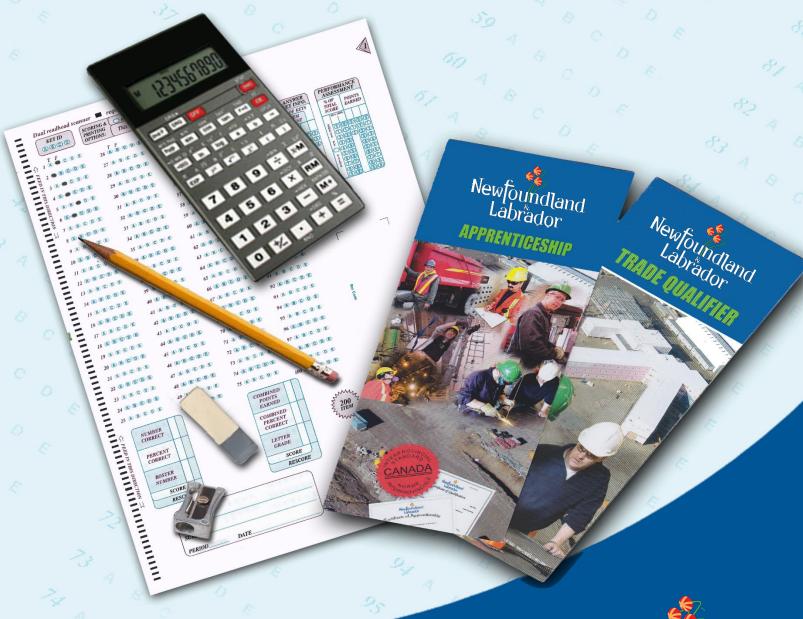
# APPRENTICESHIP & CERTIFICATION

Study Guide Welder



# **Apprenticeship and Certification**

**Study Guide** 

Welder (Based on 2014 NOA)

Government of Newfoundland and Labrador Department of Immigration, Population Growth and Skills

Version 10

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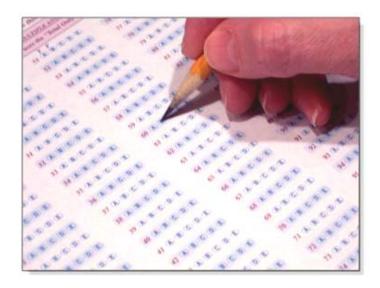
## Introduction

This Study Guide has been developed by the Newfoundland and Labrador Department of Immigration, Population Growth and Skills, Apprenticeship and Trades Certification Division, to assist apprentices and trade qualifiers as they prepare to write the Inter-provincial (IP) Red Seal Exam. IP Exams are available for all Red Seal trades. For a list of Inter-provincial trades please refer to the Department of Immigration, Population Growth and Skills website: https://www.gov.nl.ca/atcd/designated-trades/list-of-designated-trades/

#### 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 follow	ing will be provided:
	a calculator (see Appendix B for calculator information)

## 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.

☐ all other items required such as pencils, scrap paper, etc.

#### 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.

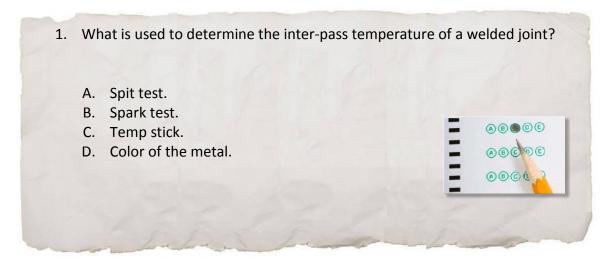
## Level 2 Procedural and Application

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:**



2. What is the minimum temperature an electrode oven should normally be set?

ME	TRIC	IMPERIAL	1 5 1 10
Α.	24° C	A. 75° F	
В.	49° C	B. 120° F	<b>a</b> B <b>®</b> 0 <b>©</b>
	121° C	C. 250° F	
D.	316° C	D. 600° F	ABONE
			<b>8</b> 00 <b>6</b>

- 3. What unit is used to measure force or pressure in a welding circuit?
  - A. Volts.
  - B. Watts.
  - C. Amperes.
  - D. Ohms.



#### **Level 2 Examples:**

- 1. When using the air carbon arc cutting (AAC) process, what must be done to eliminate the excessive slag adhering to the edges of the cut?
  - A. Change polarity.
  - B. Change electrode angle.
  - C. Decrease travel speed.
  - D. Decrease electrode diameter.



- 2. Which standard refers to welded steel construction using metal arc welding?
  - A. CSA Z662.
  - B. CSA W178.2.
  - C. CSA W59.
  - D. CSA W47.1.



- 3. What is the purpose of a groove angle when welding thick plate?
  - A. To increase weld reinforcement.
  - B. To allow access to the root of the weld.
  - C. To prevent burn-through at the root.
  - D. To reduce welding time.



#### **Level 3 Examples:**

- 1. A cylindrical tank with a 12 foot (365.75 cm) O.D. is to have a nozzle installed at 45 degrees around the circumference. From the 0° reference point what would be the linear measurement to locate the nozzle? (Answer to the nearest 16<sup>th</sup> (0.15 cm) of an inch) Imperial Metric?
  - A. 4'-1/8". 122.237 cm
  - B. 4'-8 9/16". 143.667 cm
  - C. 6'-9 7/16". 206.849 cm D. 14'-1 10/16". 430.847 cm



- 2. What is the most common cause of undercut on the cap pass of a 3F weld?
  - A. Travel speed too slow.
  - B. Amperage too high.
  - C. Wire stick out too long.
  - D. Contact tip to work distance is excessive.



- 3. What is the cause of root suck back?
  - A. Arc length too long and excessive pre-heat.
  - B. Arc length too short and incorrect fit-up.
  - C. Improper position of filler metal addition, current too low and travel speed too fast.
  - D. Improper position of filler metal addition, current too high and travel speed too low.



#### Source of questions:

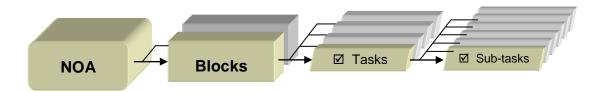
https://www.red-seal.ca/eng/s.1mpl.2.2x.1mQ.5.2st.3.4ns.shtml?tid=250

## **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 www.red-seal.ca.

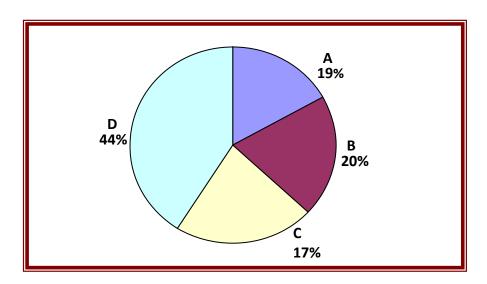
NOA material is organized into major content areas called **BLOCKS**. The blocks are further broken down into **TASKS** and **SUB-TASKS**.



## **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, 19% of the questions on the **Welder** Exam will be based on **Block A**.

## WELDER



BLOCK TITLES			
Block A	Common Occupational Skills	Block C	Cutting and Gouging
Block B	Fabrication and Preparation of Components for Welding	Block D	Welding Processes

## **Exam Breakdown**

The **Welder** exam currently has 125 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	Common Occupational Skills	24	
Task 1	Maintains tools and equipment		
Task 2	Uses access and material handling equipment		
Task 3	Performs safety-related activities		
Task 4	Organizes work		
Task 5	Performs routine trade activities		
Block B	Fabrication and Preparation of Components for Welding	25	
Task 6	Performs layout		
Task 7	Fabricates components		
Block C	Cutting and Gouging	21	
Task 8	Uses tools and equipment for non-thermal cutting and grinding		
Task 9	Uses oxy-fuel gas cutting (OFC) process for cutting and gouging		
Task 10	Uses plasma arc cutting (PAC) process for cutting and gouging		
Task 11	Uses air carbon arc cutting (CAC-A) process for cutting and gouging		
Block D	Welding Processes	55	
Task 12	Welds using shielded metal arc welding (SMAW) process		
Task 13	Welds using flux cored arc welding (FCAW), metal cored arc welding (MCAW) and gas metal arc welding (GMAW) processes		
Task 14	ask 14 Welds using gas tungsten arc welding (GTAW) process		
Task 15	Welds using submerged arc welding (SAW) process		
	Total	125	

#### **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 ( $\checkmark$ ) 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 2014 NOA Welder

Blo	ock	( <b>A</b> :	Со	mmon Occupational Skills		
			Task	1: Maintains tools and equipment		
		Sub-Tasks		Maintains hand, power, layout and measuring tools Maintains stationary machinery Maintains thermal cutting equipment Maintains welding equipment		
			Task	2: Uses access and material handling equipment		
		Sub-Tasks		Uses access equipment Uses rigging, hoisting and lifting equipment		
			Task	3: Performs safety-related activities		
		Sub-Tasks		Performs hazard assessments  Maintains safe work environment  Uses personal protective equipment (PPE) and safety equipment		
			Task	4: Organizes work		
		Sub-Tasks		Uses documentation and reference material Plans job tasks Organizes materials		
		1	Task !	5: Performs routine trade activities		
		Sub-Tasks		Performs quality inspection Marks welds, materials and parts Controls temperature of weldments Stores welding consumables Selects welding processes and power source Performs equipment start-up and shut-down Finishes final product		

Blo	ocl	kB:	Fabrication and Preparation of Components for Welding			
		☐ Task 6: Performs layout				
		Sub-Tasks	<ul> <li>□ Develops templates</li> <li>□ Transfers dimensions from drawings to materials</li> </ul>			
	☐ Task 7: Fabricates components					
		Sub-Tasks	<ul> <li>□ Prepares materials</li> <li>□ Fits components or welding</li> <li>□ Assembles components</li> </ul>			
Rlo	acl	c C·	Cutting and Gouging			
DIC			Task 8: Uses tools and equipment for non-thermal cutting and grinding			
			rask 8. Oses tools and equipment for non-thermal cutting and grinding			
		Sub-Tasks	<ul> <li>□ Selects cutting and grinding tools</li> <li>□ Cuts using stationary band saws and power hacksaws</li> <li>□ Cuts using shears and ironworkers</li> <li>□ Cuts using hand tools</li> <li>□ Cuts using handheld power tools</li> </ul>			
	☐ Task 9: Uses oxy-fuel gas cutting (OFC) process for cutting and gouging					
		Sub-Tasks	<ul> <li>□ Selects OFC gas and equipment</li> <li>□ Sets up OFC equipment</li> <li>□ Sets operating parameters for OFC equipment</li> <li>□ Performs cut and gouge using OFC equipment</li> </ul>			
			Task 10: Uses plasma arc cutting (PAC) process for cutting and gouging			
		Sub-Tasks	<ul> <li>□ Selects PAC equipment and consumables</li> <li>□ Sets up PAC equipment</li> <li>□ Sets operating parameters for PAC equipment</li> <li>□ Performs cut or gouge using PAC equipment</li> </ul>			
			Task 11: Uses air carbon arc cutting (CAC-A) process for cutting and gouging			
		Sub-Tasks	<ul> <li>□ Selects CAC-A equipment and consumables</li> <li>□ Sets up CAC-A equipment</li> <li>□ Sets operating parameters for CAC-A equipment</li> <li>□ Performs cut and gouge using CAC-A equipment</li> </ul>			

Blo	ck	(D	: We	elding Processes
			Task	12: Welds using shielded metal arc welding (SMAW) process
		Sub-Tasks		Selects SMAW equipment and consumables Sets up SMAW equipment Sets operating parameters for SMAW Performs weld with SMAW equipment
			Task	13: Welds using flux cored arc welding (FCAW), metal cored arc welding
				(MCAW) and gas metal arc welding (GMAW) processes
		Sub-Tasks		Selects FCAW, MCAW and GMAW gas, equipment and consumables Sets up FCAW, MCAW and GMAW equipment Sets operating parameters for FCAW, MCAW and GMAW Performs weld using FCAW, MCAW and GMAW equipment
			Task	14: Welds using gas tungsten arc welding (GTAW) process
		Sub-Tasks		Selects GTAW gas, equipment and consumables Sets up GTAW equipment Sets operating parameters for GTAW Performs weld using GTAW equipment
			Task	15: Welds using submerged arc welding (SAW) process
		Sub-Tasks		Selects SAW equipment and consumables. Sets up SAW equipment Sets operating parameters for SAW Performs weld using SAW equipment

## **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 subtask 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.

<b>Weekly Study Plan for Week</b>	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.						
weu.						
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 journeyperson 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.

https://www.gov.nl.ca/atcd/apprentices-youth/self-study/study-guides/

#### 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.

https://www.gov.nl.ca/atcd/designated-trades/pots-aacs/

#### **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 trades-person working in that trade. The content for the IP exam is based on the NOA.

www.red-seal.ca

#### **Welder 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.

https://www.red-seal.ca/eng/s.1mpl.2.2x.1mQ.5.2st.3.4ns.shtml?tid=250

#### Red Seal Exam Self-Assessment Guide

Use this self-assessment tool to rate your own understanding and experience with the tasks of the trade that are on the Red Seal examination:

https://www.red-seal.ca/\_conf/assets/custom/docms/welder/self-assessment.pdf

#### **Glossary of Terms**

The Red Seal website lists a Glossary of Terms which will be helpful in preparing for your IP exam: http://www.red-seal.ca/trades/weld/2014n.4.1 11 .1ppb gl.4ss.1ry-eng.html

#### Acronyms

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

http://www.red-seal.ca/trades/weld/2014n.4.1 12 .1ppc .1cr.4nym-eng.html

#### **List of Tools and Equipment**

The Red Seal website shows a list of Tools and Equipment which will be helpful in preparing for your IP exam: http://www.red-seal.ca/trades/weld/2014n.4.1\_10\_.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.

Book	Block A	Block B	Block C	Block D
Modern Welding, 10 <sup>th</sup> edition	✓	✓	✓	✓
Welding Print Reading, 5 <sup>th</sup> edition	✓	✓	✓	✓
Blueprint Reading for Welders, 7 <sup>th</sup> edition	✓	✓	✓	✓
Welding Skills, 4 <sup>th</sup> edition			✓	✓
Welding Skills Workbook, 3 <sup>rd</sup> edition	✓	✓	✓	✓
IPT's Metal Trades Handbook, 8 <sup>th</sup> edition	✓	✓	✓	✓

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

Ш	Modern Welding, 10th edition, Goodheart-Willcox Publishing, 2004, Bowditch, Althouse and
	Turnquist, ISBN 978-1-56637-987-8
	Welding Print Reading, 5th edition, Goodheart-Willcox Publishing, 2007, Polanin, W. and
	Walker J., ISBN 978-1-59070-642-8
	Blueprint Reading for Welders, 7 <sup>th</sup> edition, Thomas Delmar Learning, 2005, Bennett A.E., and
	Siy, L.J., ISBN 978-1-4018-6723-2
	Welding Skills, 4 <sup>th</sup> edition, American Technical Publishing, 2009, Miller, R.T. and Moniz, B.J.,
	ISBN 0826929923
	Welding Skills Workbook, 3 <sup>rd</sup> edition, American Technical Publishing, 2004, Gosse, J., ISBN
	0826930115
	IPT's Metal Trades Handbook, 8 <sup>th</sup> edition, IPT Publishing and Training Ltd., 1993, Ashton,
	B.J., and Garby, R.G., ISBN 0-920855-32-X

#### 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 Immigration, Population Growth and Skills, Newfoundland and Labrador endorses 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 Immigration, Population Growth and Skills 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 Immigration, Population Growth and Skills
Apprenticeship and Trades Certification Division
Toll Free: 1-877-771-3737

https://www.gov.nl.ca/atcd/contact-us/staff-listing-and-office-locations/

#### **Corner Brook**

1-3 Union Street Aylward Building, 2<sup>nd</sup> Floor Corner Brook, NL A2H 5M7

Telephone: (709) 637-2366 Facsimile: (709) 637-2519

#### Clarenville

45 Tilley's Road Clarenville, NL A5A 1Z4

Telephone: (709) 466-3982 Facsimile: (709) 466-3987

#### **Grand Falls-Windsor**

42 Hardy Avenue Grand Falls- Windsor, NL A2A 2J9

Telephone: (709) 292-4215 Facsimile: (709) 292-4502

#### 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**

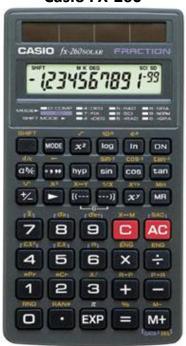
163 Hamilton River Road Bursey Building Happy Valley – Goose Bay, NL AOP 1EO

Telephone: (709) 896-6348 Facsimile: (709) 896-3733

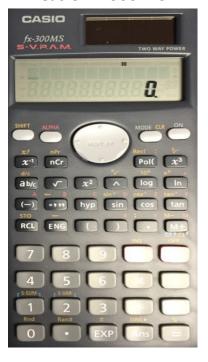
# Appendix B: Calculator Use

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.

Casio FX-260

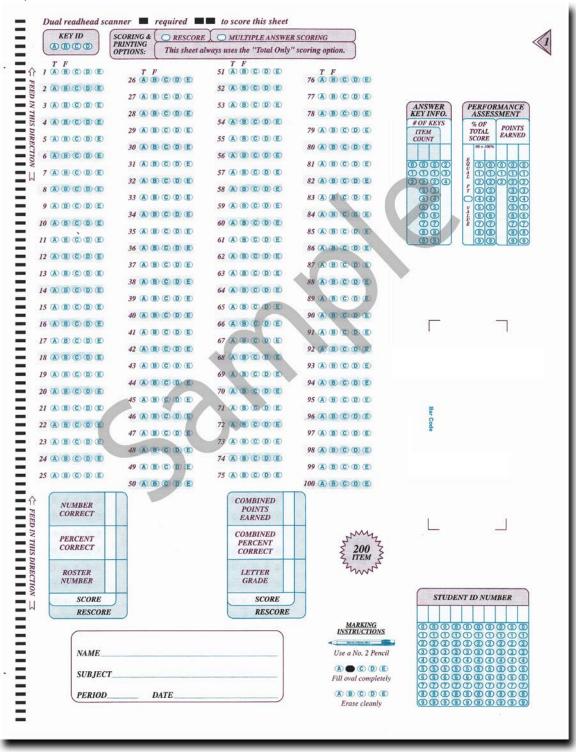


Casio FX-300 MS



## 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.



## Feedback Form Study Guide - Welder

Please answer the following:						
(1)	This Study Guide is a □ strongly agree	useful tool for	exam preparat	tion. □ strongly disagree		
(2)	The topics contained  ☐ strongly agree	d in the guide a □ agree	re arranged in a □ disagree	a logical order. □ strongly disagree		
(3)	The design and form  ☐ strongly agree	at of the guide □ agree	caught my atte  ☐ disagree	ention. □ strongly disagree		
(4)	The instructions thro  ☐ strongly agree	oughout the gu	ide are clear an □ disagree	d to the point.  ☐ strongly disagree		
(5)	The resources listed  ☐ strongly agree	in this guide ar □ agree	e suitable and o	valuable. □ 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 Immigration, Population Growth and Skills
Apprenticeship and Trades Certification Division
Standards and Curriculum Unit
45 Tilley's Road, Clarenville, NL A5A 1Z4

Fax: (709) 466-3987

