NOA blocks as referenced throughout this study guide. You can use this list to help you obtain information on specific topics. It is not necessary to use these books specifically, as you may find others that will be equally beneficial.

If you wish to obtain any of the resources listed above, here is the reference information:

- Structural Welding Code--Steel*, [Standard] AWS D1.1/D1.1M:2010,
- Detailing for Steel Construction*, 3rd edition, May, 2002, American Institute of Steel Construction, ISBN 1564240541
- Fundamentals of Reinforced and Pre-stressed Concrete (video)*, 1988, Portland Cement Association, Skokie, Ill.: The Association, OCLC #35247129
- Structural Manual for Ironworkers, 3 Volumes: Manual V*, January 1, 1979, IABRIW, International Association of Bridge, Structural, Ornamental and Reinforcing Ironworkers, ASIN: B002A6QLMS
- Swing Stage Basic Rigging and Operating Procedures, Volume 1: Manual V*, 1987, Format: DVD

Disclaimer

Various external resources (websites, textbooks) have been listed in this study guide to assist an individual in preparing to write an IP Red Seal Exam. This does not mean the Department of Advanced Education, Skills and Labour, Newfoundland and Labrador endorse the material or that these are recommended as the best resources. There may be other resources of equal or greater value to an individual preparing for an IP Red Seal exam. The Department of Advanced Education, Skills and Labour has no control over the content of external textbooks and websites listed, and no responsibility is assumed for the accuracy of the material.

Conclusion

We hope this guide has provided you with some useful tools as you prepare for your IP Red Seal exam. If you have any questions regarding your IP Red Seal exam please contact your regional office (*see Appendix A for a list of regional offices*).

We appreciate your comments and feedback regarding the usefulness of this study guide. If you have any comments or suggestions, we welcome your feedback. The feedback form at the end of this guide can be used for this purpose.

Appendix A: Regional Offices

If you have any questions regarding your IP Red Seal exam, please contact one of the following regional offices:

Department of Advanced Education, Skills and Labour
Apprenticeship and Trades Certification Division
Toll Free: 1-877-771-3737
<https://www.aesl.gov.nl.ca/app/>

Corner Brook
1-3 Union Street Aylward Building, 2 nd Floor Corner Brook, NL A2H 5M7
Telephone: (709) 637-2366 Facsimile: (709) 637-2519

Grand Falls-Windsor
42 Hardy Avenue Grand Falls-Windsor, NL A2A 2J9
Telephone: (709) 292-4215 Facsimile: (709) 292-4502

Clareville
45 Tilley's Road Clareville, NL A5A 1Z4
Telephone: (709) 466-3982 Facsimile: (709) 466-3987

St. John's
P.O. Box 8700 1170 Topsail Road Mount Pearl, NL A1B 4J6
Telephone: (709) 729-2729 Facsimile: (709) 729-5878

Happy Valley – Goose Bay
163 Hamilton River Road Burse Building Happy Valley – Goose Bay, NL A0P 1E0
Telephone: (709) 896-6348 Facsimile: (709) 896-3733

Appendix B: Calculator Use

The picture below shows a calculator with the same functions as the one you will be provided with during your exam. It is advisable to borrow or purchase one with similar functions so that you can familiarize yourself with it before you write your exam.



Appendix C: Answer Sheet Example

With your exam you will be given an answer sheet similar to the one below. When answering multiple choice questions be sure to fill the circle completely and fill the circle that corresponds to the question on the exam.

Dual readhead scanner required to score this sheet

KEY ID
 A B C D

SCORING & PRINTING OPTIONS:
 RESCORE MULTIPLE ANSWER SCORING
 This sheet always uses the "Total Only" scoring option.

↑ FEED IN THIS DIRECTION ↓

1	A B C D E	26	A B C D E	51	A B C D E	76	A B C D E
2	A B C D E	27	A B C D E	52	A B C D E	77	A B C D E
3	A B C D E	28	A B C D E	53	A B C D E	78	A B C D E
4	A B C D E	29	A B C D E	54	A B C D E	79	A B C D E
5	A B C D E	30	A B C D E	55	A B C D E	80	A B C D E
6	A B C D E	31	A B C D E	56	A B C D E	81	A B C D E
7	A B C D E	32	A B C D E	57	A B C D E	82	A B C D E
8	A B C D E	33	A B C D E	58	A B C D E	83	A B C D E
9	A B C D E	34	A B C D E	59	A B C D E	84	A B C D E
10	A B C D E	35	A B C D E	60	A B C D E	85	A B C D E
11	A B C D E	36	A B C D E	61	A B C D E	86	A B C D E
12	A B C D E	37	A B C D E	62	A B C D E	87	A B C D E
13	A B C D E	38	A B C D E	63	A B C D E	88	A B C D E
14	A B C D E	39	A B C D E	64	A B C D E	89	A B C D E
15	A B C D E	40	A B C D E	65	A B C D E	90	A B C D E
16	A B C D E	41	A B C D E	66	A B C D E	91	A B C D E
17	A B C D E	42	A B C D E	67	A B C D E	92	A B C D E
18	A B C D E	43	A B C D E	68	A B C D E	93	A B C D E
19	A B C D E	44	A B C D E	69	A B C D E	94	A B C D E
20	A B C D E	45	A B C D E	70	A B C D E	95	A B C D E
21	A B C D E	46	A B C D E	71	A B C D E	96	A B C D E
22	A B C D E	47	A B C D E	72	A B C D E	97	A B C D E
23	A B C D E	48	A B C D E	73	A B C D E	98	A B C D E
24	A B C D E	49	A B C D E	74	A B C D E	99	A B C D E
25	A B C D E	50	A B C D E	75	A B C D E	100	A B C D E

ANSWER KEY INFO.
 # OF KEYS
 ITEM COUNT

0	0	0	2
1	1	1	3
2	2	2	4
3	3	3	5
4	4	4	6
5	5	5	7
6	6	6	8
7	7	7	9
8	8	8	0
9	9	9	1

PERFORMANCE ASSESSMENT
 % OF TOTAL SCORE
 POINTS EARNED

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Bar Code

NUMBER CORRECT	
PERCENT CORRECT	
ROSTER NUMBER	
SCORE	
RESCORE	

COMBINED POINTS EARNED	
COMBINED PERCENT CORRECT	
LETTER GRADE	
SCORE	
RESCORE	

200 ITEM

MARKING INSTRUCTIONS
 Use a No. 2 Pencil
 Fill oval completely
 Erase cleanly

STUDENT ID NUMBER

0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

↑ FEED IN THIS DIRECTION ↓

NAME _____
 SUBJECT _____
 PERIOD _____ DATE _____

Feedback Form

Study Guide – Ironworker (Generalist)

Please answer the following:

- (1) This Study Guide is a useful tool for exam preparation.
 strongly agree agree disagree strongly disagree
- (2) The topics contained in the guide are arranged in a logical order.
 strongly agree agree disagree strongly disagree
- (3) The design and format of the guide caught my attention.
 strongly agree agree disagree strongly disagree
- (4) The instructions throughout the guide are clear and to the point.
 strongly agree agree disagree strongly disagree
- (5) The resources listed in this guide are suitable and valuable.
 strongly agree agree disagree strongly disagree
- (6) The guide should contain more information.
 strongly agree agree disagree strongly disagree

Suggested information/resources to include:

Additional Comments:

Please complete this form and return via fax or mail to the following:

Department of Advanced Education, Skills and Labour
Apprenticeship and Trades Certification Division
Standards and Curriculum Unit
45 Tilley's Road, Clarenville, NL A5A 1Z4
Fax: (709) 466-3987

