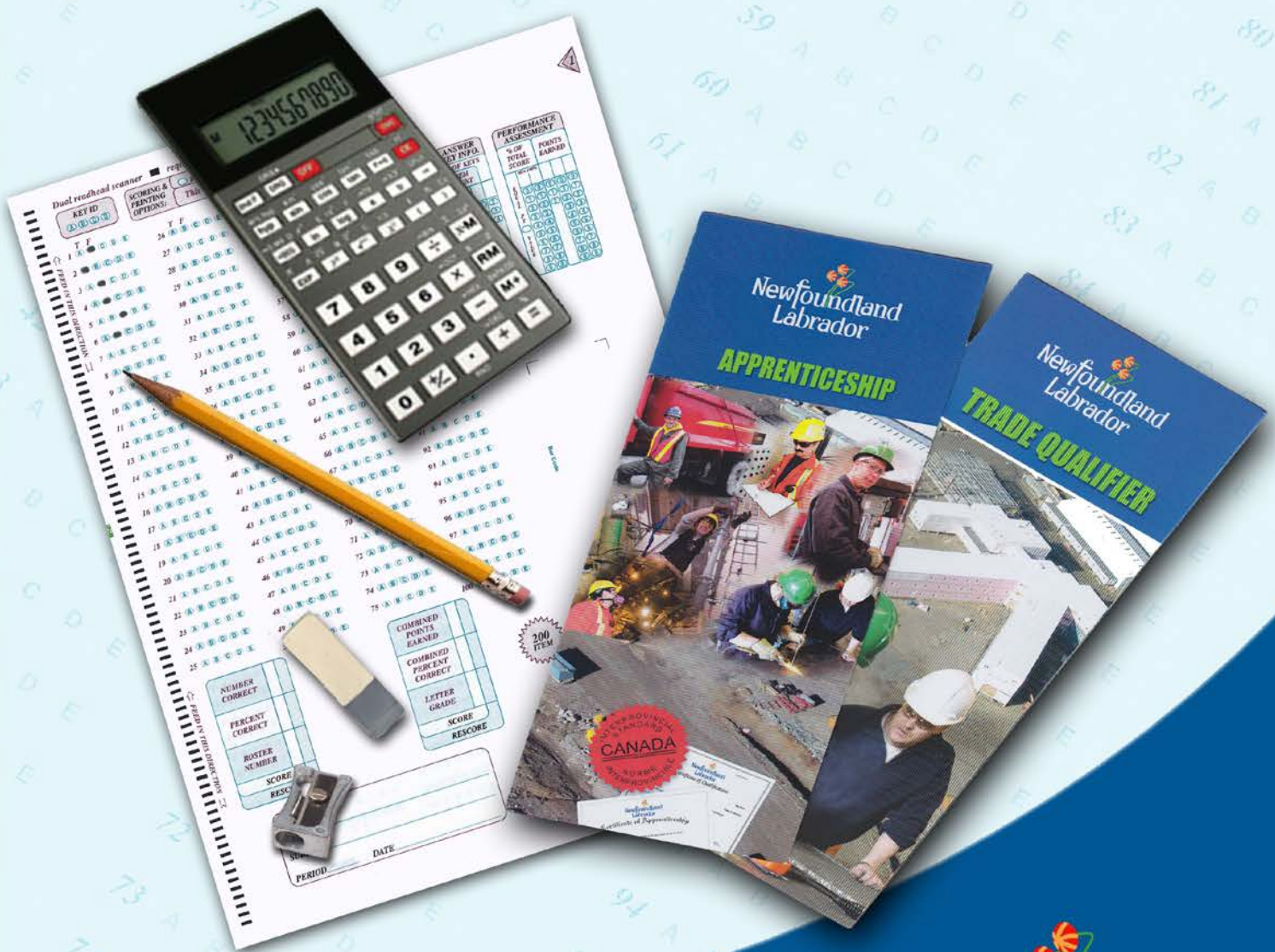


APPRENTICESHIP & CERTIFICATION

Study Guide Boilermaker




Newfoundland
Labrador

Apprenticeship and Certification

Study Guide

Boilermaker

(Based on Red Seal Occupational Standard – RSOS 2016)

Government of Newfoundland and Labrador
Department of Advanced Education, Skills and Labour

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Introduction

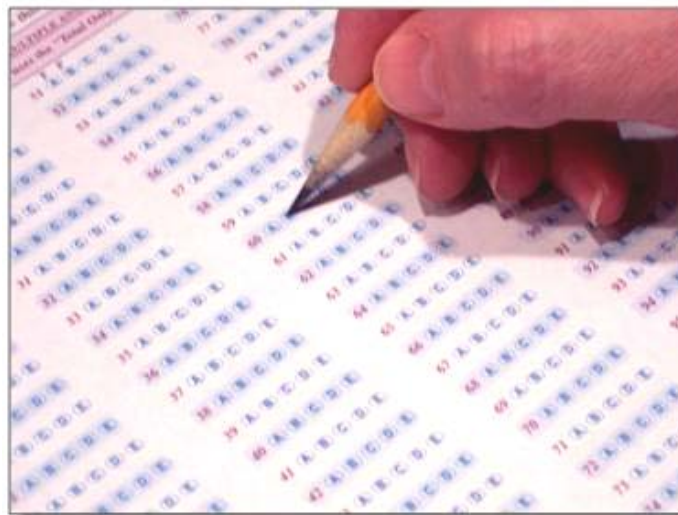
This Study Guide has been developed by the Newfoundland and Labrador Department of Advanced Education, Skills and Labour, Apprenticeship and Trades Certification Division, to assist apprentices and trade qualifiers as they prepare to write the Interprovincial (IP) Red Seal Exam. IP Exams are available 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.aesl.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 is used to determine the total number of downcomers required when erecting a tower?
 - A. Material list.
 - B. Bill of lading.
 - C. Sectional detail view.
 - D. Plan view.



2. What must be obtained before beginning to work in any tank or confined space?

- A. Breathing equipment.
- B. Entry permit.
- C. Permission from the supervisor.
- D. Safety harness.



3. What is the main advantage of using a basket hitch?

- A. There is 360° sling contact with the load.
- B. It prevents the load from rotating.
- C. It has double the capacity of a single vertical hitch.
- D. It is suited for lifting long loads.



Level 2 Examples:

1. What is the proper storage method for oxygen and acetylene gas cylinders?

- A. Laid down and grouped together.
- B. Separated, upright and secured in a designated area.
- C. Stored individually and in an upright position.
- D. Secured with nylon rope in a designated area.



2. What is the weight of an S200 x 27 x 3500 beam?

- A. 94.5 kg.
- B. 945.0 kg.
- C. 5 400.0 kg.
- D. 7 875.0 kg.



3. Which configuration is best suited for lifting a vessel shell section 5 ft. in diameter and 10 ft. long?

- A. Single choker hitch.
- B. Double wrapped choker hitch.
- C. Double basket hitch.
- D. Single vertical hitch.



Level 3 Examples:

1. What is the mean diameter of a cylinder that is to be rolled to an OD of 74 in. if the material thickness is $\frac{3}{4}$ in.?

- A. 72.50 in.
- B. 73.25 in.
- C. 74.00 in.
- D. 74.75 in.



2. A tank is 40 ft. in diameter and 30 ft. high? What must be done when the gravel base varies by $\frac{5}{8}$ in.?
- A. Trim the plates to horizontal level on the top of the first ring before starting the second ring.
 - B. Adjust the bed to horizontal level after completing the tank floor and the first ring.
 - C. Ensure that the top of the first ring is level by leaving gaps where it connects to the floor plates.
 - D. Trim the plates to horizontal level on the top of the final ring to ensure that the tank is level.



3. How many rafters are to be installed at a chord distance of 6 ft. $\frac{3}{8}$ in. on a 40 ft. diameter tank?
- A. 20.
 - B. 21.
 - C. 22.
 - D. 23.



Source of questions:

<http://www.red-seal.ca/s.1mpl.2.2x.1mQ.5.2st.3.4ns-eng.html?tid=35>

Exam Content

Understanding the *Red Seal Occupational Standard (RSOS)*

The Red Seal model has historically been based on the development of the National Occupational Analysis (NOA) which supports the development of multiple-choice format examinations.

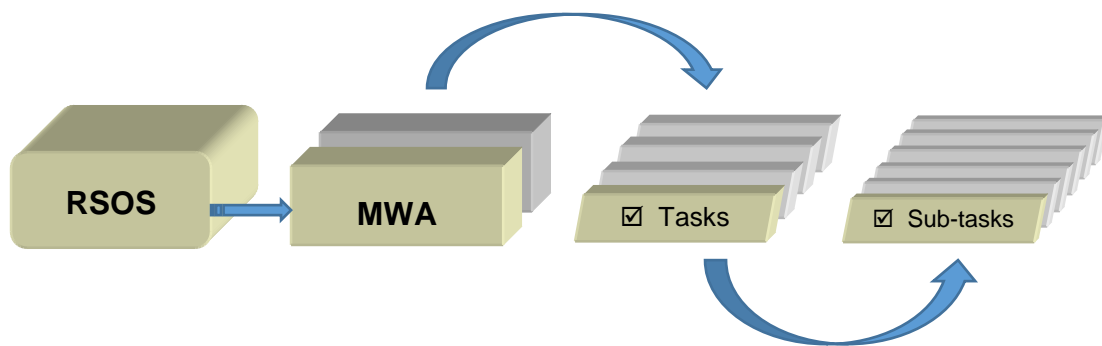
The RSOS was introduced in 2015 and is now taking the place of the NOA. Each RSOS or NOA sets the standard for a Red Seal trade. The Red Seal Inter-provincial Examination is based on the Red Seal Standard.

The new standards provide greater consistency in learning resources and allow for increased industry involvement in the development of these standards. This new model places increases emphasis on apprenticeship training and assessing skills with industry learning objectives, outcomes and performance criteria.

The RSOS for each trade describes the tasks and sub-tasks; skills and knowledge requirements; summary of essential skills; safety information; trends affecting the trade; technical terms; names of tools and equipment; acronyms; learning objectives and outcomes; industry expected performance and essential skills related to each sub-task.

The RSOS is an excellent tool to use as you study for the Red Seal exam. RSOSs can be found at <http://www.red-seal.ca/resources/n.4.1-eng.html>

RSOS material is organized into the following categories: **MWA** (*Major Working Activity*). The MWAs are further broken down into **TASKS** (*describes activities within an MWA*) and **SUB-TASKS** (*describe activities within a task – This is what the exam is based on*).

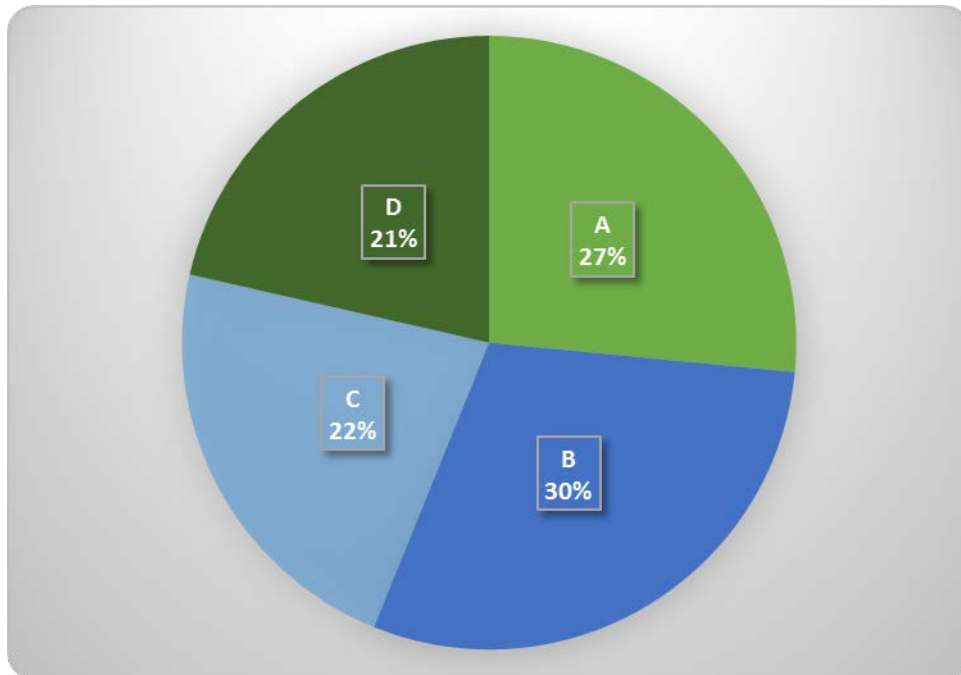


The NOA will continue to be used as the occupational standard for trades that do not yet have an RSOS developed.

RSOS Pie Chart

The RSOS Pie Chart presents the MWA percentages in the form of a pie chart which tells you the approximate number of questions from each MWA. For example, 27% of the questions on the **Boilermaker** Exam will be based on **MWA A**.

BOILERMAKER



MWA Titles			
MWA A	Performs Common Occupational Skills	MWA C	Completes New Construction
MWA B	Performs Rigging and Hoisting	MWA D	Performs Repairs, Maintenance, Upgrading, and Testing

Exam Breakdown

The **Boilermaker** exam currently has 120 questions. The following table shows a breakdown of the number of questions that come from each RSOS MWA. 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
MWA A	Performs Common Occupational Skills	31
Task 1	Performs safety-related functions	
Task 2	Uses tools, equipment and work platforms	
Task 3	Organizes work	
Task 4	Uses communication and mentoring techniques	
Task 5	Performs cutting and welding activities	
MWA B	Performs Rigging and Hoisting	36
Task 6	Plans lift	
Task 7	Rigs load	
Task 8	Hoists load	
Task 9	Performs post-lift activities	
MWA C	Completes New Construction	27
Task 10	Performs fabrication	
Task 11	Assembles and fits vessels and components	
Task 12	Fastens components	
MWA D	Performs Repairs, Maintenance, Upgrading and Testing	26
Task 13	Services vessels and components	
Task 14	Removes vessels and components	
	Total	120

RSOS Sub-tasks

The following *RSOS Task Profile Checklist* outlines the MWAs, 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 RSOS. 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 RSOS 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 RSOS, on the Red Seal website, for your trade.

**Task Profile Checklist
Based on RSOS 2016
Boilermaker**

MWA A: Performs Common Occupational Skills

Task 1: Performs common occupational skills

- Sub-Tasks*
- Uses personal protective equipment (PPE) and safety equipment
 - Maintains safe work environment
 - Monitors confined spaces

Task 2: Uses tools, equipment and work platforms

- Sub-Tasks*
- Uses hand tools
 - Uses power tools
 - Uses shop equipment
 - Uses cutting and welding tools and equipment
 - Uses work plate forms and access equipment
 - Uses aerial work platforms

Task 3: Organizes work

- Sub-Tasks*
- Organizes project tasks and procedures
 - Uses drawings and specifications
 - Handles materials and components
 - Demobilizes site

Task 4: Uses communication and mentoring techniques

- Sub-Tasks*
- Uses communication techniques
 - Uses mentoring techniques

Task 5: Performs cutting and welding activities

- Sub-Tasks*
- Cuts material
 - Prepares joints for fitting
 - Fits joints
 - Performs tack welds
 - Performs basic welding
 - Performs advanced welding

MWA B: Performs Rigging and Hoisting

Task 6: Plans lift

Sub-Tasks

- Determines load
- Performs per-lift analysis
- Selects rigging and hoisting equipment
- Secures lift area

Task 7: Rigs load

Sub-Tasks

- Inspects rigging equipment
- Fabricates rigging equipment
- Attaches rigging equipment to load

Task 8: Hoists load

Sub-Tasks

- Inspects hoisting equipment
- Assembles hoisting equipment
- Performs hoisting operation
- Secures load before rigging removal

Task 9: Performs post-lift activities

Sub-Tasks

- Conducts post-lift inspection
- Disassembles hoisting equipment
- Maintains rigging equipment

MWA C: Completes New Construction

Task 10: Performs fabrication

Sub-Tasks

- Lays out components for fabrication
- Cuts components for fabrication
- Forms components for fabrication
- Constructs components

Task 11: Assembles and fits vessels and components

Sub-Tasks

- Aligns vessels and components
- Fits vessels and components

Task 12: Fastens components

Sub-Tasks

- Bolts components
- Expands tubes
- Lays up fiberglass

0

MWA D: Performs Repairs, Maintenance, Upgrading, and Testing

Task 13: Services vessels and components

Sub-Tasks

- Inspects vessels and components defects
- Prepares vessels and components for servicing
- Repairs vessels and components
- Performs preventative maintenance and upgrades
- Tests materials, vessels and components

Task 14: Removes vessels and components

Sub-Tasks

- Dismantles vessels and components
- Removes materials

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 RSOS 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

Red Seal is a program that sets common standards to evaluate the skills of tradespeople across Canada. It is a partnership between the Federal Government and the provinces/territories.

The Red Seal model has been based on the National Occupational Analyses (NOA) which supports the development of multiple-choice examinations. A new Red Seal Occupational Standard (RSOS) was introduced in 2015 and is taking the place of the NOA.

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

Boilermaker 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:

<http://www.red-seal.ca/s.1mpl.2.2x.1mQ.5.2st.3.4ns-eng.html?tid=35>

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/boilermakers/2016rs.4s.1ppc_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/boilermakers/2016rs.4s.1pp.1.1cr.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/boilermakers/2016rs.4s.1ppb_t.4.4ls-eng.html

Resources – Book List

The books listed below can 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, here is the reference information:

- Metals and How to Weld Them*, 2nd edition, James F Lincoln, Jefferson, T.B., ISBN 978-9999738460
- IPT's Metal Trades Handbook*, IPT Publishing and Training Ltd., 1993, Garby, Ronald G., and Ashton, Bruce J., ASIN B0006F5Z7C
- IPT's Guide to Blueprint Interpretation*, IPT Publishing and Training Ltd., 2004, Jacobs, Grant E., ISBN 978-0920855423
- Practical Problems in Mathematics for Welders*, 4th edition, Delmar Cengage Learning, 1995, Schell, Frank R., and Matlock, Bill, ISBN 978-0827367067
- Boilermaking Manual*, Ministry of Education, Province of British Columbia, 1987, ISBN 978-0771882548

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

NAME _____
 SUBJECT _____
 PERIOD _____ DATE _____

Feedback Form Study Guide – Boilermaker

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
Standards and Curriculum Unit
45 Tilley's Road, Clarenville, NL A5A 1Z4
Fax: (709) 466-3987

