



Essential Skills Manual

Metal Fabricator

NOC 7263

METAL FABRICATOR MANUAL CONTENTS

Included in this Essential Skills Manual:

	PAGE
Essential Skills Inventory Assessor's Guide	7
Essential Skills Inventory	38
Technical Reading	43
Document Use	49
Numeracy	54
Oral Communication	64
Computer Use	66
Writing	67
Essential Skills Answer Key	69
Technical Reading	76
Document Use	82
Numeracy	88
Oral Communication	99
Computer Use	102
Writing	104
Essential Skills Curriculum Instructor Guide	106
Curriculum Frameworks and Guidelines	119
Technical Reading	120
Document Use	134
Numeracy	152
Oral Communication	194
Computer Use	205
Writing	217
Technical Skills Inventory	227

ABOUT TRADE ESSENTIALS

Trade Essentials is a research project funded under the Pan-Canadian Innovations Initiative, Human Resources and Skills Development Canada, in partnership with the Apprenticeship Section of the PEI Department of Innovation and Advanced Learning.

The Trades Essentials program was designed to increase participation in trades by providing a well-defined pathway for each client to build on present skills and access services necessary for success in his or her occupation.

This new concept, focusing on essential skills and recognition of prior learning (RPL), provides assessment, interventions and coordination of services for clients. This is the first project to provide a seamless learning path to trades certification.

To create this path, a number of educational tools were created and tested for thirteen trades. These tools are available in both official languages for use in any jurisdiction.

The Tools:

- Trade Specific Essential Skills Inventories (ESI)

Through a dynamic assessment process using contextualized Essential Skills assessments, clients can identify individual proficiency levels of the following Essential Skills: reading text, document use, numeracy, oral communication, writing and using computers.

The Essential Skills Inventory and the Technical Skills Inventory assist the client to develop a learning path which includes measurable targets to reach his/her individual goals.

- Trade Specific Essential Skills Curriculum

Trade specific curriculum frameworks have been created for each of the thirteen trades along with trades specific curriculum guidelines and suggested resource materials.

- Technical Skills Inventories (TSI)

Through a self assessment process, clients are able to identify their individual trade specific skills.

The Thirteen Trades:

Automotive Service Technician - Cabinet Maker – Carpenter - Construction Electrician – Cook - Industrial Electrician – Machinist - Metal Fabricator - Oil Burner Mechanic - Plumber - Refrigeration and Air Conditioning Mechanic - Steamfitter/Pipefitter - Welder

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This project is the result of the collaboration of the following dedicated adult educational consultants in Prince Edward Island:

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Karen Chandler
Gaelyne MacAulay
Karen Dempsey.

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We are grateful to the assessors, tutors and classroom instructors who patiently piloted our materials and who gave back invaluable insights and advice.

All Trade Essentials materials have been validated by teams of tradespeople who hold Certificates of Qualification, Red Seal Endorsement. We gratefully acknowledge the crucial contribution made by the following team members:

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Ryan Rogerson (Carpenter)
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Mark Seaman (Construction Electrician)

Ken Zakem (Cook)
Rod Lukeman (Cook)
Barry Strongman (Industrial Electrician)
Gregg Francis (Industrial Electrician)
Jake Shaw (Machinist)
Sue LeFort (Machinist)
John Hebert (Metal Fabricator / Welder)
Joe Johnson (Metal Fabricator)
Jim Arsenault (Metal Fabricator)
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Vincent Jenkins (Welder)

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TABLE OF CONTENTS

1	SECTION 1	10
1.1	Introduction	10
2	SECTION 2	10
2.1	Interactive Assessment	10
2.2	Adult Education	11
2.2.1	Principles of Adult Education.....	11
2.2.2	Characteristics of Adult Learners	12
3	SECTION 3	14
3.1	The Essential Skills Inventory	14
3.1.1	Process	14
3.1.2	Essential Skills Profiles	14
3.1.3	Preparation	15
3.1.4	Sections of the Inventory	17
4	SECTION 4	21
4.1	Essential Skills Inventory Records	21
5	SECTION 5	21
5.1	Essential Skills Post-Inventory	21
5.1.1	Post-Inventory Directions.....	21
5.1.2	Post-Inventory Reporting Form	22

APPENDIX A - FORMS

APPENDIX B – EXTRA INFORMATION

GLOSSARY

The definitions are intended as a guide for the language used in the Essential Skills Inventories.

ABE	Adult Basic Education
Apprentice	For the purpose of this Guide, apprentice is an inclusive term that refers to anyone working in a trade except those already certified.
Authentic workplace documents	Actual documents obtained from an employer that may be used as teaching tools. An example document is a Material Safety Data Sheet (MSDS).
Block Release Training	A period of in-school training for apprentices. It may also be referred to as Period Training or a Level.
Dynamic (interactive) Assessment	A flexible, holistic, context-sensitive approach used to evaluate learning.
Essential Skills	The set of nine skills defined by Human Resources and Skills Development Canada as being common to all occupations. The skills are: reading text (technical language), document use, numeracy (math), oral communication, writing, computer use, thinking skills, continuous learning and working with others.
Essential Skills Profile	A document that describes how each Essential Skill is used by an occupational group.
GED	General Education Diploma; a Grade 12 equivalency for adults.
Grade 12	A diploma issued by a provincial or territorial government that recognizes completion of High School. It is a challenge to use this as a common credential, since there are several different Grade 12 diplomas.

ESSENTIAL SKILLS INVENTORY ASSESSOR'S GUIDE

Intervention	For the purpose of this Guide, intervention refers to a trade-specific Essential Skills program delivered to either a group or an individual.
Journeyperson	A person who holds a Certificate of Qualification in a designated trade. A certified journeyperson is allowed to train and mentor apprentices.
Red Seal	A seal of endorsement applied to a Certification of Qualification for a trade. It allows for mobility among provinces and territories. A certified journeyperson is allowed to train and mentor apprentices.
Trade Essentials	A three-year research project to develop Essential Skills and Prior Learning assessments and curricula specific to 13 trades and to pilot the materials with six of those trades. The 13 trades included in this project were: Automotive Service Technician, Carpenter, Cabinetmaker, Cook, Construction Electrician, Industrial Electrician, Machinist, Metal Fabricator, Oil Burner Mechanic, Plumber, Refrigeration and Air Conditioning Mechanic, Steamfitter/Pipefitter and Welder. Materials were piloted with Carpenters, Steamfitter/Pipefitters, Welders, Automotive Service Technicians, Plumbers and Cooks.

1 SECTION 1

1.1 Introduction

The Essential Skills Inventories include:

- reading text
- document use
- numeracy
- oral communication
- computer use
- writing

The Essential Skills Inventories were developed during a three-year Trade Essentials project whose mandate was to develop Essential Skills assessments and curricula for 13 trades. These materials provide an opportunity for tradespeople to identify and update the Essential Skills required for their respective trades as an important step towards successful trade certification. The Essential Skills Inventory is a tool used to identify both strengths and weaknesses in trade-specific Essential Skills profiles.

2 SECTION 2

2.1 Interactive Assessment

Essential Skills Inventories:

Automotive Service Technician	7321
Carpenter	7271
Cabinetmaker	7272
Cook	6242
Construction Electrician	7241
Industrial Electrician	7242
Machinist	7231
Metal Fabricator	7263
Oil Burner Mechanic	7331
Plumber	7251
Refrigeration and Air Conditioning Mechanic	7313
Steamfitter/Pipefitter	7252
Welder	7265

Adult learners have different needs than “traditional” students so strategies must be developed to engage, motivate and build their confidence.

The Essential Skills Inventories use an innovative, interactive (dynamic) approach to assessment that is both client-centred and asset-based. An asset-based approach compares the apprentices’ present Essential Skills to the skills needed for their trade, connecting what they already know with what they need to learn.

The Inventory is a process more than a product and requires skilled and experienced assessors to establish an atmosphere where apprentices are comfortable enough to think about and explore their learning in an Essential Skills context. ***Assessors need the “inner technology” to be sensitive to the needs of the apprentice and to know when to stop an Essential Skills Inventory if the apprentice is struggling.*** The interactive assessment explores not only what the apprentice knows and can do, but also, gives an awareness of how the apprentice learns.

This type of assessment can be used in a pre- and post-format but cannot be referred to normative tables for interpretation. It is designed as a starting point for instruction in Essential Skills for the trades.

By using the trade-specific Essential Skills Inventory you can help an apprentice identify those skills to be updated by building upon the skills he/she already has. This process provides immediate, individual feedback to the learner. This is an assessment used *for* learning, not *of* learning.

Motivation is fundamental to change and this process helps an apprentice become motivated, engaged and confident in learning. Confidence can never be disconnected from skills. However, the apprentice does need to have a readiness, willingness and an ability to learn in order to be successful. In addition, many adults fear returning to a structured learning environment after a lengthy absence. It is very difficult to discover the learning needs of adults without the creation of a "safe environment". This is even more evident with those who have the greatest learning needs.

We need assessment and training so the workforce has the required Essential Skills to adapt to changing demands.

Why do apprentices need to go through this process?

At present, there is neither a process nor a place for those who are already working in a trade to update their trade-related Essential Skills other than completing Block training. Awareness of the trade-specific Essential Skills and the knowledge of the scope of a trade is a starting point on the path to certification. Individual assessments (inventories) followed by appropriate interventions (supports) provide the opportunity for eventual certification in the trade. The objective of this process is to help apprentices be successful in passing certification exams whether they be Block or Interprovincial Red Seal exams.

2.2 Adult Education

It is very important to be mindful of both the principles of Adult Education and the characteristics of adult learners.

2.2.1 Principles of Adult Education ¹

- ***Adults must want to learn.***
Trade Essentials clients have stated the primary reason for participating in an Essential Skills program and

¹ Adapted from www.literacy.ca, *Movement for Canadian Literacy, Principles of Adult Education*

obtaining certification was personal satisfaction, not job mobility or an increase in pay.

- ***Adults will learn only what they believe they need to learn.***
They have a practical approach to learning as they need to know how this learning affects them now.
- ***Adults learn by doing.***
Ninety-eight percent of the apprentices in the Trade Essentials Project identified their preferred learning style as kinesthetic.
- ***Adult learning focuses on problems and the problems must be realistic.***
The Essential Skills Inventories use trade-specific materials and focus on the apprentice's ability to solve problems since that is the nature of their jobs.
- ***Experience affects adult learning.***
All apprentices bring a varied background of acquired skills and knowledge together with an attitude about learning.
- ***Adults learn best in an informal situation.***
Many of the apprentices indicated they appreciate the opportunity to learn with their peers at a time convenient to them (evenings, Saturdays) and in a setting where they are comfortable sharing their knowledge with others. For the first time, there is a place dedicated to apprentices where they can access the information and the support they need.
- ***Adults want guidance.***
While experienced in their individual trades, apprentices may need help to create a learning plan to meet their objective.

2.2.2 Characteristics of Adult Learners ²

- ***Adult students are mature people and prefer to be treated as such.*** Being "lectured at" can cause resentment and frustration. Apprentices are usually kinesthetic learners and need to be active when

² Adapted from www.assetproject.info. *Learner Centred Methodologies*, Wynne, R.

learning. They also learn from each other in a classroom setting.

- ***Adults are goal/relevancy-oriented.*** Adults need to know why they are learning because their needs are concrete and immediate. They will be more interested in theory if it links to practical application.
- ***Adults may have insufficient confidence.*** A number of apprentices *may* have had prior experiences within the education system that have led to feelings of inadequacy, fear of study and failure. Many apprentices have been out of a formal learning situation for 20 years or more. Returning to a classroom environment can be daunting and challenging.
- ***Adults are often tired when they come to class as they are juggling work, family and other responsibilities.*** Most apprentices are working full time and are attending a program in the evenings and on occasional Saturdays. Many drive considerable distances, as well as driving in winter conditions.
- ***Adults learn best when they are ready to learn and when they have identified their own learning needs as opposed to being controlled by someone else.*** They want to choose options based on their own needs. Providing the apprentices with a chance to self-assess and identify their strengths and weaknesses is an important first step.

Adults learn at different rates and in various ways according to their learning styles, educational levels, experiences and relationships. The first section of the ESI is a Learning Styles Inventory. Most apprentices have never identified their own learning styles and this is often an “aha” moment for them. Being able to use this information for learning and studying techniques is invaluable to them.

- ***Adults have accumulated life/work experiences.*** They tend to favour learning that draws on their prior skills and knowledge. The Essential Skills Inventory is an assessment *for* learning, providing an opportunity for each apprentice to realize what he/she already knows and to move forward from that base. The Essential Skills Inventory identifies skills in need of updating using in-context materials and a guided self-

assessment. The skills may have been learned in a formal setting or on the job.

3 SECTION 3

3.1 The Essential Skills Inventory

Conducted in a manner that engages the apprentice and helps build confidence, the completed Inventory provides a picture of the apprentice's learning needs while recognizing the skills that have already been acquired. The Inventory is as much a process as a product. The time required to complete an Inventory will vary depending on the apprentice but should be completed in one and a half to two hours. Six of the nine Essential Skills are assessed in these Inventories and are in this order: reading text (technical language), document use, numeracy, oral communication, computer use and writing. The Inventory is divided into sections and the section questions are ordered from simple to complex.

3.1.1 Process

Sit *beside*, not across from, the apprentice as a table or desk impedes good communication and can be interpreted as one person being in a position of authority over another. If a round table is available, use it. Apprentices are not often asked to self assess, but will do so willingly if they are comfortable with the assessor and understand the process.

3.1.2 Essential Skills Profiles

The concept of Essential Skills and Essential Skills Profiles will likely be new to the apprentice. At the beginning of the interview therefore, introduce the trade-specific Essential Skills Profile. Give the apprentice a hard copy of the profile to take away with him/her. Encourage a thorough review of the profile as well as the Essential Skills website (www.hrsdc.gc.ca/essentialskills) for additional information.

*Knowledge is knowing ...
or knowing where to
find out.*

- Alvin Toffler

When introducing the profile, include these points:

- The profiles are Canadian. They were developed by interviewing fellow tradespersons, supervisors, managers and researchers in workplaces across the country.

- Over 350 occupational profiles are available on the website with development ongoing for additional profiles.
- Nine skills are identified as core skills common to all occupations. (The Trade Essentials Project developed learning materials for six of the nine Essential Skills).
- The Essential Skills are used in different ways and at different degrees of complexity, depending on the occupation.
- The complexity levels have nothing to do with Grade levels; they refer to the degree of difficulty of tasks completed at work. A scale of 1-5 is used for complexity levels and, even though there is a range in complexity levels, one must be able to complete tasks at the most complex level.

Gather the supplies you need prior to beginning the Essential Skills Inventory:

- *scientific calculator*
- *pencils and an eraser*
- *intake form*
- *skills summary form*
- *ESI printed on coloured paper*
- *Answer Key*

It is important to keep this discussion brief and framed in a positive manner. Adults do not want to spend time re-learning what they already know so it is helpful to give examples of the advantages of using the profile. Suggestions are: a) a plumbing apprentice may not ever need to know how to solve quadratic equations but will need to be very good at measurement and calculations for such uses as determining grade, elevation and slope, b) an apprentice may not have to read an entire operating manual but will need to find and use specific pieces of information from the manual, c) an apprentice will have to be very accurate when completing an incident or an accident report but will not be required to write an essay. The writing, in this instance, does not have to be long or complicated but it does need to be accurate and precise. It is important to make the connections between what they have learned in a more "academic" setting and how to apply those skills in a work setting.

3.1.3 Preparation

Print the apprentice's copy of the ES Inventory on light-coloured paper, preferably beige, as it reflects less light than white paper so is easier to read; the black print actually is clearer on a pastel background. The font used is Verdana, a sans serif font, 11 point, which is slightly easier to read than a serif font; 11 point is also easier to read than a smaller font.

The rationale for this formatting is that there is a need to provide equal opportunity for all apprentices without compromising standards. No two learners (apprentices) are the same. There is a possibility that an apprentice could have a learning disability and unless the apprentice has disclosed that information or provided documentation, you do not know who is at risk. Using standard formatting does not give an advantage to anyone.

Before you begin the actual Inventory, it is very important to explain to the apprentice that you will complete the Skills Summary Form as the assessment proceeds and you will give him/her a copy at the end of the interview. This avoids any discomfort that would be caused if the apprentice does not know why you are recording information during the Inventory. It is important to provide immediate feedback from the Inventory so the apprentice has a picture of the Essential Skills he/she needs to update. This also helps to mitigate anxiety prior to beginning an intervention.

Before you begin an Inventory, be sure to have these items:

- Two copies of the trade-specific **Essential Skills Profile** (one for the apprentice and one for you).
- Appropriate forms. You will need copies of the **Intake Form** and the **Skills Summary Form** (find samples in Appendix A).
- A copy of the **Essential Skills Inventory printed on pastel-coloured paper**, preferably beige or buff. You may want to work from a single copy with the apprentice or have a separate copy for yourself. Do whatever is comfortable for you and the apprentice.
- A copy of the **Answer Key**.
- A **pencil and an eraser**.
- A **basic scientific calculator**.

Although an apprentice may use a programmable or trade-specific calculator on the worksite, these types of calculators *cannot* be used when writing a Block or an Interprovincial exam. However, the prudent use of a basic scientific calculator should be encouraged while completing the Essential Skills Inventory. (One suggestion is the Casio FX-260 Solar.) A calculator is also a time saver on the job which results in increased efficiency and cost savings. Therefore the apprentice needs to be very familiar with its use. For anyone with a learning disability, the calculator can be a particularly helpful tool. The use of a calculator does

not, however, preclude the apprentice's ability to understand mathematical concepts and to estimate reasonable answers.

3.1.4 Sections of the Inventory

3.1.4.1 Learning Styles

Briefly explain the concept of learning styles (refer to Appendix B for more information). Then ask the apprentice to read each of the statements in the Inventory relatively quickly. Tell him/her to check any statements that are true personally, all or most of the time. It is best for the apprentice to go with a first reaction to the statement rather than to spend too much time thinking about it. If a statement does not apply, it is to be left blank. If there are *three or more* checks in one category, that indicates a preferred learning style. A pattern will emerge from the answers; most apprentices will have more than one learning style.

Follow the same instructions for the section on learning in a group or learning alone. This is important information for the apprentice and for the instructor.

3.1.4.2 Technical Language (Reading text)

This section begins with lists of words that are contextualized to the trade and have been taken from either the Essential Skills Profile (ESP) or the National Occupational Analysis (NOA) glossary. The lists are arranged in order from simple to complex, each list containing ten words.

Ask the apprentice to choose a list he/she would be comfortable reading aloud. As long as the apprentice has *seven out of ten* words correct in any list, ask him/her to continue reading aloud as far as possible with the lists. Some apprentices will begin reading at a lower level and continue to the end of list four; others will read list four on the first try. It is important for the apprentice to begin reading at a point of comfort and to proceed from there. *If an apprentice struggles with the first list, stop there.* Use the list to indicate a beginning point for the technical reading excerpts. For example, if an apprentice reads six out of ten words (less than seven) in list three, refer to section two in the reading. ***A crucial aspect of the technical reading is to know when to stop if the apprentice is struggling***

The Essential Skills Inventory provides a wealth of information about the apprentices and their learning.

with a skill. This is one of the most important skills for you to have as an assessor, that is, to be sensitive and responsive to the needs of each apprentice.

Before using the reading excerpts, ask each apprentice to read the list of pseudowords (nonsense words). Explain the reason for using this list; that decoding words is an important reading skill for comprehension, speed and fluency. If the apprentice struggles with this list and cannot read most of the words, this is a warning that the apprentice may have reading difficulties.

The reading excerpts consist of trade-related materials. A readability index has been completed on each passage as a guide for the difficulty of the reading. Give the apprentice the appropriate reading. Ask him/her to read the questions first, then find the answers to the questions from the excerpt. Explain that the answers to certain questions are not direct matches of information but require “reading between the lines” to find the answer. The questions have been intentionally placed at the beginning of the reading to help the apprentice become a “directed” reader.

Record the section(s) with which the apprentice experiences difficulty (if any). While the reading is not timed, you will want to record if an apprentice takes an exceptionally long time to answer the questions. All apprentices need to be able to read and understand at a post-secondary level (level 3) if they are to be able to confidently use materials at work and to keep pace with workplace changes.

If the apprentice does not need to update reading skills, complete the Skills Summary Form with “No updating required”. If the apprentice has difficulty answering any questions in a particular section, record the Section Number on the Skills Summary Form.

3.1.4.3 Document Use

The document use sections contain information that is presented in a format other than text. There may be charts, graphs, tables, schematics and/or blueprints that are trade-related. There is always a question taken from the National Occupational Analysis (NOA), in the form of a pie chart that explains the construction of the Interprovincial (Red Seal) exam and the percentage of questions on each topic (block) for the particular trade. This question not only indicates if

the apprentice can find and use information from a pie chart but also gives you, the assessor, the opportunity to give a brief explanation of the exam format and the scope of the specific trade.

Record the Section and **the type of document** with which an apprentice experiences difficulty. If there is no apparent difficulty, record "No updating required".

3.1.4.4 Numeracy

The numeracy sections are arranged from simple to complex and are based on the Math Skills Summary identified in the Essential Skills Profile for each trade. Not all skills are included for the sake of brevity of the Inventory but enough are included to give an instructor a picture of the skills of the apprentices. There is a *Math Legend* included in each Inventory that identifies the math concept illustrated by each question. Refer to this as you proceed through the Inventory and record the skills needing updates on the Skills Summary Sheet.

Section 1 (S-1) begins with using whole numbers. It is important to have a place for the apprentice to begin where he/she is comfortable and confident and then proceed to more difficult concepts. The apprentice will likely choose to skip the work with whole numbers. An apprentice does not have to write the answers to all the questions as this is often far too time-consuming. You can decide to ask the apprentice *how* to find the answer. *The process is as important as the product.* Stop Inventory if the apprentice is struggling. The numeracy sections take the most amount of time when completing an Inventory.

Record the section number and the concepts the apprentice needs to update. This information will be required by both the apprentice and the instructor or tutor; it will also be used for a post-inventory after instruction or self-study has occurred. If your apprentice can answer all the questions, record "No updating required".

3.1.4.5 Oral Communication

There are two parts to the Oral Communication section of the Essential Skills Inventory. The Speaking Skills Rating Scale is to be completed by you, the assessor; the other is a self-assessment completed by the apprentice. After having

spent one and a half to two hours with the apprentice, you will be able to complete most sections of the scale. If not, document a particular skill as “not assessed” or “not applicable”. The remaining questions are taken directly from the Essential Skills Profile for the trade. The questions (tasks) are arranged in order from simple to complex. The self-assessment scale mirrors the stages of learning or skill building, that is, “needs help”, “can do alone” and “can help an apprentice”. This is an opportune time to mention the fact that it is a responsibility of being a journeyperson to mentor other apprentices.

If the journeyperson indicates he/she cannot help an apprentice, record that updating is required.

3.1.4.6 Computer Use

The questions in the Computer Use section may reflect the information in the trade-specific Essential Skills Profile or may go beyond that profile. In a knowledge-based economy, it is realistic to expect a certain level of computer literacy regardless of the trade in which one is employed. The Computer Use questions reflect the basic skills required. Changes in technology will continue to occur rapidly so it is critical to have at least a basic knowledge of computer use.

Record the skills to be updated. If there are no needs identified, record “No updating required”.

3.1.4.7 Writing

The first questions in the writing section are examples taken directly from the Essential Skills profile and range in difficulty from simple to complex. The scale used reflects the stages of learning: “needs help”, “can do alone”, and “can help an apprentice”. One additional question pertains to the preparation of a resumé, a skill required by all tradespersons.

The last question is a writing sample and is common to all the Inventories. The writing sample provides an opportunity for you to observe if the apprentice is able to:

- use cursive writing (as compared to printing)
- write legibly
- complete the activity with ease or struggle to write a sentence or two

- put thoughts on paper in a logical order
- use punctuation correctly
- spell correctly
- use correct grammar

Record on the Skills Summary Form areas in need of updating, or use "No updating required".

4 SECTION 4

4.1 Essential Skills Inventory Records

*Education is what remains
after one has forgotten
what has been learned at
school.*

- Albert Einstein

You will have completed the Skills Summary form by the end of the Inventory. Using this process as a means of learning the apprentice's strengths and weaknesses provides an opportunity to give each apprentice immediate, individual and confidential feedback about his/her Essential Skills needs. Inform the apprentice that a copy will go to an instructor or a tutor if an Essential Skills intervention is planned. Both the apprentice and the instructor are then cognizant of the Essential Skills needs of each apprentice.

The information from the Skills Summary can be summarized in graph form (bar graph recommended) individually, or as a group dependent on specific needs. It is also helpful for an instructor to have an accompanying narrative.

5 SECTION 5

5.1 Essential Skills Post-Inventory

5.1.1 Post-Inventory Directions

The post-inventory will be different for each apprentice dependent upon his/her learning needs as identified in the original ES Inventory. Only the skills that were to be updated are used to create the post-inventory. There is a scale used to indicate an apprentice's improvement or mastery of the skills. This post-inventory can be used at a time determined either by the instructor or after a specific number of intervention hours.

The administrative directions for the post-inventory are that it is to be given under standard test conditions, that is, each

apprentice is to complete the inventory independently and without assistance. The time required for each post-inventory will vary, but each apprentice must be allowed the time required for completion.

5.1.2 Post-Inventory Reporting Form

See Appendix A for a sample Post-Inventory form.

APPENDIX A

FORMS

**ESSENTIAL SKILLS INVENTORY
INTAKE FORM**

DATE: _____		TIME IN: _____	
TRADE: _____		TIME OUT: _____	
1.	NAME: Last _____	First _____	Middle _____
2.	Mailing Address: _____ _____ _____ _____		Email Address: _____ _____
3.	PHONE: Home _____	Work _____	Cell _____
4.	Who is your present employer? _____		
5.	Have you registered as an apprentice?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
6.	Do you have experience in other trades:	<input type="checkbox"/> YES	<input type="checkbox"/> NO
7.	What school did you attend? (be sure to document if they have Grade 12)	_____ _____	When? _____
8.	How long have you been out of school? _____		
9.	What other training have you taken? _____		
If you have written the Red Seal exam before, continue with questions 10 and 11. If you have not written the exam before, please skip to question 12.			
10.	When did you write the Red Seal exam? _____		
11.	What difficulties did you have with the exam? _____ _____		
12.	Why do you want to write the Red Seal exam? _____ _____		

ESSENTIAL SKILLS INVENTORY
INTAKE FORM

13.	Which Essential Skills updating programs do you believe will be most helpful for you?
14.	What would be the best time for you to attend a program?
	Days of the week? _____
	Time of Day? _____
	Months? _____
15.	How did you hear about this program?

NOTES:

NAME:

TRADE:

DATE:

Having completed the Essential Skills Inventory for your trade, this summary outlines which Essential Skills you need to update as you continue on your chosen career path.

	Auditory (hearing)	Visual (seeing)	Kinesthetic (doing)	Group	Alone
Learning Style					

1. Technical Reading _____

2. Document Use _____

3. Numeracy _____

3.1 Scientific Calculator YES _____ NO _____

4. Oral Communication _____

5. Computer Use _____

6. Writing _____

Interviewer

Essential Skills Post Inventories

The results of the Essential Skills Inventories, completed by each of your apprentices prior to the beginning of your program, indicated the Essential Skills in need of updating for each apprentice.

To track each apprentice's progress, it is now time to complete a post-inventory of those same skills.

Please administer the Post-Inventory as a "test", that is, each apprentice is to complete the Inventory *without any help*. **Ask each apprentice to complete only the questions that are marked.** The time required will vary for each apprentice as each post-inventory is different; therefore please give each apprentice the time needed to complete the inventory. Upon completion, return the Inventories to Trade Essentials (with your program coordinator). The results will be returned to you to share with your apprentices. This will be one indication of each apprentice's readiness to challenge an exam whether it be the IP Red Seal exam or block exam.

If you have any questions, please contact the Trade Essentials office at 620-3623.

Thanks in advance for your cooperation.

NAME:

TRADE:

DATE:

INSTRUCTOR:

Upon completion of the Essential Skills Inventory prior to the beginning of the program, your Essential Skills Summary indicated that you would benefit from instruction in the Essential Skills shown in the chart below as you prepare for licensing in your trade.

The results of the Post Inventory indicate which of your Essential Skills have improved, which need further development and those that appear to meet trade requirements. Please note that "meets trade Essential Skill requirement" means that you had the correct response to *each* question.

	Shows Improvement	Needs further development	Meets trade Essential Skill requirement
Technical Reading			
➤ Section 1			
➤ Section 2			
➤ Section 3			
➤ Section 4			
Document Use			
➤ Section 1			
➤ Section 2			
➤ Section 3			
➤ Section 4			
Numeracy			
➤ Section 1			
➤ Section 2			
➤ Section 3			
➤ Section 4			

APPENDIX B

EXTRA INFORMATION

The following information is provided as supplemental information for you the interviewer. Because the Essential Skills initial interview is a dynamic assessment involving your input and possible responses to the apprentice, you may need/want additional reference material on both Learning Styles and the Essential Skills required for the various trades.

Learning style refers to the way an individual processes information, that is, the way a person learns best. Most people tend to use one sense more than the other. However, a number of people may learn equally well regardless of how information is presented to them. Knowing your learning style is an important key to improving success in a classroom and on exams.

It is important to know *how* one learns, not just *what* one needs to learn. Completion of the Learning Styles section at the beginning of the Essential Skills Inventory will help the apprentice discover his/her learning style. This can often be an “Aha” moment for the apprentice as s/he may not have had access to this information. The learner can then reflect on, gather, or be provided with information about the study and learning techniques suited to his/her individual learning style. This knowledge should contribute to an improvement in the quality and speed of learning.

There are basically three learning styles preferences: auditory (hearing), visual (seeing), and kinesthetic (doing, experiencing).

Visual learners are those who learn best by seeing things. A visual learner may display these characteristics:

- good at spelling but may forget names
- needs quiet time to study
- needs time to think before understanding a lecture
- understands/likes charts
- good with sign language

Auditory learners are those who learn best by hearing things. An auditory learner may display these characteristics:

- not afraid to speak in a group/class
- likes to read aloud to him/herself
- likes oral reports
- good at explaining
- remembers names
- enjoys music
- good at grammar and foreign languages
- may read slowly
- follows spoken directions well
- good in study groups
- finds it difficult to stay quiet for long periods

Kinesthetic learners are those who learn by experiencing /doing things. A kinesthetic learner is one who:

- can't sit still for long
- may be good at sports
- may not have great handwriting
- likes role playing
- studies with music playing
- takes breaks when studying
- fidgets during lectures

(Adapted from <http://homeworktips.about.com>)

Suggested strategies for studying /learning are:

Auditory	Visual	Kinesthetic
Listen to instructions and information orally	Watch for key words to summarize points	Ask questions and participate in discussions whenever possible
Sit towards the front of the room	Complete readings before class	Do something physical before sitting down to study
Repeat information silently to yourself	Use visuals like symbols and color in notes	Break reading tasks into small chunks
Work in quiet areas	Write down what you hear	Highlight, underline or take notes
Tape important information	Ask for other visual information	Take regular brief breaks to move around
Use rhymes or jingles to summarize important points	Try to remember important terminology by looking for parts of words already known	Break reading into chunks and write brief summaries
Create verbal descriptions	Color code notes	

(Adapted from The University of Western Ontario, Student Development Centre)

Note : There are many Learning Style Inventories available, some of which can be completed on line. These sites may also provide strategies for learning for each Learning Style.

Suggestions are:

www.vark-learn.com

<http://homeworks.about.com>

www.sdc.uwo.ca

π (π) = 3.1415926535 ...

Perimeter formula

Square	$4 * \text{side}$
Rectangle	$2 * (\text{length} + \text{width})$
Parallelogram	$2 * (\text{side1} + \text{side2})$
Triangle	$\text{side1} + \text{side2} + \text{side3}$
Regular n-polygon	$n * \text{side}$
Trapezoid	$\text{height} * (\text{base1} + \text{base2}) / 2$
Trapezoid	$\text{base1} + \text{base2} + \text{height} * [\csc(\theta_1) + \csc(\theta_2)]$
Circle	$2 * \pi * \text{radius}$
Ellipse	$4 * \text{radius1} * E(k, \pi/2)$ E(k, $\pi/2$) is the Complete Elliptic Integral of the Second Kind $k = (1/\text{radius1}) * \sqrt{\text{radius1}^2 - \text{radius2}^2}$

Area formula

Square	side^2
Rectangle	$\text{length} * \text{width}$
Parallelogram	$\text{base} * \text{height}$
Triangle	$\text{base} * \text{height} / 2$
Regular n-polygon	$(1/4) * n * \text{side}^2 * \cot(\pi/n)$
Trapezoid	$\text{height} * (\text{base1} + \text{base2}) / 2$
Circle	$\pi * \text{radius}^2$
Ellipse	$\pi * \text{radius1} * \text{radius2}$
Cube (surface)	$6 * \text{side}^2$
Sphere (surface)	$4 * \pi * \text{radius}^2$
Cylinder (surface of side)	$\text{perimeter of circle} * \text{height} = 2 * \pi * \text{radius} * \text{height}$
Cylinder (whole surface)	Areas of top and bottom circles + Area of the side
	$2(\pi * \text{radius}^2) + 2 * \pi * \text{radius} * \text{height}$
Cone (surface)	$\pi * \text{radius} * \text{side}$
Torus (surface)	$\pi^2 * (\text{radius2}^2 - \text{radius1}^2)$

Volume formula

Cube	side^3
Rectangular Prism	$\text{side1} * \text{side2} * \text{side3}$
Sphere	$(4/3) * \pi * \text{radius}^3$
Ellipsoid	$(4/3) * \pi * \text{radius1} * \text{radius2} * \text{radius3}$
Cylinder	$\pi * \text{radius}^2 * \text{height}$
Cone	$(1/3) * \pi * \text{radius}^2 * \text{height}$
Pyramid	$(1/3) * (\text{base area}) * \text{height}$
Torus	$(1/4) * \pi^2 * (r1 + r2) * (r1 - r2)^2$

METRIC PREFIX IN ELECTRONICS

Multiplication Factor	Prefix	Symbol
$1,000,000,000,000,000,000 = 10^{18}$	exa	E
$1,000,000,000,000,000 = 10^{15}$	peta	P
$1,000,000,000,000 = 10^{12}$	tera	T
$1,000,000,000 = 10^9$	giga	G
$1,000,000 = 10^6$	mega	M
$1,000 = 10^3$	kilo	k
$100 = 10^2$	hecto	h
$10 = 10^1$	deka	da
$0.1 = 10^{-1}$	deci	d
$0.01 = 10^{-2}$	centi	c
$0.001 = 10^{-3}$	milli	m
$0.000\ 001 = 10^{-6}$	micro	μ
$0.000,000,001 = 10^{-9}$	nano	n
$0.000,000,000,001 = 10^{-12}$	pico	p
$0.000,000,000,000,001 = 10^{-15}$	femto	f
$0.000,000,000,000,000,001 = 10^{-18}$	atto	a

Example: $1500\text{ Hz} = 1.5\text{ kHz} = 1.5\text{ kilohertz} = 1.5 \times 10^3\text{ Hz}$

Example: $0.007\text{ A} = 7\text{ mA} = 7\text{ milliamps} = 7 \times 10^{-3}\text{ Amps}$

Each different ratio has its own formula. These are shown below.

The ratio of $\frac{\text{opposite}}{\text{hypotenuse}}$ = sine or sin

The ratio of $\frac{\text{adjacent}}{\text{hypotenuse}}$ = cosine or cos

The ratio of $\frac{\text{opposite}}{\text{adjacent}}$ = tangent or tan

NOTE

The acronyms for the three ratios are:

- Sine opposite hypotenuse – SOH
- Cosine adjacent hypotenuse – CAH
- Tangent opposite adjacent - TAS

These acronyms are extremely helpful as they can be used to write out the three different formulas and aid in solving trigonometry questions. These three formulas can be changed into three formula triangles and then it is a matter of substituting them into the formula. The three formula triangles are shown in Figure 9.

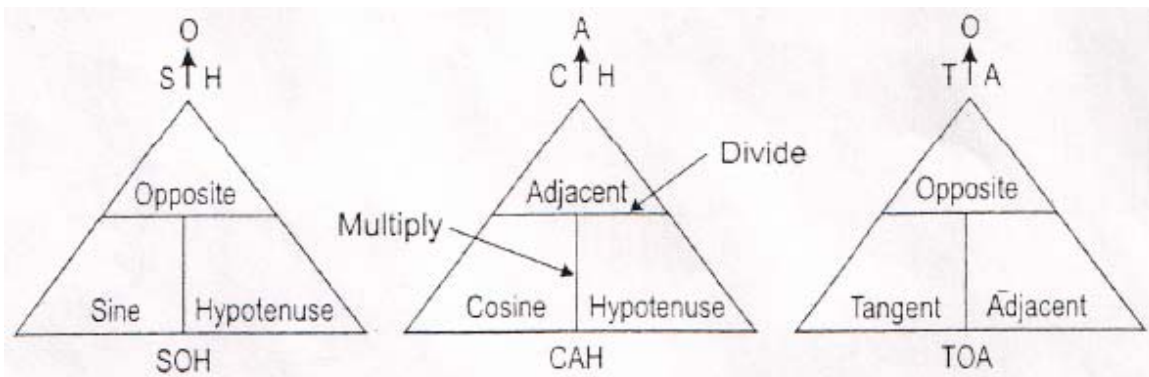


Figure 9 – Formula triangles

To use the formula triangles, cover the unknown and complete the remaining calculation. Each formula triangle can be used to construct three variations.

Essential Skills Inventory

TABLE OF CONTENTS**METAL FABRICATOR
NOC 7263**

	PAGE
Learning Styles Checklist	39
Technical Reading (Reading Text)	
Technical Language	41
Pseudowords	42
Section 1	43
Section 2	44
Section 3	47
Document Use	
Section 1	49
Section 2	50
Section 3	51
Section 4	52
Numeracy	
Section 1	54
Section 2	56
Section 3	58
Section 4	61
Oral Communication	64
Computer Use	66
Writing	67

NAME:

DATE:

LEARNING STYLES CHECKLIST**Learning by hearing (auditory)**

- ☐ I remember the things I hear better than the things I see.
- ☐ I learn better when someone explains to me how to do something better than when I follow a diagram.
- ☐ I find it easier to remember a telephone number I have heard than one I have read.
- ☐ I prefer to listen to the news on the radio than to read the newspaper.
- ☐ I remember the times tables by saying them to myself.
- ☐ After I am introduced to someone, I'm good at remembering his/her name.

Learning by seeing (visual)

- ☐ I remember what I've seen, better than what I have heard.
- ☐ I remember what happened by seeing the incident in my head.
- ☐ I remember what I hear by picturing it in my head.
- ☐ I am good at remembering faces.
- ☐ When someone says a number, I don't understand it until I see it written down.
- ☐ I can add simple numbers which are written down better than numbers that are in my head (e.g., $16+24+10+98$).
- ☐ To remember a car license number, I picture it in my head.

Learning by doing (kinesthetic)

- ☐ When I put something together, I remember how it works.
- ☐ I remember certain directions after I have done something once or twice.
- ☐ I like to do things like simple repairs where I can use my hands.
- ☐ I can learn best if the instructor uses models, experiments and other practical tools to show what he/she is talking about.
- ☐ Using concrete examples is a good way for me to improve my math or spelling skills.
- ☐ I remember telephone numbers if I've dialed them a few times.

Learning in a group

- ☐ I like learning in a group so I can discuss the work with others.
- ☐ I enjoy helping other people in the group with their work.
- ☐ If I need to do something, I don't mind asking the person next to me.

Learning Alone

- ☐ I can concentrate best if I work on my own.
- ☐ It's hard to work if people are talking around me.
- ☐ I'd be embarrassed to show my mistakes to anyone other than an instructor.
- ☐ I can't concentrate if people are moving around the room.

(Adapted from SGL Handbook, ALSO, Ottawa)

1	2	3	4
arc	safety	tolerance	traceability
slag	routine	distortion	numerical
tack	plasma	galvanized	material
weld	machines	dimensions	polarity
shears	foreman	residue	softeners
heat	dunnage	induction	stationary
base	ferrous	equipment	diameter
bridges	template	quality	Circumference
tanks	layout	fabricate	specifications
steel	process	components	priorities

poy

meef

fesh

moyp

toof

koyth

hafe

tibe

hoysh

thoop

marp

theg

yome

zule

NAME: _____

DATE: _____

From the article below, answer the following questions.

1. What are two additional terms for a "blind edge"?

2. List, in order, the steps in making a blind edge.

Blind Edges

The blind edge (also known as a false edge or Dutchman) is used to cover nail heads and the raw edges of sheet metal when sheets must be nailed to a wooden surface.

A formed strip of metal is slipped under the sheet. Nails are driven through both pieces of metal, close to the edge. Once the nails are driven in to secure the sheet, the upright edge is pounded carefully down with a mallet. This will ensure the nail heads are covered and the metal has the appearance of a double hem.

This edge can be used in the same way to finish a joint where two sheets of metal must be joined over wood.

FOG Index 8.2

NAME: _____

DATE: _____

From the article below, answer the following questions.

1. List three types of shears.

2. What are the consequences of not setting the proper clearances for blade cutting?

3. What do you think "machine uptime" means?

Shears

Shears are common pieces of fabricating equipment that can be found in many metal forming plants. From tube mills to small fabricators, the shear is one of the most critical and diverse tools used in metal fabricating.

Varying in size from small hand-held metal shears and foot-operated trim shears to high-production in-line flying cutoffs, the modern metal shear has replaced the saw as the machine of choice for high-production metal cutting. This article addresses improving uptime and reducing maintenance when using shears for high production. The following tips are from shear users and rebuilders who found success when they implemented them.

1. Understand your machine.

It is important to understand function, design, and operation of your machines. The main cause of shear failure is overloading it beyond the OEM's parameters. Shears are designed to cut metal of an established thickness and width. When these limits are exceeded, damage occurs. In addition to following the OEM's load recommendations, normal adjustments should be made regularly, and maintenance schedules and service

requirements should be followed carefully. Misusing lubricants and other fluids also cause damage. Lubricants and fluids must be used as specified by the OEM.

2. Perform and document regular inspections.

A regimented inspection schedule should be posted and adhered to. Areas that should be inspected include the shear's ability to execute all functions of operation; on mechanical machines, all bearings should be checked for lost motion and wear; and all emergency and safety functions should be examined.

3. Review documentation.

After regular inspections are performed and documented, the data should be reviewed systematically. This review can reveal wear patterns; the potential for accidents, and non-conformance so that repairs can be made.

Documentation and analysis are the basis of preventive maintenance. With this information, a clearly laid out maintenance plan can be prepared, eliminating most emergency repairs.

4. Set the blade properly.

Setting the shear blade properly is key to extending blade and machine life. Setting the proper clearances for blade cutting affects the drive, ram, tooling, and cut quality. Additionally, before setting the blade, the blade seat should be checked for flatness and to ensure that the tooling is seated properly to eliminate blade chipping caused by shifting during cutting.

If the clearances are too tight, improper cutting action occurs because the metal jams between the blade and the machine. If the blades have no clearance, they will break. When clearances are too loose, the blade acts as a hammer that applies multiple forces to the machine's components.

5. Maintain Correct Gib Clearance.

Setting and maintaining proper gib clearances increase tooling life and machine uptime. The gibs maintain proper guiding action of the ram and attached tooling. If the clearances are not maintained, the same problems occur as those that take place when the blade clearances are ignored.

6. Isolate and Level the Machine.

Levelling a shear and isolating it from vibration are critical to proper operation. The proper selection and installation of isolation pads can increase tooling life and shearing speed, decrease vibration, improve foundation life, reduce noise, and eliminate shear frame distortion.

Using today's isolators, machine levelling can be done in less than a half hour. Making sure that the shear is level eliminates the twisting action that can destroy a shear.

7. Follow a Basic Maintenance Plan.

The following parts of a shear require regularly scheduled maintenance:

- a. The air system should be maintained properly to ensure that the air is clean. All regulators must be set so that they are operating correctly. Maintaining the regulators helps the pneumatically actuated mechanisms to function properly.
- b. The lubrication system must be cleaned, filled, and properly filtered. Broken, kinked, or twisted lines must be replaced. Each point must be disconnected and examined to determine if the lubrication is reaching its destination. Sumps and reservoirs should be routinely emptied, cleaned, and refilled.
- c. The machine clutch and brakes must be examined for proper lining thickness, clearances, and signs of failure. Worn linings must be replaced immediately. Overtravel beyond the machine builder's specifications must be adjusted and/or corrected upon inspection.
- d. Counterbalance cylinders should be tested and reworked at the first sign of air leaks or failure. A counterbalance cylinder that has the proper action ensures the longevity of all working components of the shear and its tooling.

8. Make Repairs as Soon as Possible.

When damage, wear or out-of-adjustment conditions are found, the shear should be immediately repaired or adjusted. Most catastrophic failure is caused by putting off simple repairs. Addressing repairs quickly is almost always less expensive than the cost of correcting the damage that can take place when repairs are ignored or put off. Additionally, operator safety depends on timely repairs. Keeping the shear productive can be accomplished by performing these simple tasks. When a shear is maintained properly, replacement costs and catastrophic failure are avoided.

www.thefabricator.com.
FOG Index 10.8

NAME:

DATE:

From the article below, answer the following questions.

1. Why do projects that use hot-dip-galvanized zinc have no maintenance costs?

2. What data has to be entered into the computer program, Zinc Coating Life Predictor, to estimate a corrosion rate?

Predicting the Service Life of Galvanized Steel

Zinc, which has been used to hot-dip-galvanize steel for 250 years, provides 50 to 75 years of corrosion protection in many environments. Empirical data collected about hot-dip-galvanized (HDG) steel field performance from 1940-1980 - in environments ranging from industrial to marine to suburban - indicates that zinc can prevent base steel corrosion more than other surface treatments. Because of zinc's long-lasting protection, projects require no maintenance and therefore no maintenance costs.

Much of the industrialized world has become cleaner and safer over the last 20 years, mainly because of progress in environmental protection. Sulfur and chloride emissions have been reduced. Because both sulfur and chloride compounds increase the corrosion rate of most metals, including zinc, it reasonably can be assumed that galvanized steel should last longer than in previous years.

This was confirmed in a 2001 study funded by the International Lead Zinc Research Organization (ILZO) and conducted by Gregory Zang, PhD, of Tech Cominco Metals Ltd.

A computer program, the Zinc Coating Life Predictor, was developed to estimate the corrosion in various environments. The program performs calculations based on models developed using statistical methods, neural network technology, and an extensive worldwide corrosion database. The environmental data input required to estimate a corrosion rate includes temperature, airborne salinity, sulfur dioxide concentration, relative humidity, rainfall, and sheltering conditions for the project (indoor, rain-sheltered, or outdoor).

Once these values are known, the software calculates and reports a corrosion rate and also gives an option either to calculate the predicted life given the coating thickness required to achieve a specific life.

www.thefabricator.com

FOG Index 13.0

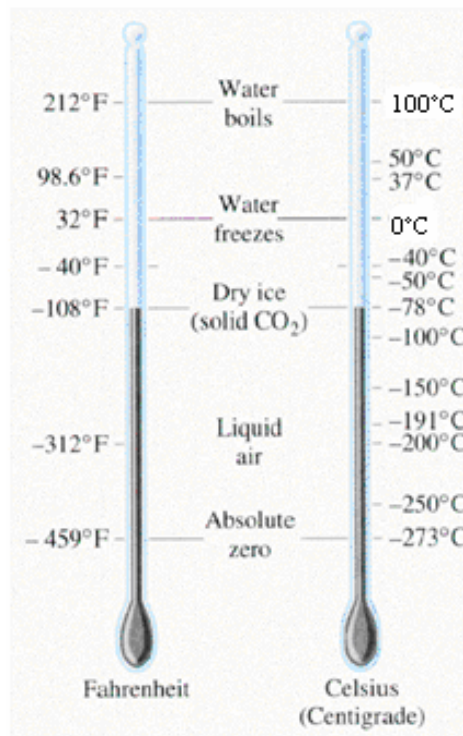
NAME: _____

DATE: _____

1. According to the Fahrenheit and Celsius temperature scales, at what temperature Celsius does water turn to steam?

2. At what temperature Celsius does water freeze?

3. At which temperature are the two scales the same?



www.abyss.uoregon.edu. 2009

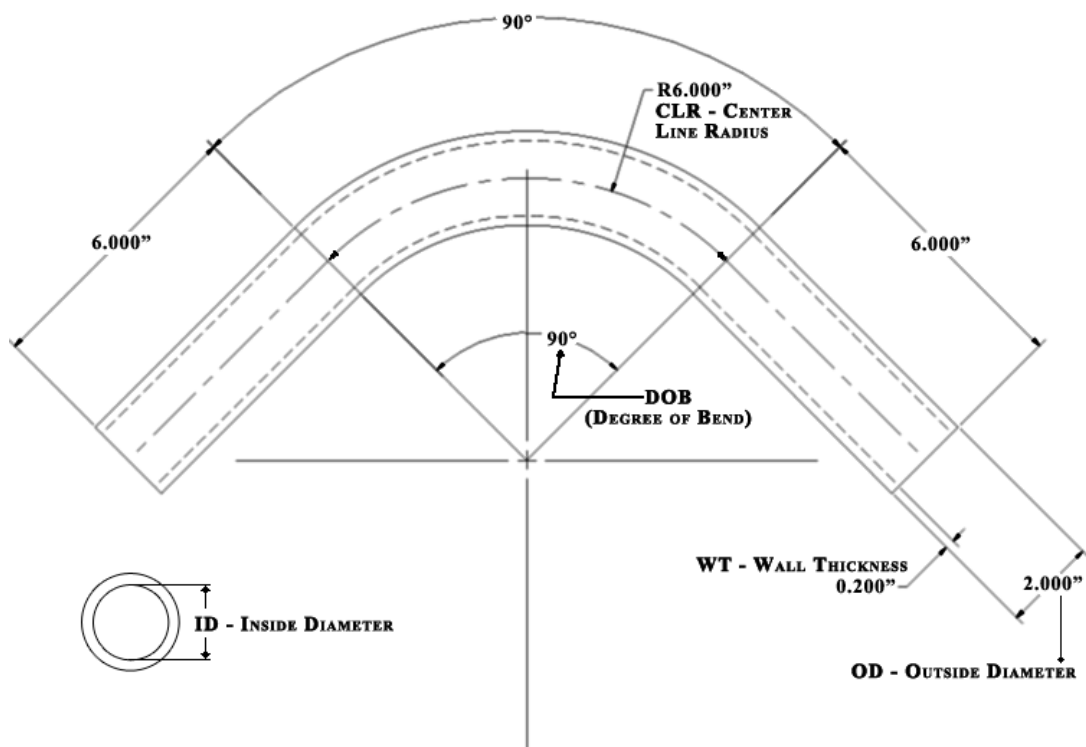
NAME: _____

DATE: _____

From the diagram below, answer the following questions.

1. What is the degree of the bend in the pipe?

2. What is the ID of the pipe shown in the figure below?



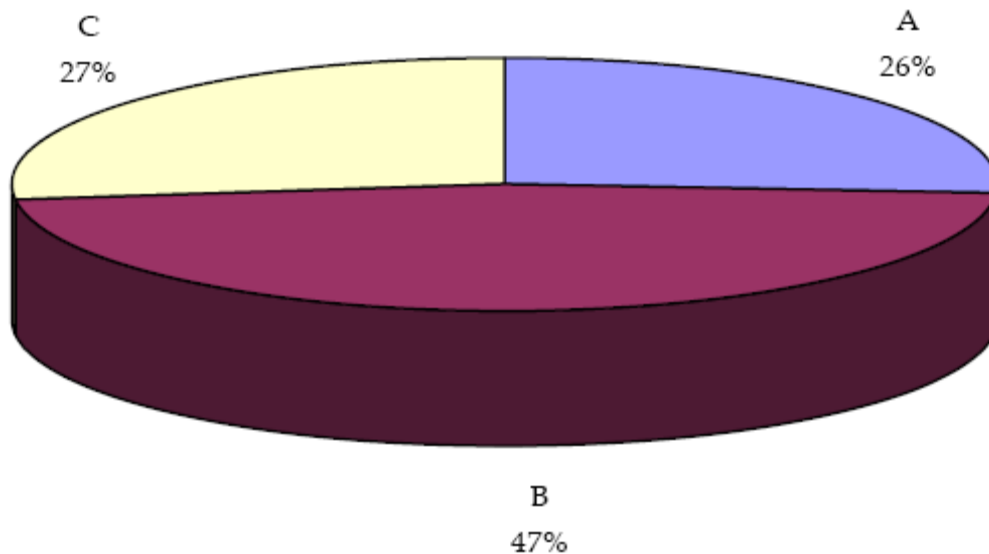
NAME: _____

DATE: _____

The Interprovincial standards exam (Red Seal) for your trade contains 125 multiple choice questions.

1. How many questions are on the "fabrication of components"?

2. How many questions are on "Occupational Skills"?



BLOCK A	Common Occupational Skills
BLOCK B	Fabrication of Components
BLOCK C	Assembly of Components

National Occupational Analysis 2009, Metal Fabricator, Human Resources Partnership Directorate

NAME:

DATE:

Refer to the drawing on the following page to answer these questions:

1. What is the name of the part?

2. What number has been assigned to the drawing?

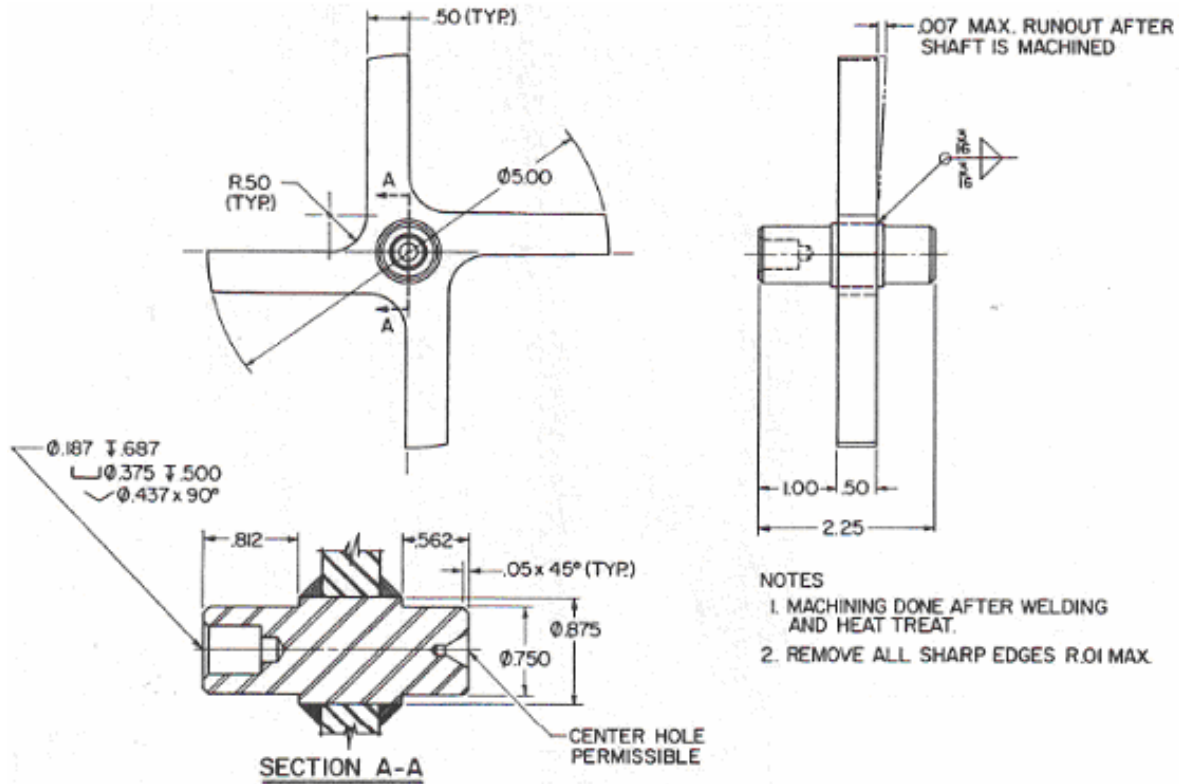
3. The part is made of what material?

4. What tolerances are allowed for decimal dimensions?

5. What is the largest diameter of the part?

6. Are centre holes permissible in the shaft?

7. The drawing is ____ of ____ needed to make and assemble the part.



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS $\pm 1/64$ DECIMALS ± 0.010 ANGLES ± 1	DRAWN BY JRW	WALKER INDUSTRIES	
	DATE 5-26	TITLE ROTARY LOADER	
	CHK'D GF	SCALE FULL & 15X	
	MATERIAL STEEL AISI 1020	SHEET 2 OF 7	DRAWING NO. B3345
	HEAT TREATMENT STRESS REL.		

Modern Metalworking, Walker, J R Goodheart-Wilcox, 2004

NAME: _____

DATE: _____

Calculate the following:

1. $138 \text{ in.} + 164 \text{ in.}$ 2. $34 \text{ cm} - 18 \text{ cm}$ 3. $24 \text{ ft.}^3 \times 46 \text{ ft.}^3$ 4. $10,024 \text{ cm} \div 24 \text{ cm}$

5. $.0067 \text{ gal.} + .2543 \text{ gal.}$ 6. $26 \text{ L} - .03 \text{ L}$ 7. $.034 \text{ ml} \times .025 \text{ ml}$ 8. $13.25 \text{ mm} \div 25 \text{ mm}$

9. State the range of measurement for the following:

➤ 2.5 with a tolerance of $\pm .1 \text{ in.}$ = _____

➤ 45.6 mm with a tolerance of $\pm .5 \text{ mm}$ = _____

10. $6 \frac{3}{8} \text{ in.} - 1 \frac{1}{8} \text{ in.}$ 11. $\frac{2}{3} \text{ ft.} + \frac{1}{2} \text{ ft.}$ 12. $\frac{9}{16} \text{ in.} + \frac{7}{32} \text{ in.}$ 13. $\frac{5}{8} \text{ in.} \times \frac{2}{3} \text{ in.}$

14. $21/64 \text{ mm} \div 9/16 \text{ mm}$ 15. $2 \frac{7}{16} \text{ cm} \div 1 \frac{1}{4} \text{ cm}$

Change to either a mixed number or an improper fraction:

16. $\frac{10}{3} \text{ gal.} =$ _____

17. $5\frac{7}{8} \text{ gal.} =$ _____

Write an equivalent fraction:

18. $\frac{3}{8}'' =$ _____

19. $\frac{15}{16}'' =$ _____

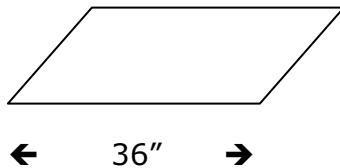
20. Complete the chart with the missing measurements.

Fraction	Decimal	Percent
$\frac{1}{2}$.5	50%
	.75	75%
$\frac{3}{16}$		
$\frac{1}{32}$		

21. In February, the temperature at your work site fell from $+5^{\circ}\text{C}$ to -14°C . What was the total drop in temperature that day?

22. An increase of 45 pounds per square inch of pressure is expressed as $+45 \text{ lb./in.}^2$. How would you express a pressure decrease of 17 lb./in.^2 ?

23. You need to cut strips $\frac{3}{4}$ " wide from a piece of 16-gauge sheet metal 36" wide. How many strips can you shear from this sheet?



24. You have cut 6 pieces of steel angle, each 3.0698" long. The total length is rounded to the nearest thousandth inch. How long was the original piece? (do not count the waste).

NAME: _____

DATE: _____

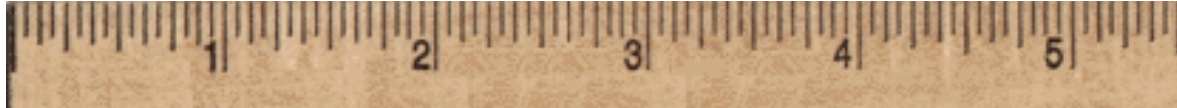
1. On the tapes, indicate:

a) 15/16 in.

b) $\frac{3}{4}$ in.

c) $\frac{3}{8}$ in.

Imperial



d) 12 mm

e) 5.5 cm

Metric



Convert the following:

30.48 cm = 1 ft.
2.54 cm = 1 in.
27 cubic feet = 1 cubic yard

2. 0.45 km = _____ m

3. 65 cm = _____ mm

4. 6 in. = _____ cm

5. 91.44 cm = _____ ft.

6. 12 ft 4 in = _____ in

7. 144 in² = _____ ft.²

8. 3 yd³ = _____ ft.³

9. Complete the chart with examples of a unit of measurement for each measurement system.

	Imperial	Metric
Length		
Weight (mass)		
Volume (or capacity)		

Calculate the following:

10. $8 - 3 \times 2 + 15 \div 5^\circ =$ $^\circ\text{C}$

11. $42 \div 14 + 2 (16 - 18 \div 3) - 16^\circ =$ _____ $^\circ\text{C}$

12. In your current work as a Metal Fabricator, you are working 40 hours per week and earning \$24.50 an hour. Your deductions are:

- Income tax 32%
- Union dues 5%
- Health insurance 6%

- What is your gross pay before deductions? _____
- What is the amount of income tax you pay? _____
- What is the amount you pay in union dues? _____
- What is your net pay? _____

13. The area of a piece of steel is 1447.64 square inches. How many square inches are in 25% of the steel?

Calculate the value of:

14. 6^5 ft. = _____ ft. 15. 10^5 mm _____ mm

16. $\sqrt{96}$ yd. = _____ yd.

Change the following ratios to their lowest fractional forms:

17. 35 lb.:10 lb. = _____ lb. 18. 12 in. to 36 in. = _____ in.

19. $18 \text{ ft.}^2 : 180 \text{ ft.}^2 = \underline{\hspace{2cm}} \text{ ft.}^2$ 20. $6 \text{ min. to } \frac{1}{4} \text{ hr.} = \underline{\hspace{2cm}}$

21. Two forgings are made of the same stainless steel alloy. One forging weighs 170 pounds and contains 0.80 pounds of chromium. How many pounds of chromium are in the second forging if it weighs 255 pounds?

NAME: _____

DATE: _____

1. The circle below is cut from $\frac{3}{8}$ " steel plate. What is the name used to describe the labelled parts on the plate?

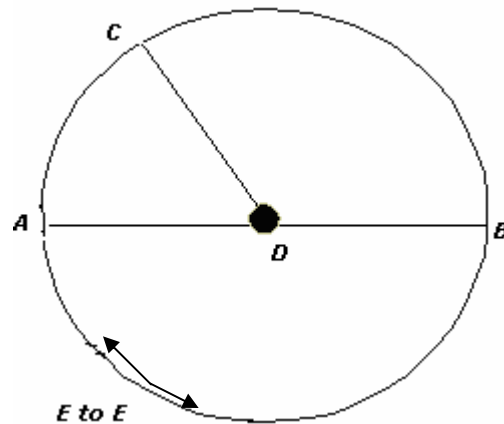
ADB _____

AD, DB, CD _____

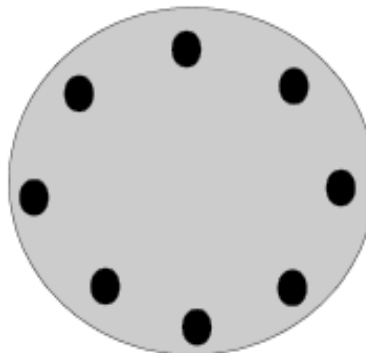
D _____

E to E _____

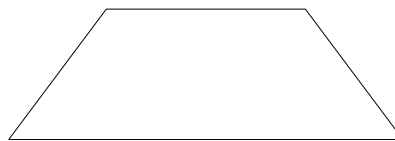
AC _____

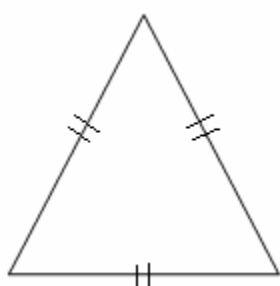


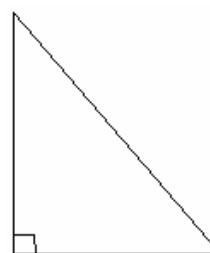
2. This is an 8-hole blind flange. How many degrees are between the centres of each hole?

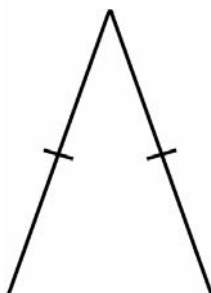


3. Identify the different shapes below:



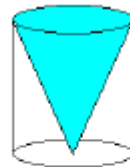
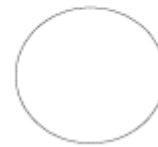
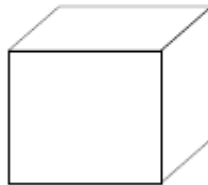
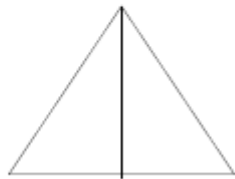
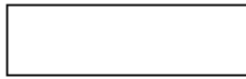








4. Match the formula to the appropriate description (you may use the diagram as a guide).



1) $p = 2l + 2w$

2) $V = e^3$

3) $A = \pi r^2$

4) $V = \pi r^2 h$

5) $A = \frac{1}{2}bh$

6) $V = \frac{4}{3}\pi r^3$

7) $C = \pi d$

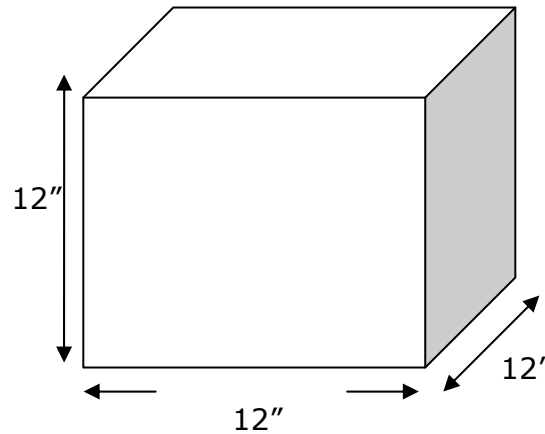
8) $A = lw$

- a. area of a triangle
b. circumference of a circle
c. area of a circle
d. volume of a cube
e. area of a rectangle
f. volume of a sphere
g. volume of a cylinder
h. perimeter of a rectangle

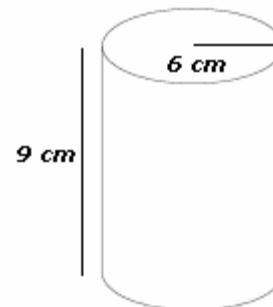
NAME: _____

DATE: _____

1. What is the volume of this solid cube of steel?



2. The formula for the volume of a cylinder is $V = \pi r^2 h$. What is the volume of a cylinder 9 cm high and whose radius is 6 cm?



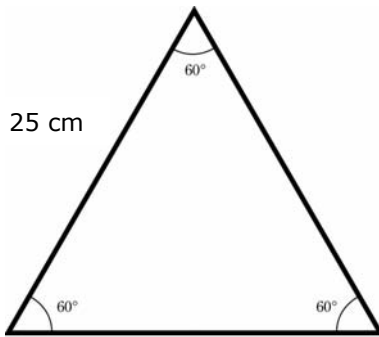
What would be the formula for h?

3. The formula for finding the pressure of a solid is defined as the force exerted over a certain area. $P = F/A$

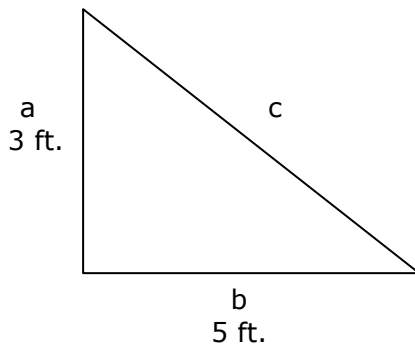
a. What is the pressure if the force is 2 kg and the area is 2 m²?

b. What would be the formula for finding the area?

4. An equilateral triangle is a shape often used in fabricating. All 3 sides are equal and each angle is 60°. Calculate the perimeter of the triangle.



5. Use the formula $a^2 + b^2 = c^2$ to calculate the length of side c.

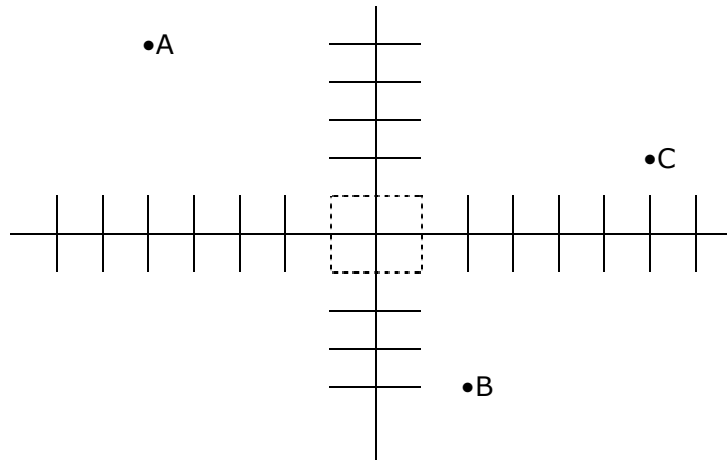


6. State the coordinates of points A, B and C on the graph below.

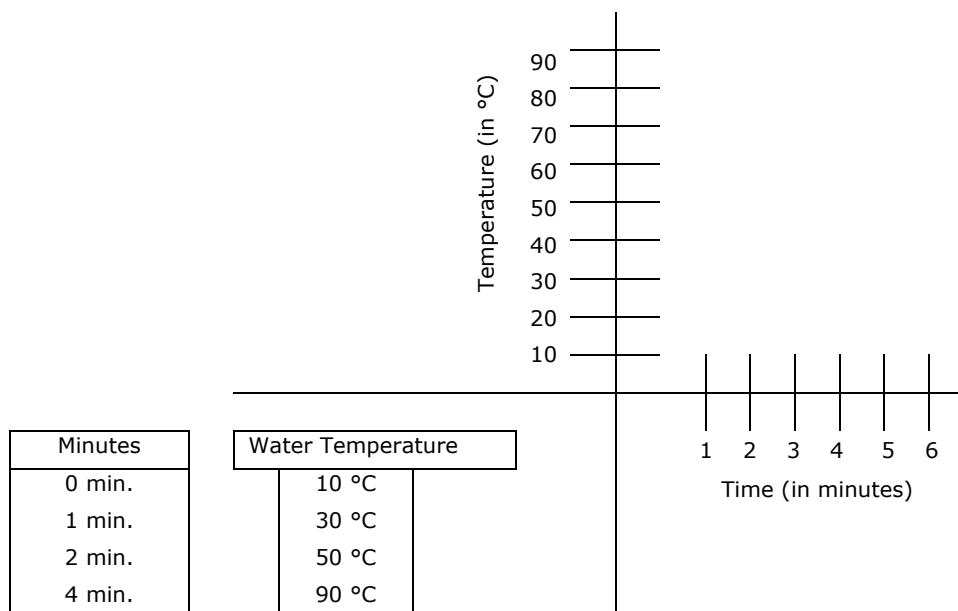
A = _____

B = _____

C = _____



7. Use the table to plot the points on the grid.



NAME:

DATE:

** To be completed by the Assessor – not the Learner***Speaking Skills Rating Scale**

		Improvement Needed	Acceptable	Very good
1.	Is comfortable communicating orally (i.e., body posture and facial expressions are appropriate)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Maintains eye contact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Waits for his/her turn to speak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Willingly and confidently engages in conversation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Performs social courtesies, such as greeting others, using titles and making introductions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Speaks at an appropriate volume	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Rate of speech is understandable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Adjusts voice inflection for statements, requests, directions, exclamations and questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Pronounces words clearly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Does not use stalling devices such as "uh", "you know", etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.	Does not say the same thing twice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Uses words and phrases related to the subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	Has a good vocabulary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.	Speaks in complete sentences of appropriate length	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Uses good grammar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Maintains focus on the subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Gives appropriate responses to questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Is aware of listener's reaction and responds appropriately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Talks "with" rather than "at" a person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In your work as a Metal Fabricator, you may have to deal with a noisy workplace. However, it is still very important to speak with and listen to those with whom you work.

Please rate yourself on your ability to do the following work tasks:

		Need help	Can do alone	Can help an apprentice
1.	Ask co-workers questions about work-related matters such as work orders or instructions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Discuss problems with supervisors, for example, changes in design or work processes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Respond to customer inquiries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Act as a lead hand or supervisor and help workers who have less experience.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<http://srv108.gc.ca>, Essential Skills Profile, Metal Fabricator

NAME:

DATE:

		YES	NO
1.	Do you use a computer at home?	<input type="checkbox"/>	<input type="checkbox"/>
	at work?	<input type="checkbox"/>	<input type="checkbox"/>
2.	Do you use any computerized equipment/ systems at work, for example, Computer Numeric Control (CNC) press brakes or cutting tables?	<input type="checkbox"/>	<input type="checkbox"/>
3.	Do you know the "language" used to describe computers, for example, monitor, software, hardware, word processing, data base, virus and SPAM?	<input type="checkbox"/>	<input type="checkbox"/>
4.	Do you use a computer to:	Need help	Can do alone
			Can help an apprentice
	Search for information on the internet?	<input type="checkbox"/>	<input type="checkbox"/>
	Send and receive email, including attachments?	<input type="checkbox"/>	<input type="checkbox"/>
	Write a memo, letter or report (use word processing software)?	<input type="checkbox"/>	<input type="checkbox"/>
	Manage files and folders?	<input type="checkbox"/>	<input type="checkbox"/>
	Use a data base?	<input type="checkbox"/>	<input type="checkbox"/>

NAME:

DATE:

In your work as a Metal Fabricator, you will be required to keep a written record of certain job tasks. Please rate yourself on your ability to do the following:

		Need help	Can do alone	Can help an apprentice
1.	Write reminder notes to keep track of materials and equipment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Complete production forms regarding hours worked and work completed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Write notes to a supervisor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Write a report about a work situation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Prepare a resumé.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Please write 5-6 sentences about yourself.

<http://srv108.gc.ca>, Essential Skills Profile, Metal Fabricator

TABLE OF CONTENTS

METAL FABRICATOR
NOC 7263

	PAGE
Learning Styles Checklist	71
Technical Reading (Reading Text)	
Technical Language	74
Pseudowords	75
Section 1	76
Section 2	77
Section 3	80
Document Use	
Section 1	82
Section 2	83
Section 3	84
Section 4	85
Numeracy	
Section 1	88
Section 2	90
Section 3	92
Section 4	95
Oral Communication	99
Computer Use	102
Writing	104

ASSESSOR'S ANSWER KEY

METAL FABRICATOR

Learning Styles

After the apprentice has completed the learning styles checklist, note the sections that contain **three or more** checkmarks. Those sections indicate the preferred learning style of that apprentice. The majority of apprentices will show preference for more than one learning style.

Learning Environment

Group and individual learning environments: If an apprentice indicates a strong preference for one environment over another, an instructor needs to be aware of the implications this has for a teaching environment.

NAME:

DATE:

LEARNING STYLES CHECKLIST**Learning by hearing (auditory)**

- ☐ I remember the things I hear better than the things I see.
- ☐ I learn better when someone explains to me how to do something better than when I follow a diagram.
- ☐ I find it easier to remember a telephone number I have heard than one I have read.
- ☐ I prefer to listen to the news on the radio than to read the newspaper.
- ☐ I remember the times tables by saying them to myself.
- ☐ After I am introduced to someone, I'm good at remembering his/her name.

Learning by seeing (visual)

- ☐ I remember what I've seen, better than what I have heard.
- ☐ I remember what happened by seeing the incident in my head.
- ☐ I remember what I hear by picturing it in my head.
- ☐ I am good at remembering faces.
- ☐ When someone says a number, I don't understand it until I see it written down.
- ☐ I can add simple numbers which are written down better than numbers that are in my head (e.g., $16+24+10+98$).
- ☐ To remember a car license number, I picture it in my head.

Learning by doing (kinesthetic)

- ☐ When I put something together, I remember how it works.
- ☐ I remember certain directions after I have done something once or twice.
- ☐ I like to do things like simple repairs where I can use my hands.
- ☐ I can learn best if the instructor uses models, experiments and other practical tools to show what he/she is talking about.
- ☐ Using concrete examples is a good way for me to improve my math or spelling skills.
- ☐ I remember telephone numbers if I've dialed them a few times.

Learning in a group

- ☐ I like learning in a group so I can discuss the work with others.
- ☐ I enjoy helping other people in the group with their work.
- ☐ If I need to do something, I don't mind asking the person next to me.

Learning Alone

- ☐ I can concentrate best if I work on my own.
- ☐ It's hard to work if people are talking around me.
- ☐ I'd be embarrassed to show my mistakes to anyone other than an instructor.
- ☐ I can't concentrate if people are moving around the room.

(Adapted from SGL Handbook, ALSO, Ottawa)

ASSESSOR'S ANSWER KEY**METAL FABRICATOR****TECHNICAL LANGUAGE***1. Word Lists*

Have the apprentice begin reading aloud a list with which he/she is comfortable. If an apprentice has difficulty with more than three words in list one, **stop** the inventory. If the apprentice has 7/10 words correct in any list, move up to the next list. The lists have been written in a simple-to- more complex order and include words contextualized to each trade.

2. Pseudowords

The apprentice should not have major difficulty with the pronunciation of these pseudowords. The reason for inclusion of this list is that it tells the assessor if the apprentice has major difficulty with phonics, which can affect his/her ability to learn to read technical language at the required level.

3. Reading Excerpts

The reading passages are *not* leveled by Essential Skill complexity level but are arranged from simple to complex using a readability index. Apprentices should be able to answer both the recall questions as well as those questions requiring "reading between the lines." Apprentices need to be comfortable reading and answering questions at the highest level in the inventory.

1	2	3	4
arc	safety	tolerance	traceability
slag	routine	distortion	numerical
tack	plasma	galvanized	material
weld	machines	dimensions	polarity
shears	foreman	residue	softeners
heat	dunnage	induction	stationary
base	ferrous	equipment	diameter
bridges	template	quality	Circumference
tanks	layout	fabricate	specifications
steel	process	components	priorities

poy

meef

fesh

moyp

toof

koyth

hafe

tibe

hoysh

thoop

marp

theg

yome

zule

DATE:

NAME: _____

DATE: _____

From the article below, answer the following questions.

1. List three types of shears.

small hand-held foot-operated trim in-line flying cutoffs

2. What are the consequences of not setting the proper clearances for blade cutting?

If the proper clearances are not set, the drive, ram, tooling and cast quality will be negatively affected.

3. What do you think "machine uptime" means?

It means the time that the machine is being used.

Shears

Shears are common pieces of fabricating equipment that can be found in many metal forming plants. From tube mills to small fabricators, the shear is one of the most critical and diverse tools used in metal fabricating.

Varying in size from small hand-held metal shears and foot-operated trim shears to high-production in-line flying cutoffs, the modern metal shear has replaced the saw as the machine of choice for high-production metal cutting. This article addresses improving uptime and reducing maintenance when using shears for high production. The following tips are from shear users and rebuilders who found success when they implemented them.

1. Understand your machine.

It is important to understand function, design, and operation of your machines. The main cause of shear failure is overloading it beyond the OEM's parameters. Shears are designed to cut metal of an established thickness and width. When these limits are exceeded, damage occurs. In addition to following the OEM's load recommendations, normal adjustments should be made regularly, and maintenance schedules and service requirements should be followed carefully. Misusing lubricants and other fluids also cause damage. Lubricants and fluids must be used as specified by the OEM.

2. Perform and document regular inspections.

A regimented inspection schedule should be posted and adhered to. Areas that should be inspected include the shear's ability to execute all functions of operation; on mechanical machines, all bearings should be checked for lost motion and wear; and all emergency and safety functions should be examined.

3. Review documentation.

After regular inspections are performed and documented, the data should be reviewed systematically. This review can reveal wear patterns; the potential for accidents, and non-conformance so that repairs can be made.

Documentation and analysis are the basis of preventive maintenance. With this information, a clearly laid out maintenance plan can be prepared, eliminating most emergency repairs.

4. Set the blade properly.

Setting the shear blade properly is key to extending blade and machine life. Setting the proper clearances for blade cutting affects the drive, ram, tooling, and cut quality. Additionally, before setting the blade, the blade seat should be checked for flatness and to ensure that the tooling is seated properly to eliminate blade chipping caused by shifting during cutting.

If the clearances are too tight, improper cutting action occurs because the metal jams between the blade and the machine. If the blades have no clearance, they will break. When clearances are too loose, the blade acts as a hammer that applies multiple forces to the machine's components.

5. Maintain Correct Gib Clearance.

Setting and maintaining proper gib clearances increase tooling life and machine uptime. The gibs maintain proper guiding action of the ram and attached tooling. If the clearances are not maintained, the same problems occur as those that take place when the blade clearances are ignored.

6. Isolate and Level the Machine.

Levelling a shear and isolating it from vibration are critical to proper operation. The proper selection and installation of isolation pads can increase tooling life and shearing speed, decrease vibration, improve foundation life, reduce noise, and eliminate shear frame distortion.

Using today's isolators, machine levelling can be done in less than a half hour. Making sure that the shear is level eliminates the twisting action that can destroy a shear.

7. Follow a Basic Maintenance Plan.

The following parts of a shear require regularly scheduled maintenance:

- a. The air system should be maintained properly to ensure that the air is clean. All regulators must be set so that they are operating correctly. Maintaining the regulators helps the pneumatically actuated mechanisms to function properly.
- b. The lubrication system must be cleaned, filled, and properly filtered. Broken, kinked, or twisted lines must be replaced. Each point must be disconnected and examined to determine if the lubrication is reaching its destination. Sumps and reservoirs should be routinely emptied, cleaned, and refilled.
- c. The machine clutch and brakes must be examined for proper lining thickness, clearances, and signs of failure. Worn linings must be replaced immediately. Overtravel beyond the machine builder's specifications must be adjusted and/or corrected upon inspection.
- d. Counterbalance cylinders should be tested and reworked at the first sign of air leaks or failure. A counterbalance cylinder that has the proper action ensures the longevity of all working components of the shear and its tooling.

8. Make Repairs as Soon as Possible.

When damage, wear or out-of-adjustment conditions are found, the shear should be immediately repaired or adjusted. Most catastrophic failure is caused by putting off simple repairs. Addressing repairs quickly is almost always less expensive than the cost of correcting the damage that can take place when repairs are ignored or put off. Additionally, operator safety depends on timely repairs. Keeping the shear productive can be accomplished by performing these simple tasks. When a shear is maintained properly, replacement costs and catastrophic failure are avoided.

www.thefabricator.com.
FOG Index 10.8

NAME: _____

DATE: _____

From the article below, answer the following questions.

1. Why do projects that use hot-dip-galvanized zinc have no maintenance costs?

Zinc prevents base steel corrosion.

2. What data has to be entered into the computer program, Zinc Coating Life Predictor, to estimate a corrosion rate?

The data includes temperature airborne salinity, sulphur dioxide concentration, relative humidity, rainfall and sheltering conditions for the project.

Predicting the Service Life of Galvanized Steel

Zinc, which has been used to hot-dip-galvanize steel for 250 years, provides 50 to 75 years of corrosion protection in many environments. Empirical data collected about hot-dip-galvanized (HDG) steel field performance from 1940-1980 - in environments ranging from industrial to marine to suburban - indicates that zinc can prevent base steel corrosion more than other surface treatments. Because of zinc's long-lasting protection, projects require no maintenance and therefore no maintenance costs.

Much of the industrialized world has become cleaner and safer over the last 20 years, mainly because of progress in environmental protection. Sulfur and chloride emissions have been reduced. Because both sulfur and chloride compounds increase the corrosion rate of most metals, including zinc, it reasonably can be assumed that galvanized steel should last longer than in previous years.

This was confirmed in a 2001 study funded by the International Lead Zinc Research Organization (ILZO) and conducted by Gregory Zang, PhD, of Tech Cominco Metals Ltd.

A computer program, the Zinc Coating Life Predictor, was developed to estimate the corrosion in various environments. The program performs calculations based on models developed using statistical methods, neural network technology, and an extensive worldwide corrosion database. The environmental data input required to estimate a corrosion rate includes temperature , airborne salinity, sulfur dioxide concentration, relative

humidity, rainfall, and sheltering conditions for the project (indoor, rain-sheltered, or outdoor).

Once these values are known, the software calculates and reports a corrosion rate and also gives an option either to calculate the predicted life given the coating thickness required to achieve a specific life.

www.thefabricator.com

FOG Index 13.0

NAME: _____

DATE: _____

1. According to the Fahrenheit and Celsius temperature scales, at what temperature Celsius does water turn to steam?

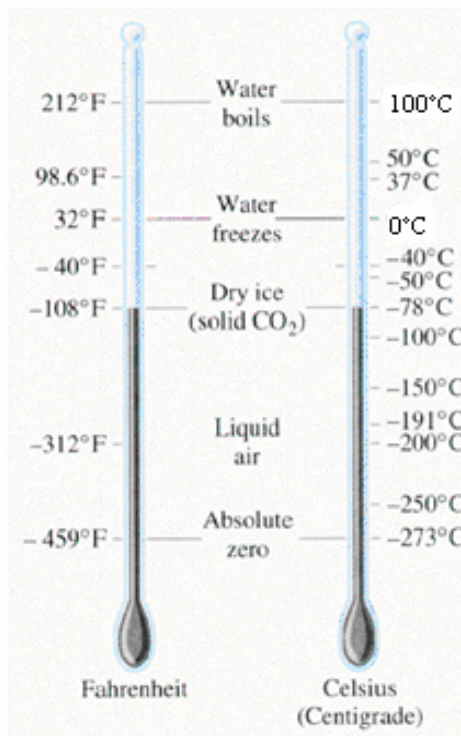
100°C

2. At what temperature Celsius does water freeze?

0°C

3. At which temperature are the two scales the same?

- 40°



www.abyss.uoregon.edu. 2009

NAME: _____

DATE: _____

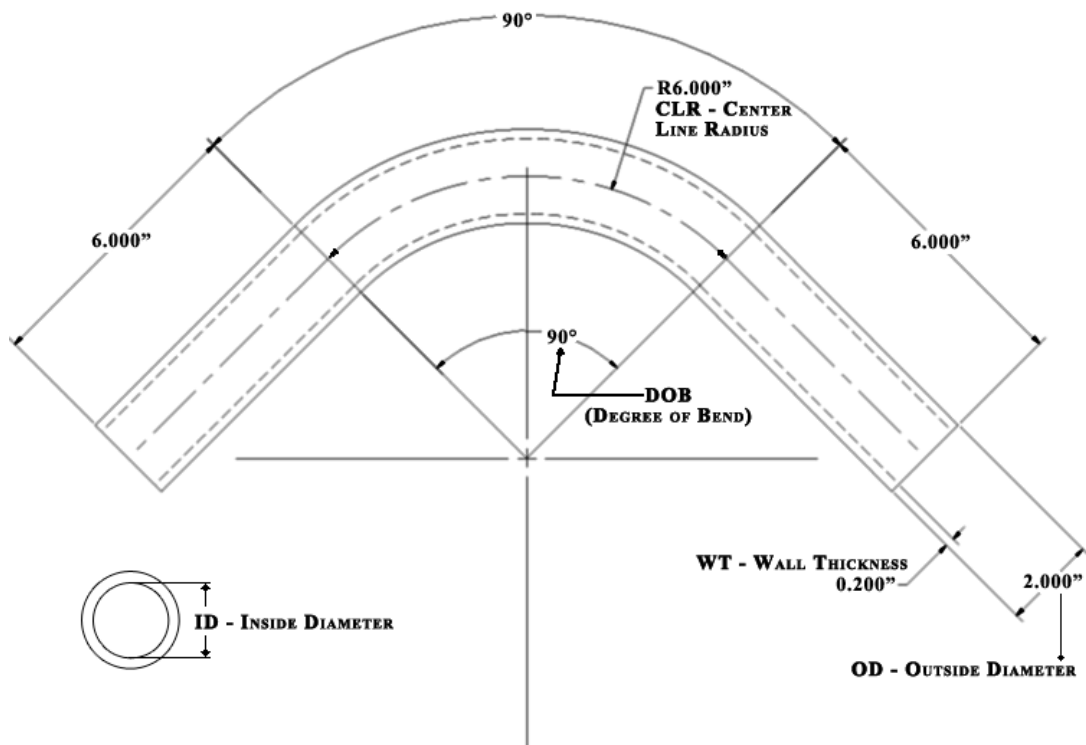
From the diagram below, answer the following questions.

1. What is the degree of the bend in the pipe?

90°

2. What is the ID of the pipe shown in the figure below?

ID = 1.600"



NAME: _____

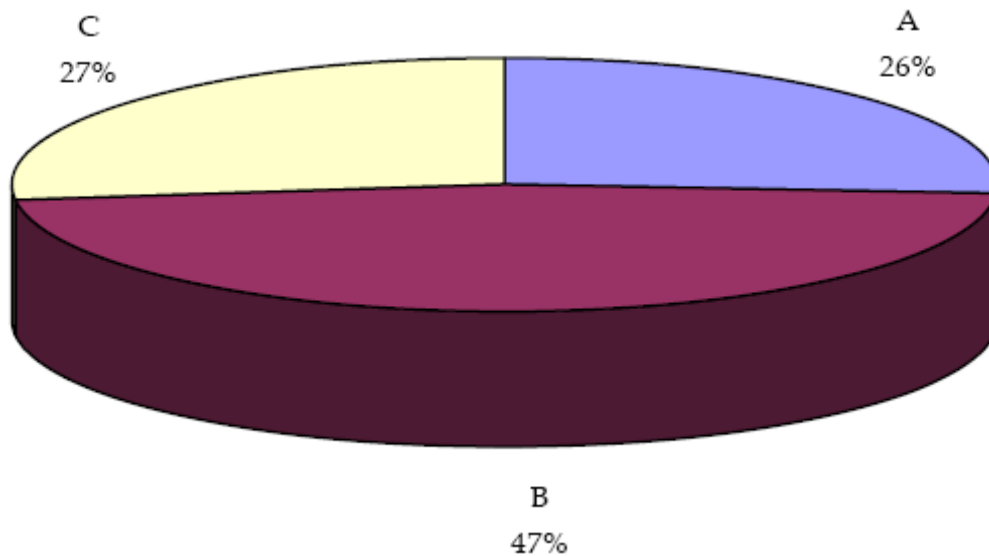
DATE: _____

1. How many questions are on the "fabrication of components"?

_____ 59 _____

2. How many questions are on "Occupational Skills"?

_____ 33 _____



BLOCK A	Common Occupational Skills
BLOCK B	Fabrication of Components
BLOCK C	Assembly of Components

National Occupational Analysis 2009, Metal Fabricator, Human Resources Partnership Directorate

NAME:

DATE:

Refer to the drawing on the following page to answer these questions:

1. What is the name of the part?

rotary loader

2. What number has been assigned to the drawing?

B3345

3. The part is made of what material?

Steel, AISI 1020

4. What tolerances are allowed for decimal dimensions?

+ 0.010"

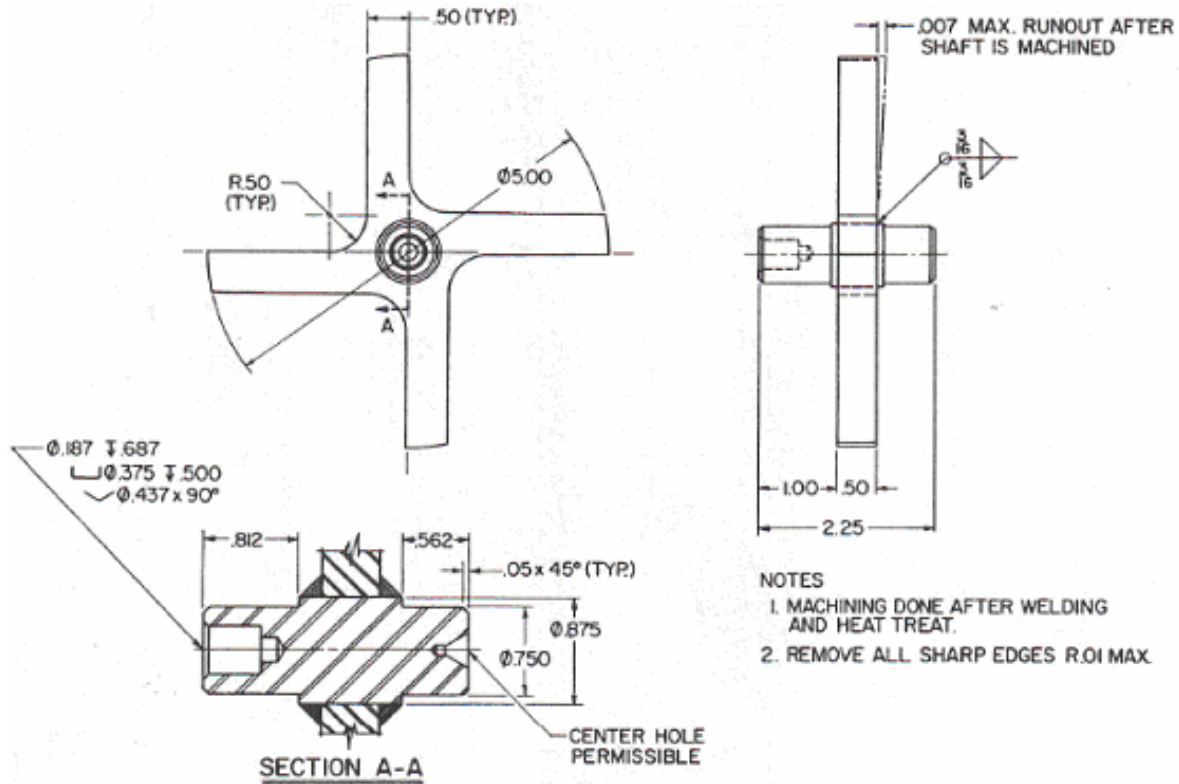
5. What is the largest diameter of the part?

5.00"

6. Are centre holes permissible in the shaft?

YES

7. The drawing is 2 of 7 needed to make and assemble the part.



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS $\pm 1/64$ DECIMALS ± 0.010 ANGLES ± 1	DRAWN BY JRW	WALKER INDUSTRIES	
	DATE 5-26	TITLE ROTARY LOADER	
	CHK'D GF	SCALE FULL & 15X	
	HEAT TREATMENT STRESS REL.	SHEET 2 OF 7	DRAWING NO. B3345

Modern Metalworking, Walker, J R Goodheart-Wilcox, 2004

SECTION	CONCEPT	QUESTION NUMBERS
1	Whole numbers	1-4
	Decimals	5-9, 24
	Fractions	10-19, 23
	Conversions (fractions, decimals, percents)	20
	Positive and negative numbers	21-22
2	Metric and Imperial measures	1-9
	Order of operations	10-11
	Percents	12-13
	Exponents, square root, scientific notation	14-16
	Ratio and proportion	17-21
3	Geometry (circles)	1-2
	Geometric figures	3
	Formulae	4
4	Formulae	1-3
	Angles	4
	Geometry Pythagorean Theorem (6-8-10 method)	5
	Coordinate graphing	6, 7

NAME: _____

DATE: _____

1. $\begin{array}{r} 138 \text{ in.} \\ + 164 \text{ in.} \\ \hline 302 \text{ in.} \end{array}$	2. $\begin{array}{r} 34 \text{ cm} \\ - 18 \text{ cm} \\ \hline 16 \text{ cm} \end{array}$	3. $\begin{array}{r} 24 \text{ ft.}^3 \\ \times 46 \text{ ft.}^3 \\ \hline 1104 \text{ ft.}^3 \end{array}$	4. $\begin{array}{r} 10,024 \text{ cm} \\ \div 24 \text{ cm} \\ \hline 417.7 \text{ cm} \end{array}$
--	--	--	--

5. $\begin{array}{r} .0067 \text{ gal.} \\ + .2543 \text{ gal.} \\ \hline 0.2610 \text{ gal.} \end{array}$	6. $\begin{array}{r} 26 \text{ L} \\ - .03 \text{ L} \\ \hline 25.97 \text{ L} \end{array}$	7. $\begin{array}{r} .034 \text{ ml} \\ \times .025 \text{ ml} \\ \hline .00085 \text{ ml} \end{array}$	8. $\begin{array}{r} 13.25 \text{ mm} \\ \div 25 \text{ mm} \\ \hline 0.53 \text{ mm} \end{array}$
--	---	---	--

9. State the range of measurement for the following:

➤ 2.5 with a tolerance of $\pm .1 \text{ in.}$ = 2.4 to 2.6 in.

➤ 45.6 mm with a tolerance of $\pm .5 \text{ mm}$ = 45.1 to 46.1 mm

10. $\begin{array}{r} 6 \frac{3}{8} \text{ in.} \\ - 1 \frac{1}{8} \text{ in.} \\ \hline 6 \frac{1}{4} \text{ in.} \end{array}$	11. $\begin{array}{r} \frac{3}{8} \text{ ft.} \\ + \frac{1}{2} \text{ ft.} \\ \hline 1 \frac{1}{6} \text{ ft.} \end{array}$	12. $\begin{array}{r} 9/16 \text{ in.} \\ + 7/32 \text{ in.} \\ \hline 25/32 \text{ in.} \end{array}$	13. $\begin{array}{r} 5/8 \text{ in.} \\ \times 2/3 \text{ in.} \\ \hline 5/12 \text{ in.} \end{array}$
---	---	---	---

14. $\begin{array}{r} 21/64 \text{ mm} \\ \div 9/16 \text{ mm} \\ \hline 7/12 \text{ mm} \end{array}$	15. $\begin{array}{r} 2 \frac{7}{16} \text{ cm} \\ \div 1 \frac{1}{4} \text{ cm} \\ \hline 1 \frac{19}{20} \text{ cm} \end{array}$
---	--

Change to either a mixed number or an improper fraction:

16. $\frac{10}{3} \text{ gal.} = \underline{3 \frac{1}{3} \text{ gal.}}$

17. $5 \frac{7}{8} \text{ gal.} = \underline{47/8 \text{ gal.}}$

Write an equivalent fraction:

18. $\frac{3}{8}'' = \underline{6/16''}$

19. $\frac{15}{16}'' = \underline{30/32''}$
(answers will vary)

20. Complete the chart with the missing measurements.

Fraction	Decimal	Percent
$\frac{1}{2}$.5	50%
$\frac{3}{4}$.75	75%
$\frac{3}{16}$	0.1875	18.75%
$\frac{1}{32}$	0.03125	3.12%

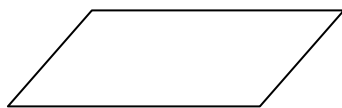
21. In February, the temperature at your work site fell from +5°C to -14°C. What was the total drop in temperature that day?

19°C

22. An increase of 45 pounds per square inch of pressure is expressed as +45 lb./in.². How would you express a pressure decrease of 17 lb./in.²?

-17 lb./in.²

23. You need to cut strips $\frac{3}{4}$ " wide from a piece of 16-gauge sheet metal 36" wide. How many strips can you shear from this sheet?



← 36" →

48 strips

24. You have cut 6 pieces of steel angle, each 3.0698" long. The total length is rounded to the nearest thousandth inch. How long was the original piece? (do not count the waste).

18.419" (18.4188")

NAME: _____

DATE: _____

1. On the tapes, indicate:

a) 15/16 in.

b) 3/4 in.

c) 3/8 in.

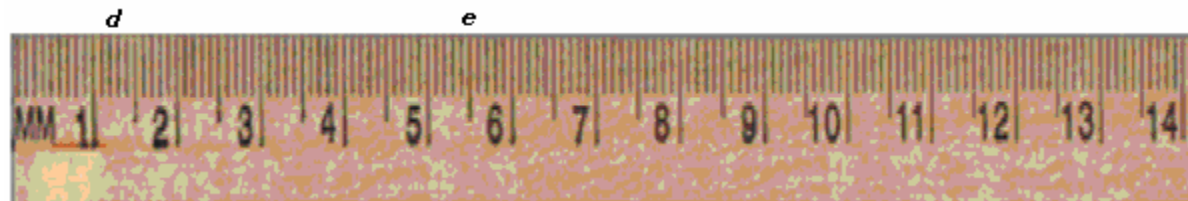
Imperial



d) 12 mm

e) 5.5 cm

Metric



Convert the following:

30.48 cm = 1 ft.
2.54 cm = 1 in.
27 cubic feet = 1 cubic yard

2. 0.45 km = 450 m

3. 65 cm = 650 mm

4. 6 in. = 15.24 cm

5. 91.44 cm = 3 ft.

6. 12 ft. 4 in. = 148 in.

7. 144 in.² = 1 ft.²

8. 3 yd.³ = 81 ft.³

9. Complete the chart with examples of a unit of measurement for each measurement system. (Answers will vary)

	Imperial	Metric
Length	<i>in., ft., yds., miles</i>	<i>metre</i>
Weight (mass)	<i>lbs., ounces</i>	<i>gram</i>
Volume (or capacity)	<i>cups, pt., qt., gal.</i>	<i>L</i>

Calculate the following:

10. $8 - 3 \times 2 + 15 \div 5^\circ = \underline{+5}^\circ \text{C}$

11. $42 \div 14 + 2 (16 - 18 \div 3) - 16^\circ = \underline{+7}^\circ \text{C}$

12. In your current work as a Metal Fabricator, you are working 40 hours per week and earning \$24.50 an hour. Your deductions are:

- Income tax 32%
- Union dues 5%
- Health insurance 6%

- a. What is your gross pay before deductions? \$980.00
- b. What is the amount of income tax you pay? \$313.60
- c. What is the amount you pay in union dues? \$49.00
- d. What is your net pay? \$558.60

13. The area of a piece of steel is 1447.64 square inches. How many square inches are in 25% of the steel?

361.91 in.²

Calculate the value of:

14. $6^5 \text{ ft.} = \underline{7776} \text{ ft.}$

15. $10^5 \text{ mm} = \underline{100,000} \text{ mm}$

16. $\sqrt{96} \text{ yd.} = \underline{9.798} \text{ yd.}$

Change the following ratios to their lowest fractional forms:

17. $35 \text{ lb.} : 10 \text{ lb.} = \underline{7:2} \text{ lb.}$

18. $12 \text{ in. to } 36 \text{ in.} = \underline{1:3} \text{ in.}$

19. $18 \text{ ft.}^2 : 180 \text{ ft.}^2 = \underline{1:10} \text{ ft.}^2$

20. $6 \text{ min. to } \frac{1}{4} \text{ hr.} = \underline{6:15} \text{ min.}$

21. Two forgings are made of the same stainless steel alloy. One forging weighs 170 pounds and contains 0.80 pounds of chromium. How many pounds of chromium are in the second forging if it weighs 255 pounds?

1.2 lbs.

NAME: _____

DATE: _____

1. The circle below is cut from 3/8" steel plate. What is the name used to describe the labelled parts on the plate?

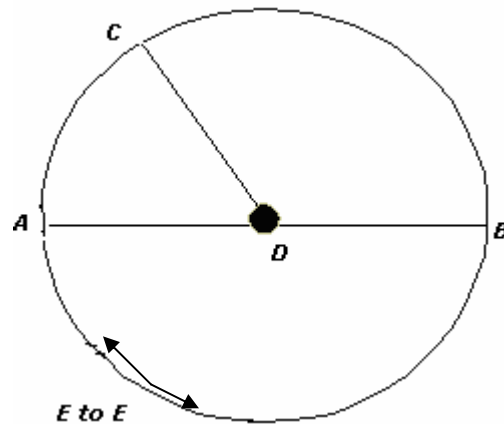
ADB diameter

AD, DB, CD radius

D centre

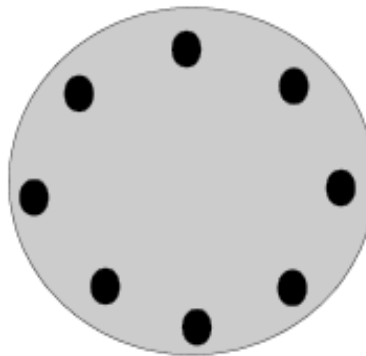
E to E circumference

AC arc



2. This is an 8-hole blind flange. How many degrees are between the centres of each hole?

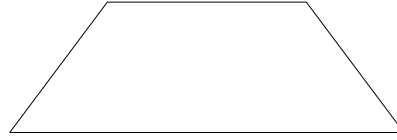
45°



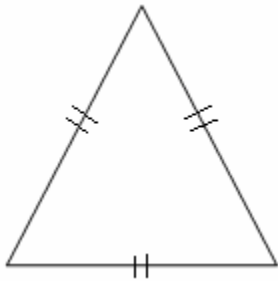
3. Identify the different shapes below:



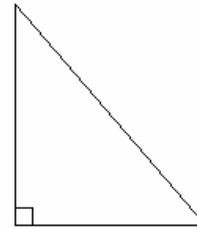
parallelogram



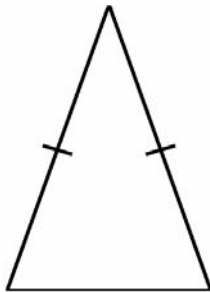
trapezoid



equilateral triangle



right triangle

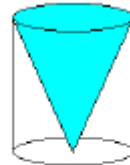
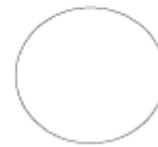
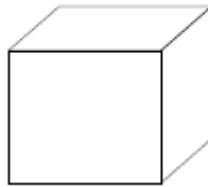
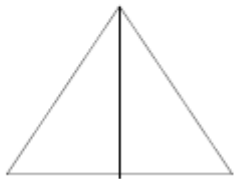
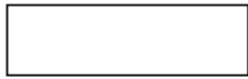


isosceles triangle



scalene triangle

4. Match the formula to the appropriate description (you may use the diagram as a guide).



1) $p = 2l + 2w$

2) $V = e^3$

3) $A = \pi r^2$

4) $V = \pi r^2 h$

5) $A = \frac{1}{2}bh$

6) $V = \frac{4}{3}\pi r^3$

7) $C = \pi d$

8) $A = lw$

h

d

c

g

a

f

b

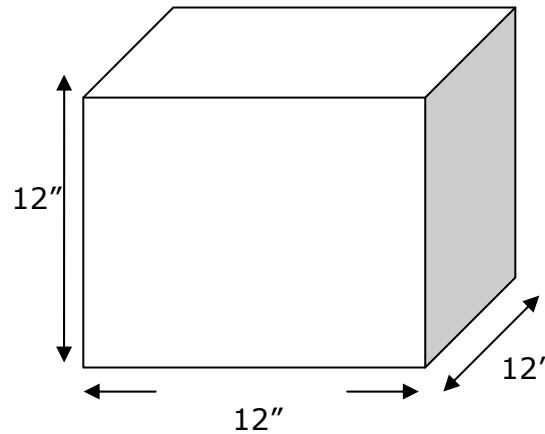
e

- a. area of a triangle
b. circumference of a circle
c. area of a circle
d. volume of a cube
e. area of a rectangle
f. volume of a sphere
g. volume of a cylinder
h. perimeter of a rectangle

NAME: _____

DATE: _____

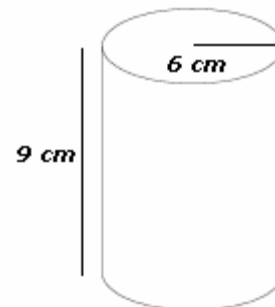
1. What is the volume of this solid cube of steel?



$V = 1728 \text{ in.}^3$

2. The formula for the volume of a cylinder is $V = \pi r^2 h$. What is the volume of a cylinder 9 cm high and whose radius is 6 cm?

1017.88 cm^3



What would be the formula for h?

$$H = \frac{V}{\pi r^2}$$

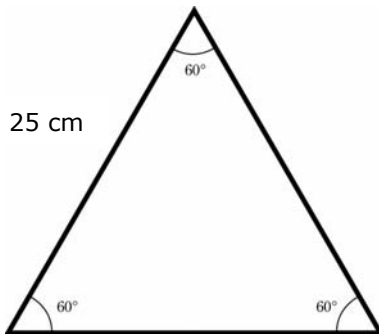
3. The formula for finding the pressure of a solid is defined as the force exerted over a certain area. $P = F/A$

a. What is the pressure if the force is 2 kg and the area is 2 m²?

1 kg / m²

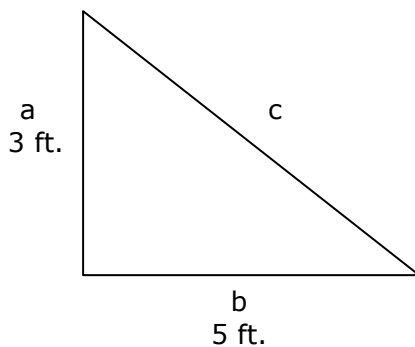
b. What would be the formula for finding the area?

4. An equilateral triangle is a shape often used in fabricating. All 3 sides are equal and each angle is 60°. Calculate the perimeter of the triangle.



75 cm

5. Use the formula $a^2 + b^2 = c^2$ to calculate the length of side c.



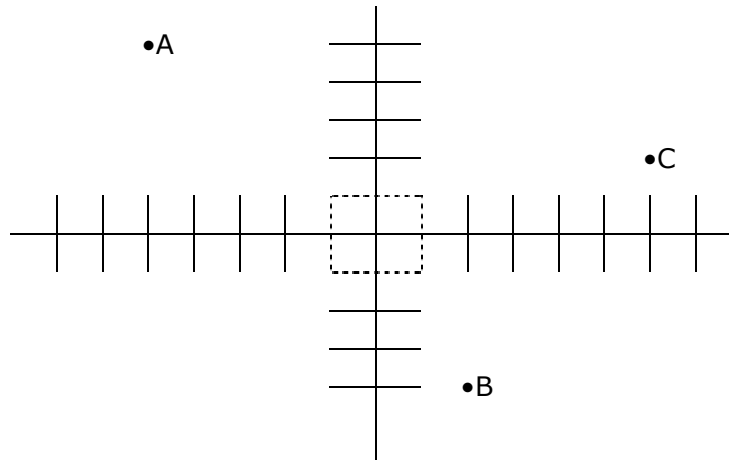
5.83 ft.

6. State the coordinates of points A, B and C on the graph below.

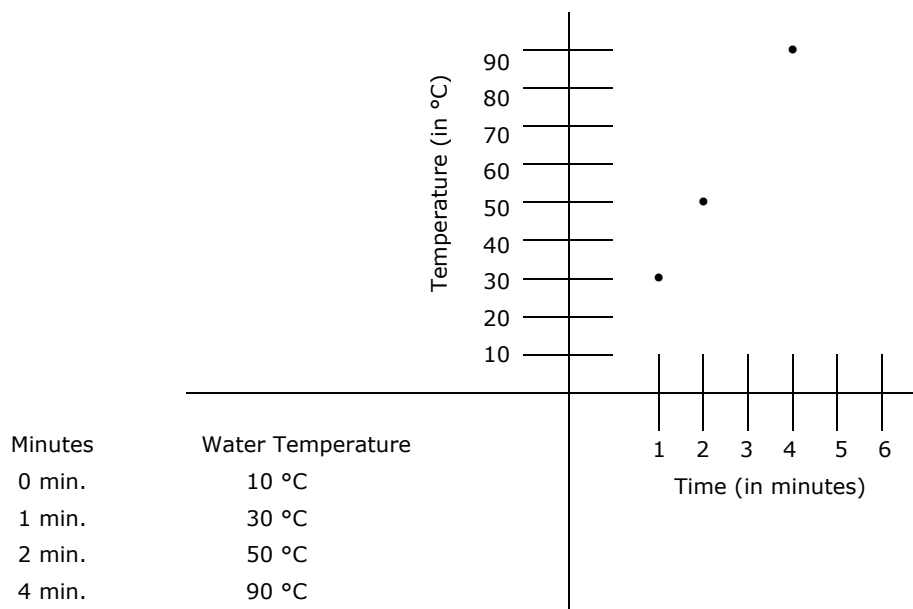
A = $(-5, 5)$

B = $(1, -4)$

C = $(5, 2)$



7. Use the table to plot the points on the grid.



ASSESSOR'S ANSWER KEY**METAL FABRICATOR****Oral Communication****Speaking scale**

This scale is to be completed by you, the assessor, during the course of the Essential Skills Inventory. While you may not have the opportunity to assess all the skills, you will be able to rate most of them. This scale may also be particularly helpful with those for whom English is not their first language, and it may be used for different cultural norms.

Examples of oral communication tasks

These are examples taken directly from the Essential Skill Profiles and range in complexity from simple to complex. The self-rating scale mirrors the stages of learning or skill- building.

NAME:

DATE:

** To be completed by the Assessor – not the Learner*

Speaking Skills Rating Scale

		Improvement Needed	Acceptable	Very good
1.	Is comfortable communicating orally (i.e., body posture and facial expressions are appropriate)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Maintains eye contact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Waits for his/her turn to speak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Willingly and confidently engages in conversation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Performs social courtesies, such as greeting others, using titles and making introductions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Speaks at an appropriate volume	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Rate of speech is understandable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Adjusts voice inflection for statements, requests, directions, exclamations and questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Pronounces words clearly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Does not use stalling devices such as "uh", "you know", etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.	Does not say the same thing twice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Uses words and phrases related to the subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	Has a good vocabulary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.	Speaks in complete sentences of appropriate length	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Uses good grammar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Maintains focus on the subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Gives appropriate responses to questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Is aware of listener's reaction and responds appropriately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Talks "with" rather than "at" a person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In your work as a Metal Fabricator, you may have to deal with a noisy workplace. However, it is still very important to speak with and listen to those with whom you work.

Please rate yourself on your ability to do the following work tasks:

		Need help	Can do alone	Can help an apprentice
1.	Ask co-workers questions about work-related matters such as work orders or instructions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Discuss problems with supervisors, for example, changes in design or work processes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Respond to customer inquiries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Act as a lead hand or supervisor and help workers who have less experience.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<http://srv108.gc.ca>, Essential Skills Profile, Metal Fabricator

ASSESSOR'S ANSWER KEY**METAL FABRICATOR****Computer use**

The computer use scale is not reflective of the computer use referenced in the Essential Skills Profile. However, there are basic computer skills required for survival in today's economy.

The scale used in this inventory reflects those very basic skills.

NAME:

DATE:

		YES	NO
1.	Do you use a computer at home?	<input type="checkbox"/>	<input type="checkbox"/>
	at work?	<input type="checkbox"/>	<input type="checkbox"/>
2.	Do you use any computerized equipment/ systems at work, for example, Computer Numeric Control (CNC) press brakes or cutting tables?	<input type="checkbox"/>	<input type="checkbox"/>
3.	Do you know the "language" used to describe computers, for example, monitor, software, hardware, word processing, data base, virus and SPAM?	<input type="checkbox"/>	<input type="checkbox"/>
4.	Do you use a computer to:	Need help	Can do alone
			Can help an apprentice
	Search for information on the internet?	<input type="checkbox"/>	<input type="checkbox"/>
	Send and receive email, including attachments?	<input type="checkbox"/>	<input type="checkbox"/>
	Write a memo, letter or report (use word processing software)?	<input type="checkbox"/>	<input type="checkbox"/>
	Manage files and folders?	<input type="checkbox"/>	<input type="checkbox"/>
	Use a data base?	<input type="checkbox"/>	<input type="checkbox"/>

ASSESSOR'S ANSWER KEY**METAL FABRICATOR****Writing**

The first questions in the writing section are examples taken directly from the Essential Skills Profile for the trade and range in difficulty from simple to more complex. The scale used for self assessment of these skills reflects the stages of learning: "need help, can do alone and can help an apprentice."

The second part requires the apprentice to provide a brief personal writing sample by composing 5-6 sentences.

Criteria for evaluating the sample are:

- Does the apprentice use print or cursive writing?
- Is the writing legible?
- Can the apprentice do the activity easily or does he/she struggle to write a sentence or two?
- Can the apprentice put his/her thoughts on paper in a logical order?
- Can the apprentice use punctuation correctly?
- Can the apprentice spell correctly?
- Can the apprentice use correct grammar?

NAME:

DATE:

In your work as a Metal Fabricator, you will be required to keep a written record of certain job tasks. Please rate yourself on your ability to do the following:

		Need help	Can do alone	Can help an apprentice
1.	Write reminder notes to keep track of materials and equipment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Complete production forms regarding hours worked and work completed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Write notes to a supervisor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Write a report about a work situation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Prepare a resumé.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Please write 5-6 sentences about yourself.

<http://srv108.gc.ca>, Essential Skills Profile, Metal Fabricator

Table of Contents

1.	Introduction	107
2.	Why Essential Skills?	107
3.	Instructor Requirements.....	108
4.	Curriculum Development	108
5.	Curriculum Resources	111
6.	Preparation and Delivery	111
7.	Measuring Learning: Instructor's Role in Evaluation.....	113
8.	Intervention Timeframe.....	113

Appendix A - Lesson Plan Template

Appendix B – Essentials Skills for All Apprentices

1. Introduction

The Curriculum Guidebook is designed to provide support and practical advice to instructors who are delivering Essential Skills training, as well as to those who wish to incorporate Essential Skills into technical training. Currently, this Guidebook has been prepared for thirteen trades; however, the template can be adapted for use in any trade.

The thirteen trades include:

- Automotive Service Technician
- Cabinetmaker
- Carpenter
- Cook
- Construction Electrician
- Industrial Electrician
- Machinist
- Metal Fabricator
- Oil Burner Mechanic
- Plumber
- Refrigeration and Air Conditioning Mechanic
- Steamfitter-Pipefitter
- Welder

2. Why Essential Skills?

Essential Skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in every occupation and throughout daily life in different ways.

- Reading Text
- Document Use
- Numeracy
- Oral Communication
- Writing
- Computer Use
- Thinking Skills
- Working with Others
- Continuous Learning

*The Trade Essentials curriculum materials currently uses **six** of these Essential Skills: **Reading, Document Use, Numeracy, Oral Communication, Writing and Computer Use***

For more information on Essential Skills, visit the website at www.hrsdc.gc.ca/essentialskills

Although the term 'Essential Skills' has been around for a number of years, there is growing recognition of the link between Essential Skills and success in the trades. Essential Skills are used in every occupation and more specifically, in every trade, but they are used in different ways and at varying degrees of difficulty.

These skills are not technical skills though they may be taught using materials or examples from a particular trade. Rather, they are the foundational skills that exist in all occupations. The six Essential skills outlined above were used in the creation of materials for the Trade Essentials project.

The Curriculum Frameworks identify the Essential Skills requirements for thirteen trades and provide concrete examples of how these skills are utilized in each trade.

The Essential Skill requirements are based primarily on HRSDC's Essential Skills profiles www.hrsdc.gc.ca/essentialskills and the National Occupational Analyses.

(<http://www.red-seal.ca/tr.1d.2n.4adeta.3l@-eng.jsp?tid=230>)

They have been reviewed and validated by certified tradespeople and supplemented by additional research gathered from the Trade Essentials project.

3. Instructor Requirements

To be effective, curriculum development and delivery must be guided by the principles of adult education. Learners in the Essential Skills programs will have a wide variety of backgrounds, work experience, education and work-related credentials. Many of these learners will be employed in full time positions with additional responsibilities outside of work. It is critical for the instructor to understand the unique requirements of adult learners and be prepared with challenging, relevant and engaging learning activities.

- Instructors must have knowledge and experience in the area of adult education.
- Instructors should have experience in working in a multi-level classroom environment.
- Instructors must be familiar with Essential Skills, how Essential Skills are used in the trades, and with the trade itself. Red Seal certification is encouraged.
- Instructors must be able to provide the link between Essential Skills and the trade and will provide a trade context from their own experience and expertise. In some instances a team approach with both an Essential Skills and a trades instructor may be preferable.
- It is important that those who presently provide technical training also receive training to increase their understanding of Essential Skills.

4. Curriculum Development

The curriculum frameworks are derived from an outcomes-based approach to learning focusing on the *outcome* of the intervention or course of study-what the learner will be able to do or will know at the end of the intervention. They have been developed to

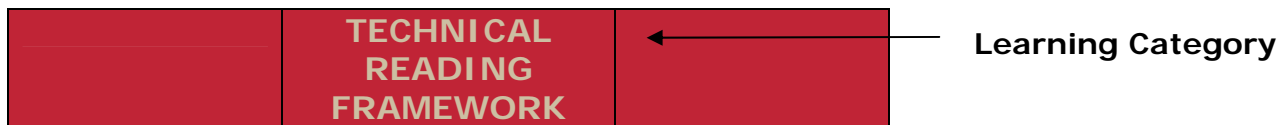
support individual learning needs in each of the six Essential Skills and are the generic **Essential Skills Maps** for all thirteen trades included in the Trade Essentials project.

The following describes the structure and components of the curriculum frameworks developed for apprentices at the Trade Essentials Centre.

Learning Category

A Learning Category (as defined by Trade Essentials) is a general curriculum outcome and is one of the six Essential Skills identified for development in the Trade Essentials project: Reading Text, Document Use, Numeracy, Oral Communication, Computer Use and Writing. It appears in the top band across each of the six frameworks as shown in the example below.

Note: Reading Text will be referred to as Technical Reading in all frameworks



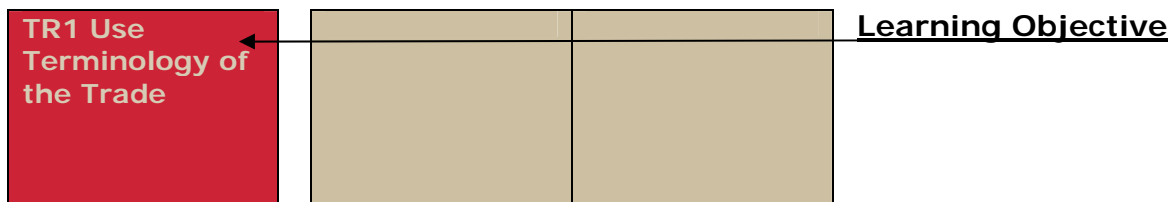
Learning Outcome

A Learning Outcome is a specific curriculum outcome and describes what a learner should know or be able to do as the result of a course of study. Trade Essentials has identified one Learning Outcome for each Learning Category. The learning outcome statement appears below the Learning Category. For example, the learning outcome in the Trade Essentials Technical Reading Framework is:

Learners will locate, recall, understand and interpret information in written text

Learning Objective

Learning objectives are the standards or benchmarks that identify what learners will know or will be able to do as the result of the completion of a number of related competencies in a particular "band". In the example below, the objective for the band is:
TR1 – Use Terminology of the Trade (Burgundy Box).



Competency

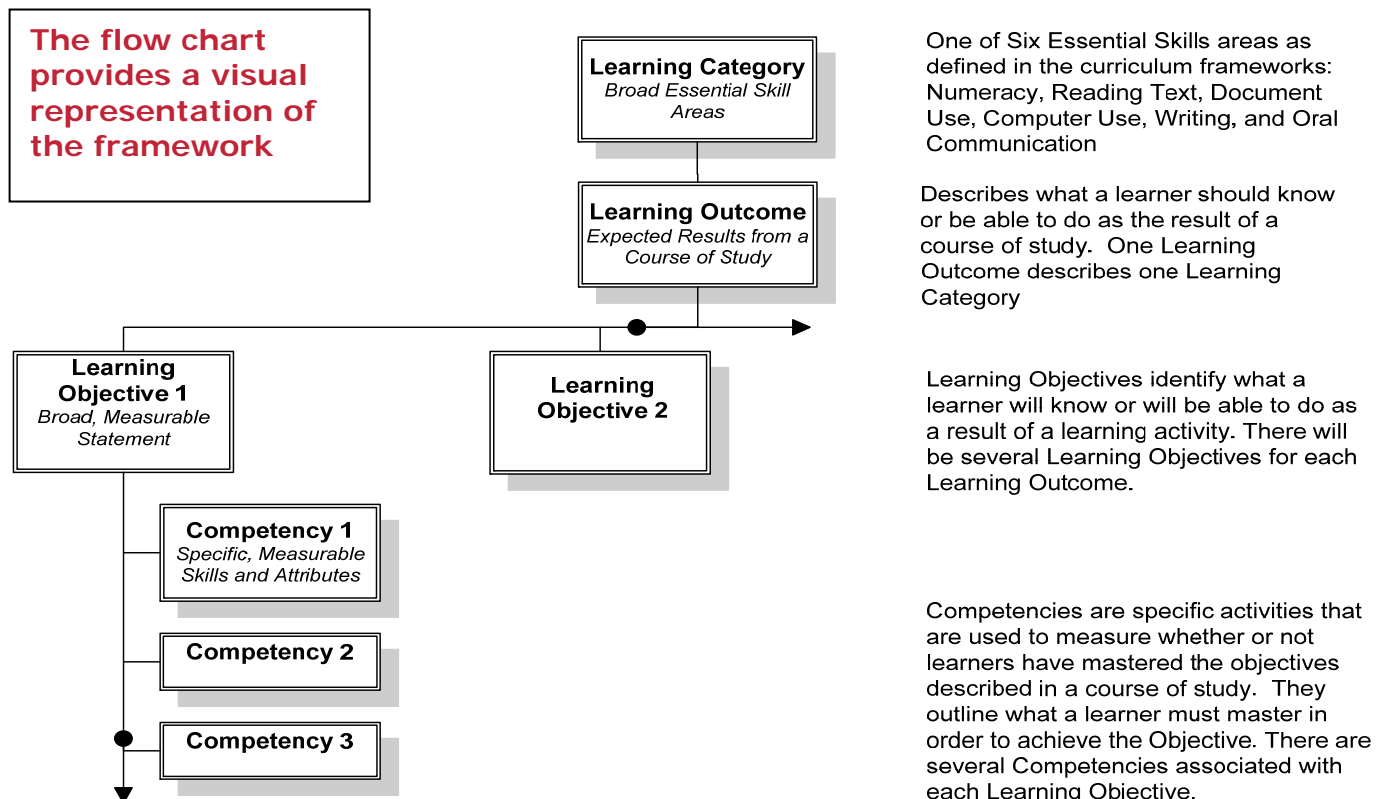
While an objective describes ‘what’ we expect learners to achieve, competencies identify ‘how’ learners can achieve that objective. Competencies are specific activities used to measure whether or not learners have mastered the objective. In Table 1 below, the learner must master competencies 2.1 and 2.2 (taupe boxes) to demonstrate mastery of the objective. Where objectives demonstrate the end result, competencies are a means to that end.

Competencies provide a framework for selecting instructional materials and techniques and provide a basis for determining when instruction has been successful.

Table 1

TR2 Use Strategies to Improve Understanding and Recall	2.1 Identify strategies to improve understanding and recall of written information	2.2 Implement strategies to improve understanding and recall of written information	<u>Competency</u>
--	--	---	-------------------

Curriculum Overview



5. Curriculum Resources

Three types of resources are identified in the curriculum guidelines: *non-contextualized*, *contextualized*, and *technical*. These resources have been listed throughout the guidelines. It is not intended that instructors use all of the resources outlined but, instead, choose material and deliver its content as it best suits individual learner needs.

Non-contextualized resources are not related to any trade or occupation. These resources may be used to review the competencies in a stand-alone manner before transferring the skill to trade-related materials. They can be useful when learners have identified literacy challenges or when basic strategies need to be understood before applying them to higher order learning.

Contextualized resources provide Essential Skills applications in the context of a specific trade or occupation and are generally written at a more basic level than technical materials. They are particularly useful when learners have identified Essential Skills gaps but can only identify relevance/motivation to the task if it is related to their specific trade.

Technical resources are trades training materials from which Essential Skills can be extracted. These resources are written at a higher reading level than non-contextualized and contextualized resources and can often be found in block release training and college trade programs. Generally, learners who would benefit from these materials have few Essential Skills gaps in their learning.

6. Preparation and Delivery

Instructors will be provided with a complete copy of the Essential Skills Frameworks associated with the trades/courses for which they are responsible. Instructors will use essential skills assessment information to build a learning session for one client or a group of clients.

The instructor will be required to prepare lesson plans as a tool to organize and plan the delivery of training. A lesson plan template is included in Appendix A. A brief description of each section of the lesson plan is included in the attached template to serve as a guide. The instructor may add additional notes and documents as required. Completed lesson plans should be kept on file to provide continuity in subsequent sessions.

It is important to note that, even though objectives and competencies progress from least to most difficult, instruction need not move in a linear fashion. In recognition of their prior knowledge, learners may begin their study at any objective in the curriculum frameworks, may not require instruction in all of the competencies in each band, and/or may simultaneously complete competencies in all six Essential Skill curriculum frameworks.

Learners who have extensive Essential Skills gaps may require that the curriculum framework be followed using a linear approach beginning with the least complex objectives.

The curriculum frameworks are applicable to all thirteen trades identified for the project. For instance, though *“Using Documents”* is identified as important to both cooks and carpenters; however, the way documents are used in the trade is what makes them relevant to that specific trade.

The exception is “Numeracy” where not all objectives listed are required in all thirteen trades. For example, a cook may not be required to master all of the learning objectives outlined in the framework whereas a machinist requires mastery of all. Appendix B includes a checklist of the skills required for each particular trade.

The guidelines define objectives and competencies and identify matching resources. The instructor can then use these resources to develop lesson plans that best suit the needs of their particular audience.

Though frameworks are written in academic language (at an academic level), the intent is that the objectives and competencies be taught using **trade specific examples**. Curriculum frameworks may be delivered one-on-one or in a group learning environment.

6.1 Approaches to Delivery

The delivery approach can be **stand alone** or **cross curricular**, depending on the needs of the client or client group.

A **stand alone approach** involves using any one of the curriculum frameworks in its entirety as a stand alone course. For example, carpenters who have been away from the classroom for a long time may benefit from a review of the complete Numeracy framework and focus solely on that Essential Skill.

Others, including those who have achieved journey person status, may require a Computer Course or a course in Oral Communication to improve their skills in dealing with customers or in mentoring new apprentices.

It is assumed that in many classroom situations instructors will use a **cross-curricular approach** to develop a number of skills at the same time.

All students will benefit from instruction in how to understand and retain information from trade-related materials. For example, using the codebook for locating information can address both technical reading and document use. An activity which requires the learner to complete an invoice may provide the opportunity to incorporate technical reading, writing, document use and numeracy in one exercise.

It is intended that Essential Skills can be embedded in the curriculum wherever possible and that instruction in many of the skill areas will not be time-tabled as such. It has

been proven that a learning environment that provides opportunity for discussion and interaction among learners will improve comprehension and long-term memory.

7. Measuring Learning: Instructor's Role in Evaluation

There are a number of informal methods that could be used periodically by the instructor to ensure progress. It is important to note that measurement is not based on a "Pass-Fail;" it is understood that the learner sees the value in improving their skill level and will continue to develop their skills until they are comfortable and confident in performing the required tasks.

Informal Evaluation Methods:

- Provide opportunities and simple recording forms for the learner to assess their progress.
- Review individual assessments on a regular basis against the curricula framework
- Pay particular attention to those identified as potential "early leavers" to ensure they are moving forward as anticipated.
- Pay attention to those who experience unanticipated difficulties in the group environment.
- Document observations of performance in class
- Develop a rubrics for a particular objective that can be shared with students

Formal Evaluation:

- Where a more formal evaluation approach is desired, the instructors or learners could design and complete a structured checklist (see sample checklist in Appendices). Mastery of skills at the highest level using the application to the trade would demonstrate that the learner meets trade requirements.

8. Intervention Timeframe

The Trade Essentials interventions have been developed for individualized learning; therefore, no set time period has been determined for the delivery of the material. Learners' prior knowledge and time necessary to learn or relearn skills should determine the length of time spent in the intervention. For that purpose, a continuous exit policy should be implemented into all programs. There may be a mixture of "early leavers" (those identified as having few or isolated essential skills gaps), with those who have broader range of needs.

Appendix A

Trade Essentials Lesson Plan Template

Course Title:		Dates:	
Instructor:		Location:	

Session Topic(s):		Duration:	
--------------------------	--	------------------	--

Session Description:
Describe what you plan to accomplish during the session or group of sessions. Why is this learning important? What is the context for the learning?

Learning Outcomes, Objectives, and Competencies:
List or attach the specific or related Learning Outcomes, Objectives, and Competency statements (from the framework) here.

Assessment and Evaluation Strategies:
Outline or attach learner evaluation strategies that align with specific Learning Outcome, Objectives, and Competencies. Pre- or post-tests; in-class exercises; individual skill inventories; etc.

Teaching Points and Organization:

Time	Content and Delivery Method
	Use this section to prepare a schedule of learning activities and events. For example:
7:00-7:15	Use bridge-in activity (describe activity) to gain student interest and prepare them to learn
7:15-8:00	Using carpentry estimating handout, have students work on assignment in groups of 2 then debrief assignment
8:00-8:15	Break
8:15-8:20	Energizer activity (describe activity) to refocus students on learning

Resources and Materials Required:

List resources and materials you will use during this session. If applicable, attach copies, descriptions or links to items such as handouts, assignments, demonstration equipment, websites, readings, activities or other specific resources for instructor and/or student use.

Accommodations:

Describe any teaching/learning accommodations that may be implemented in this session to support learner diversity.

Reflective Notes:

How did the session go? What worked well and what work not so well? Outline any ideas for improvement that can be made for the next session.

Appendix B – Essential Skills for All Apprentices

	Automotive Service Tech	Carpenter	Cabinet Maker	Construction Electrician	Cook	Industrial Electrician	Machinist
PM1 Use Calculators	✓	✓	✓	✓	✓	✓	✓
PM2 Use Positive and Negative Numbers	✓	✓	Whole numbers only	✓	✓	✓	✓
PM3 Use Order of Operations	✓	✓	✓	✓	✓	✓	✓
PM4 Use Fractions	✓	✓	✓	✓	✓	✓	✓
PM5 Use Mixed Numbers	✓	✓	✓	✓	✓	✓	✓
PM6 Use Decimals	✓	✓	✓	✓	✓	✓	✓
PM7 Use Percent	✓	✓	✓	✓	✓	✓	✓
PM8 Use Conversion	✓	✓	✓	✓	✓	✓	✓
PM9 Use Measurement Systems	✓	✓	✓	✓	✓	✓	✓
PM10 Use Rate, Ratio and Proportion	✓	✓	✓	✓	✓	✓	✓
PM11 Use Square Root and Exponents	✓	✓	-	✓	-	✓	✓
PM12 Solve Equations	✓	✓	✓	✓	✓	✓	✓
PM13 Use Trade-Related Formulae	✓	✓	✓	✓	✓	✓	✓
PM14 Use Estimation	✓	✓	✓	✓	✓	✓	✓
PM15 Use Angles	✓	✓	✓	✓	✓	✓	✓
PM16 Use Geometric Shapes	✓	✓	✓	✓	-	✓	✓
PM17 Use Trigonometry	✓	✓	✓	✓	-	✓	✓
PM18 Analyze Numerical Data	✓	-	-	-	✓	-	✓

CURRICULUM GUIDEBOOK

	Metal Fabricator	Plumber	Refrigeration & Air Conditioning Mechanic	Oil Burner Mechanic	Steamfitter/ Pipefitter	Welder
PM1 Use Calculators	✓	✓	✓	✓	✓	✓
PM2 Use Positive and Negative Numbers	✓	✓	✓	✓	✓	✓
PM3 Use Order of Operations	✓	✓	✓	✓	✓	✓
PM4 Use Fractions	✓	✓	✓	✓	✓	✓
PM5 Use Mixed Numbers	✓	✓	✓	✓	✓	✓
PM6 Use Decimals	✓	✓	✓	✓	✓	✓
PM7 Use Percent	-	-	✓	✓	✓	✓
PM8 Use Conversion	-	✓	✓	✓	✓	✓
PM9 Use Measurement Systems	✓	✓	✓	✓	✓	✓
PM10 Use Rate, Ratio and Proportion	-	No proportion	✓	✓	✓	No proportion
PM11 Use Square Root and Exponents	-	-	✓	✓	✓	✓
PM12 Solve Equations	-	Plus quadratic equations	✓	✓	✓	✓
PM13 Use Trade-Related Formulae	✓	✓	✓	✓	✓	✓
PM14 Use Estimation	✓	✓	✓	✓	✓	✓
PM15 Use Angles	✓	✓	✓	✓	✓	✓
PM16 Use Geometric Shapes	✓	✓	✓	✓	✓	✓
PM17 Use Trigonometry	✓	✓	✓	✓	✓	✓
PM18 Analyze Numerical Data	-	-	✓	✓	-	-

TABLE OF CONTENTS

CURRICULUM FOR

WELDER/METAL FABRICATOR

NOC 7365/NOC 7363

	PAGE
Technical Reading	
Framework	120
Guidelines	121
Document Use	
Framework	134
Guidelines	135
Numeracy	
Framework	152
Numeracy – Essential Skills for Apprentices	156
Numeracy Checklist	159
Guidelines	163
Oral Communication	
Framework	194
Guidelines	195
Computer Use	
Framework	205
Guidelines	207
Writing	
Framework	217
Guidelines	218

Technical Reading (TR) Learning Outcome: Learners will locate, recall, understand and interpret information in written text

TR1 Use Terminology of the Trade	1.1 Identify strategies to organize and remember new terminology	1.2 Implement strategies to organize and remember new terminology				
TR2 Use Strategies to Improve Understanding and Recall	2.1 Identify strategies to improve understanding and recall of written information	2.2 Implement strategies to improve understanding and recall of written information				
TR3 Read to Perform Job Tasks	3.1 Identify purpose of reading information to perform job tasks	3.2 Locate specific information	3.3 Skim for overall meaning	3.4 Read to understand and learn	3.5 Read to critique	3.6 Read to evaluate
TR4 Improve Examination Performance	4.1 Identify barriers to successful examination performance	4.2 Identify strategies to improve examination performance	4.3 Implement strategies to improve examination performance			

Learners will locate, recall, understand, and interpret information in written text

Introduction

Success in technical training and in the trade requires that apprentices understand, connect with and recall important information. Knowing the language of the trade and developing strategies to quickly locate specific information in reading materials such as code books, manuals and texts not only increases reader comprehension but also productivity on the job.

Just as it is important to think about reading habits, it is important for apprentices to think about and develop strategies for exam preparation. Whether writing tests that are required during technical training or getting ready to write the Red Seal certification exam, adequate test preparation is essential. As multiple-choice testing is the most common form of assessment for certification, knowing how multiple-choice questions are constructed and applying strategies for responding can significantly improve test scores.

Technical Reading in the Metal Fabricating and Welding Trades

Metal fabricators and welders use technical reading on a daily basis to complete job tasks. The complexity of these reading tasks, according to Human Resources and Skills Development Canada's Essential Skills Profile (http://www10.hrsdc.gc.ca/es/english/ES_Profiles.aspx) ranges from reading short texts to locate a single piece of information (e.g., read notes containing daily orders) to choosing and integrating information from various sources or from several parts of a single text (e.g., read manuals to repair or adjust equipment; read codes or specifications).

Metal fabricators and welders follow written instructions, interpret specifications, and refer to codes and regulations to perform the tasks of their trade. They read routine notes, WHMIS labels for information about safe handling of dangerous products, and equipment and safety manuals that describe safe operating procedures. In many cases, the text is often complex, lengthy and technical.

Introduction to the Curriculum Guide

Success in technical training and performance on the job requires that apprentices have strong Essential Skills. Although all Essential Skills contribute to success, this guide is intended to help apprentices in the metal fabricating and welding trades develop the reading strategies necessary to locate, understand, interpret and recall information presented in a variety of text formats common to the trade.

It is assumed that the instruction for the Technical Reading course will not be time-tabled as such, but instructors will use a cross-curricular approach to incorporate reading strategies using the materials of the trade.

The following guide outlines a list of recommended resources (see Appendix A) for each objective in the Technical Reading curriculum framework and, where possible, includes online website materials that complement these resources. Three formats are provided to allow learners the opportunity to review competencies in a way that best suits their needs. These resources are categorized as follows:

- **Non-contextualized** - Curriculum resources that are **not** related to any trade or occupation. These resources may be used to review the competencies in a stand-alone manner before transferring the skill to trade-related materials.
- **Contextualized** - Curriculum resources that provide Essential Skills applications in the context of a specific trade or occupation.
- **Technical** – Trade-training materials from which Essential Skills are extracted. For the purpose of the Trade Essentials project, ***Individual Learning Modules*** from Alberta Advanced Education were used as the primary technical resource.

Note: Though only some modules are outlined as resources for specific objectives, all Individual Learning Modules can be used for the instruction of Essential Skills. (Visit www.tradesecrets.org for current listing of modules.)

The list of resources has been designed to act only as a guide and may, therefore, need to be adapted to meet the needs of individuals or groups. It is the role of you, the instructor, to choose materials and deliver the content as it best suits individual learner needs. A variety of materials are listed under each set of competencies for this purpose.

The following websites contain both welding and fabricating-related and generic content which may be used as an additional reading forum.

Welding and Fabricating-Related Online Websites:

- www.pprc.org/pubs/workbook/appmetal.pdf (Metal Fabrication Industry-Compliance and Pollution Prevention Workbook)
- www.khake.com/page89.html (Metal Fabrication/Welding-related Information on Various Topics)
- www.twi.co.uk/j32k/index.xtp (Metal Fabrication/Welding-related Information on Various Topics)
- www.welding.com/ (Metal Fabrication/Welding-related Information on Various Topics)
- www.welding.org/newsletters/current/index.html (Fabricating Information)

- www.gowelding.com/weld/symbol/symbol.htm (Welding Symbols)
- www.metalwebnews.com/wc.html (Metal Web News)
- www.metalinfo.com/partners/AMM/metalglossary.cfm (Metal Glossary)
- www.aws.org/w/a/ (American Welding Society)
- www.cwa-acs.org/ (Canadian Welding Association)
- www.cwbgroup.org/ (Canadian Welding Bureau)
- www.mcac.ca/ (Mechanical Contractors Association of Canada)
- www.creativeglossary.com/welding/ (Glossary of Welding Terms)

Generic Resources:

- www.nationalcodes.ca (National Research Center)
- www.red-seal.ca/Site/index_e.htm (The Interprovincial Standards Red Seal Program)
- <http://trades.exambank.com> (Trades Exam Bank)
- http://www.hrsdc.gc.ca/en/labour/workplace_health/index.shtml (Workplace Health and Safety)
- www.hrsdc.gc.ca/en/hip/hrp/essential_skills/essential_skills_index.shtml (Human Resources and Social Development Canada-Essential Skills Website)
- www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index-eng.php (WHMIS)
- www.wcb.pe.ca/index.php3?number=60189 (Worker's Compensation Board of PEI)
- www.gov.pe.ca/educ/index.php3?number=74951 (PEI Apprenticeship Training)
- www.nationalcodes.ca/ (National Code Documents)
- www.canoshweb.org/ (Canada's National Occupational Health and Safety Website)
- <http://employment.alberta.ca/cps/rde/xchg/hre/hs.xsl/364.html#1> (Alberta Employment and Immigration; Health and Safety Publications with Links to other Associations)

TR1 Use Terminology

Upon completion of this objective, learners will be able to:

- 1.1 identify strategies to organize and remember new terminology
 - use context clues to find the meaning of new terms
 - use word parts to create meaning
 - use trades glossary to find meaning of technical terms
 - use standard dictionary to find meaning of non-technical terms
- 1.2 implement strategies to organize and remember new terminology
 - define terms
 - use terminology in context

Suggested Strategies and Activities:

- Identify and define terms unique to the trade
- Highlight unfamiliar terms in trade-related reading
- Choose appropriate strategy to find meaning of unfamiliar terms
- Demonstrate understanding of new terms by using in sentences, providing examples or providing illustrations
- Create a personal dictionary
- Use graphic organizers to remember terms of the trade

Non-contextualized Resources:

- Shape Up Your Reading
- Cross Curricular Reading Tools (Vocabulary Study)
- Navigating Texts and Documents in Technical Training

Contextualized Resources:

- EARAT (Communications for Precision Metal Fabricators: Skill #2)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Building Trades Dictionary
- Welding Print Reading
- Welding Print Reading Instructor's Guide
- Modern Welding (Glossary of Welding Terms)
- Modern Welding Instructor's Guide
- Alberta Advanced Education-Apprenticeship and Training Glossary of Terms
- All Individual Learning Modules
- National Occupational Analysis (NOA) for Metal Fabricator and Welder

Online Resources:

- <http://www.edu.gov.on.ca/ca/eng/studentsuccess/thinkliteracy/files/Reading.pdf>
(Reading Strategies for using context clues)

Online Glossaries:

- <http://www.mig-welders-tig-welder.com/welding-definitions.htm>
- <http://www.grbwelding.com/content/study/welders-glossary.htm>
- http://www.simwelder.com/docs/welding_glossary.pdf
- <http://www.americanboiler.com/terms.shtml>
- <http://www.4crawler.com/Welding/Glossary.shtml>
- <http://www.airgas.com/content/details.aspx?id=7000000000111>
- <http://www.midwestmetalfabrication.com/glossary.html>
- http://www.tradesecrets.gov.ab.ca/trades/pdf/trade_glossaries/012_glossary.pdf
(Welder)
- http://www.tradesecrets.gov.ab.ca/trades/pdf/trade_glossaries/026_glossary.pdf
(Structural Steel and Plate Fitter)

TR2 Use Strategies to Improve Understanding and Recall

Upon completion of this learning objective, learners will be able to:

- 2.1 identify strategies to improve understanding and recall of written information
 - use prior knowledge to make sense of new information
 - use SQ3R
 - use KWL
 - use note-taking strategies
- 2.2 implement strategies to improve understanding and recall of written information

Suggested Strategies and Activities:

- Identify individual learning style
- Incorporate learning strategies for individual learning style for study and class participation
- Model strategies and encourage learners to use them
- Explain the steps to the SQ3R strategy
- Explain the steps to the KWL strategy
- Create and use charts for SQ3R and KWL
- Use KWL in group settings to introduce new concepts

Non-contextualized Resources:

- Shape Up Your Reading
- Study Smarter, Not Harder
- Cross Curricular Reading Tools
- Navigating Texts and Documents in Technical Training

Contextualized Resources:

- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- All Individual Learning Modules
- Modern Welding
- Modern Welding Instructor's Guide

Online Resources:

- <http://www.bucks.edu/~specpop/Lrnprfil.htm> (Learning Styles and Study Skills)
- <http://www.ldpride.net/learningstyles.MI.htm#Learning%20Styles%20Explained> (Learning Styles)
- <http://www.learning-styles-online.com/> (Learning Styles)
- <http://www.edu.gov.on.ca/eng/studentssuccess/thinkliteracy/files/Reading.pdf> (Reading Strategies)
- http://www.mindtools.com/pages/main/newMN_ISS.htm (Reading and Study Skills)
- <http://www.studygs.net/> (Reading and Study Strategies)
- <http://www.khake.com/page3.html> (Study Skills)
- http://www.mindtools.com/pages/article/newISS_02.htm (SQ3R)

TR3 Read to Perform Job Tasks

Upon completion of this objective, learners will be able to:

- 3.1 identify purpose of reading information to perform job tasks
- 3.2 locate specific information
 - scan to locate specific information
 - locate information using organizational features of text
- 3.3 skim for overall meaning
- 3.4 read to understand and learn
- 3.5 read to critique
- 3.6 read to evaluate

Suggested Strategies and Activities:

- Use organizational features to predict content and relevance of text
- Locate information using key words
- Scan for information in trade-related material (e.g., texts, memos, newsletters, safety information, equipment manuals, codes and regulations)
- Practice skimming to get the main idea in reading material of the trade (i.e., texts, memos, newsletters, safety information, equipment manuals, codes, specifications and regulations)
- Use Table of Contents, Indices, Appendices, Headings and Sub-headings to locate information in material of the trade (e.g., texts, collective agreements, manuals, codes, specifications and regulations)
- Read selections of text and provide a verbal or written summary
- Read specification sheets to determine project requirements
- Read installation manuals to follow procedures
- Compare the advantages and disadvantages of various tools or materials for a particular situation
- Read Occupational Health and Safety regulations to determine safe work practices
- Read and interpret codes, regulations and standards to comply with national, provincial and municipal regulations

Non-contextualized Resources:

- Shape Up Your Reading
- Navigating Texts and Documents in Technical Training
- Cross Curricular Reading Tools
- Study Smarter, Not Harder
- A Tool Box of Reading Activities Apprenticeship Branch of Manitoba Competitiveness Training and Trade (Interpreting Building Specifications)
- Navigating Texts and Documents in Technical Training

Contextualized Resources:

- EARAT (Communications for Precision Metal Fabricators: Skill #1, 3, 4, 5, 7, 9-12)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Modern Welding
- Modern Welding Instructor's Guide
- National Building Code

Online Resources:

- <http://www.edu.gov.on.ca/eng/studentssuccess/thinkliteracy/files/Reading.pdf> (Reading Strategies)
- <http://www.keyskillssupport.net/teacandlearresoa/> (Learning Resources - see Construction Sector)
- <http://www.42explore.com/skim.htm> (Skimming and Scanning)
- <http://www.edu.gov.on.ca/eng/studentssuccess/thinkliteracy/files/Reading.pdf> (Strategies for Reading Graphical Text)
- www.open.ac.uk/skillsforstudy/active-reading.php (Active Reading)

TR4 Improve Examination Performance

Upon completion of this objective, learners will be able to:

- 4.1 identify barriers to successful examination performance
- 4.2 identify strategies to improve examination performance
 - identify ways to prepare for exams
 - identify test-taking strategies
 - identify strategies to reduce test anxiety
- 4.3 implement strategies to improve examination performance

Note: *Learners preparing for the Interprovincial Red Seal exam should review the National Occupational Analysis for Metal Fabricators and Welders.*

Suggested Strategies and Activities:

- Analyze past tests
- Provide opportunity to complete practice questions
- Provide information on testing locations and procedures for your province
- Review the NOA for Metal Fabricators and Welders
- Discuss test-taking strategies
- Discuss strategies to reduce test anxiety
- Discuss steps in test preparation

Non-contextualized Resources:

- Shape Up Your Reading
- Study Smarter, Not Harder
- National Electrical Trade Council (NETCO) Instructor's Guide: Test-taking Strategies for Interprovincial Red Seal Exams (Generic Version)

Technical Resources:

- National Occupational Analysis for Metal Fabricator and Welder
- All Individual Learning Modules (Self Tests)
- Trades Exam Bank (online)

Online Resources:

- http://www.tradesecrets.gov.ab.ca/trades/pdf/trade_practice_exams/012_IP_PracticeExam.pdf (Practice Red Seal Exam)
- <http://www.red-seal.ca> (National Occupational Analysis)
- www.ceca.org/netco (Preparing for Red Seal: Instructor Guide and PowerPoint Presentation)
- <http://trades.exambank.com/welding.html> (Trades Exam Bank)
- www.testtakingtips.com (Test-taking Skills)
- www.studygs.net/tsttak3.htm (Study and Test taking strategies)
- www.d.umn.edu/kmc/student/loon/acad/strat/testcheck.html (Test-taking checklist)
- www.collegeboard.com/student/testing/clep/prep_hint_mc.html (Multiple-choice tips)

Appendix A

Resource Materials:

Alberta Individual Learning Modules for Welder

Alberta Apprenticeship and Industry Training, 1998

Tel: 1-800-232-7215

<http://www.tradesecrets.gov.ab.ca/>

Building Trades Dictionary

American Technical Publishers

ISBN: 0-8269-0405-X

Welder-related Essential Skills Resource Binder

Manitoba Competitiveness Training and Trade

Tel: 1-877-978-7233 (1-877-97-TRADE)

Email: apprenticeship@gov.mb.ca

Cross Curricular Reading Tools

CAMET

P.O. Box 2044; Halifax, NS B3J 1M7

ISBN: 1-895660-77-4

Evaluating Academic Readiness for Apprenticeship Training (EARAT)

Communications for Precision Metal Fabricator Apprentices

Workplace Support Services Branch

Ontario Ministry of Training, Colleges and Universities, October 2000

Tel: 416-325-2929 or 1-800-387-5514

Email: info@edu.gov.on.ca

Interprovincial Red Seal Welder Upgrade Program

Books 1-4

CWB Learning Centre, 2008

Modern Welding

Andrew D. Althouse, Carl H. Turnquist, Kevin E. Bowditch, Mark A. Bowditch, William A. Bowditch

The Goodheart-Willcox Company Inc., 2004

ISBN: 1-56637-987-3

Modern Welding Instructor's Manual

Kevin E. Bowditch, Mark A. Bowditch, William A. Bowditch

The Goodheart-Willcox Company, Inc., 2004

ISBN: 13-978-1-56637-989-2

National Building Code of Canada 2005, Volume 2 (12th edition)

National Research Council Canada, 2005

ISBN: 0-660-19425-2

***Instructor's Guide: Test-Taking Strategies for Interprovincial Red Seal Exams
(Generic Version: Applicable to all Red Seal Trades)***

National Electrical Trade Council (NETCO), 2008

www.ceca.org/netco

Navigating Texts and Documents in Technical Training

Manitoba Competitiveness Training and Trade

Tel: 1-877-978-7233 (1-877-97-TRADE)

Email: apprenticeship@gov.mb.ca

Study Smarter, Not Harder

Kevin Paul

Self-Counsel Press, 1996

ISBN: 1-55180-059-4

Shape Up Your Reading

Sheila Trant

Harcourt Brace & Company, Canada, 1997

ISBN: 0-7747-3296-2

Tools for the Trade: A Guide to Success in Apprenticeship

Sue Grecki

Skillplan-B.C. Construction Industry Skills Improvement Council

Burnaby, B.C., 2000

Welding Print Reading

John R. Walker and W. Richard Polanin

The Goodheart-Willcox Company Inc., 2007

ISBN: 1-59070-642-0

Welding Print Reading Instructor's Guide

John R. Walker and W. Richard Polanin

The Goodheart-Willcox Company Inc., 2007

ISBN: 13-978-1-59070-643-5

All online resources listed in this document were operational at time of publication.

Document Use (DU) Learning Outcome: Learners will use strategies for locating, retrieving, interpreting and entering information in/from documents and for creating trade documents

DU 1 Use Lists	1.1 Define lists	1.2 Identify purpose	1.3 Locate information in lists	1.4 Interpret information in lists	1.5 Create lists	1.6 Evaluate lists for effectiveness
DU 2 Use Tables	2.1 Define tables	2.2 Identify purpose	2.3 Locate information in tables	2.4 Interpret information in tables	2.5 Create tables	2.6 Evaluate tables for effectiveness
DU 3 Use Forms	3.1 Define forms	3.2 Identify purpose	3.3 Locate information in forms	3.4 Interpret information in forms	3.5 Enter information into forms	3.6 Create forms
	3.7 Evaluate forms for effectiveness					
DU 4 Use Charts	4.1 Define charts	4.2 Identify purpose	4.3 Locate information in charts	4.4 Interpret information in charts	4.5 Create charts	4.6 Evaluate charts for effectiveness
DU 5 Use Graphic Documents	5.1 Define graphic documents	5.2 Identify purpose	5.3 Locate information in graphic documents	5.4 Interpret information in graphic documents	5.5 Create graphic documents	5.6 Evaluate graphic documents for effectiveness

Learners will use strategies for locating, retrieving, interpreting and entering information in/from documents and for creating trade documents

Introduction

Document Use (DU) tasks involve the process of locating, organizing and using information in different visual displays that include words, numbers and diagrams. These visual materials efficiently summarize large amounts of information in a small amount of space and are widely used in trade occupations.

Apprentices must be proficient document users if they are to be successful in technical training and in job performance. This guide has been developed to provide apprentices with strategies to use trade documents quickly, efficiently and accurately. Learners will locate, interpret and evaluate information in documents and will create documents common to their trade. Understanding document structure and the strategies for using them will lead to more efficient information processing. For the purpose of the Trade Essentials project, documents have been categorized and defined as follows:

- **List** - A document that records items in a row
- **Table** - A document that arranges information in rows and columns
- **Form** - A document which contains blanks for the insertion of pre-specified information
- **Chart** - A document that is used primarily to make large quantities of data easier to understand, illustrates the relationship between different parts of the data, and commonly presents information as plots with reference to an axis. Charts are generally graphical in nature and contain very little text. Examples of charts include pie chart, flow chart, bar graph, line graph, histogram and pictogram
- **Graphic Document** - A document which portrays information as an imitation of the real world. Examples of graphic documents include pictures, diagrams, drawings, blueprints, schematics, maps, symbols, signs and icons

The following guide outlines a list of recommended resources (see Appendix A) for each objective in the Document Use curriculum framework and, where possible, includes online website materials that complement these resources. Three formats are provided to allow learners the opportunity to review competencies in a way that best suit their needs. These resources are categorized as follows:

- **Non-contextualized** - Curriculum resources that are **not** related to any trade or occupation. These resources may be used to review the competencies in a stand-alone manner before transferring the skill to trade-related materials.

- **Contextualized** - Curriculum resources that provide Essential Skills applications in the context of a specific trade or occupation.
- **Technical** – Trade-training materials from which Essential Skills are extracted. For the purpose of the Trade Essentials project, **Individual Learning Modules** from Alberta Advanced Education were used as the primary technical resource.

Note: *Though only some modules are outlined as resources for specific objectives, all Individual Learning Modules can be used for the instruction of Essential Skills. (Visit www.tradesecrets.org for current listing of modules.)*

The list of resources has been designed to act only as a guide and may, therefore, need to be adapted to meet the needs of individuals or groups. It is the role of you, the instructor, to choose materials and deliver the content as it best suits individual learner needs. A variety of materials are listed under each set of competencies for this purpose.

Document Use in the Welding and Metal Fabricating Trade

Welders and Metal Fabricators use documents on a daily basis to complete job tasks. The complexity of these tasks, according to Human Resources and Skills Development Canada's Essential Skills profiles (http://www10.hrsdc.gc.ca/es/english/ES_Profiles.aspx) varies slightly between Metal Fabricators and Welders. The complexity of tasks performed by welders ranges from using very simple, brief text combined with uncomplicated structure (e.g., use checklists to learn and follow proper work procedures and safety guidelines) to using complex documents with multiple pieces of information organized into multiple sections (e.g., interpret and constantly refer to diagrams and tables on blueprints to determine material requirements and measurements).

The complexity of tasks performed by Metal Fabricators ranges from using very simple, brief text combined with uncomplicated structure (e.g., complete machine maintenance checklists) to using complex documents with multiple pieces of information organized in multiple sections which include at least two of the following: colour, coding, scale, perspective and symbols (e.g., interpreting blueprints to determine how steel should be cut and assembled by integrating plan views, elevations and section drawings).

For background information on Document Use and how documents are used in the welding and fabricating trades, visit these sites:

- http://www.hrsdc.gc.ca/eng/workplaceskills/essential_skills/general/understanding_es.shtml (Understanding Document Use - Human Resource Skills Development Canada)

- http://www.red-seal.ca/Site/trades/analist_e.htm (The Interprovincial Standards Red Seal Program)

The following websites contain welding and fabricating-related content which may be used as an additional document use forum.

Welding and Fabricating-Related Online Websites:

- www.khake.com/page89.html (Metal Fabrication/Welding-related Information on Various Topics)
- www.twi.co.uk/j32k/index.xtp (Metal Fabrication/Welding-related Information on Various Topics)
- www.welding.com/ (Metal Fabrication/Welding-related Information on Various Topics)
- www.gowelding.com/weld/symbol/symbol.htm (Welding Symbols)
- www.metalwebnews.com/wc.html (Metal Web News)
- www.metalinfo.com/partners/AMM/metalglossary.cfm (Metal Glossary)
- www.aws.org/w/a/ (American Welding Society)
- www.cwa-acs.org/ (Canadian Welding Association)
- www.cwbgroup.org/ (Canadian Welding Bureau)
- www.mcac.ca/ (Mechanical Contractors Association of Canada)
- www.creativeglossary.com/welding/ (Glossary of Welding Terms)
- <http://www.airgas.com/content/details.aspx?id=7000000000119> (Airgas Website)
- <http://www.millerwelds.com/resources/improving-your-skills/mig/> (Downloadable Welding Resources)

DU1 Use Lists

Upon completion of this objective, learners will be able to:

- 1.1 define lists
- 1.2 identify purpose
- 1.3 locate information in lists
- 1.4 interpret information in lists
- 1.5 create lists
- 1.6 evaluate lists for effectiveness

Suggested Strategies and Activities:

- Identify presence and uses of lists in documents of the trade
- Find examples and extract information from the four types of lists (simple, combined, intersected and nested)
- Create lists to organize and compare information by category (i.e., tools, materials, and special equipment for each installation)
- Create material lists from specification sheets
- Differentiate between lists and tables
- Analyze lists and determine degree of difficulty (i.e., simple or complex)
- Encourage learners to share their knowledge and experiences

Non-contextualized Resources:

- The Language of Documents- A Guide to Information Display in the Workplace
- Field Safety, Volume One
- Document Use Refresher for Apprentices (Module 2)
- Applied Communication Skills for the Construction Trades

Contextualized Resources:

- Interprovincial 'Red Seal' Welder Upgrade Program
- IPT's Safety First Handbook (Book One)

Technical Resources:

- Modern Welding
- Individual Learning Module 020204h- Welder- Estimating-Pattern Development and Drawing Interpretation- Second Period
- Individual Learning Module 120304h- Welder – Destructive Testing- Trades Science- Third Period
- Individual Learning Module 120101b- Welder – Safety Guidelines- Safety, Tools, Weld Faults and OAW- Period

- Individual Learning Module 120101g- Welder – Oxyfuel Equipment- Safety, Tools, Welding Faults, and OAW- First Period
- Individual Learning Module 120103g- Welder – Shop/Lab Practices: FCAW Welds on Mild Steel- GMAW, FCAW, and SAW- First Period
- Individual Learning Module 120103e- Welder – Submerged Arc welding (SAW)- GMAW, FCAW, and SAW- First Period

Online Resources:

- www.pprc.org/pubs/workbook/appmetal.pdf (Metal Fabrication Industry- Compliance and Pollution Prevention Workbook)

DU2 Use Tables

Upon completion of this objective, learners will be able to:

- 2.1 define tables
- 2.2 identify purpose
- 2.3 locate information in tables
- 2.4 interpret information in tables
- 2.5 create tables
- 2.6 evaluate tables for effectiveness

Suggested Strategies and Activities:

- Brainstorm to identify the use of tables and schedules in the trade
- Create tables to sort and separate materials, supplies and equipment
- Discuss various types of data sheets used in the trade
- Analyze tables and determine degree of difficulty (i.e., simple or complex)
- Examine structure and components of a variety of tables
- Encourage learners to share their knowledge and experiences

Non-contextualized Resources:

- Field Safety, Volume One
- Applied Communication Skills for the Construction Trades
- Workplace Communications-The Basics, 3rd Edition (Chapter 3)

Contextualized Resources:

- Interprovincial Red Seal Welder Upgrade Program
- IPT's Safety First Handbook (Book One)

Technical Resources:

- Modern Welding
- Welding Print Reading
- Individual Learning Module 120101c- Welder – Welding- SMAW One- First Period
- Individual Learning Module 120103g- Welder – Shop/Lab Practices: FCAW Welds on Mild Steel- GMAW, FCAW, and SAW- First Period
- Individual Learning Module 120103g- Welder – Shop/Lab Practices: GMAW Welds on Mild Steel- GMAW, FCAW, and SAW- First Period
- Individual Learning Module 120103e- Welder – Submerged Arc welding (SAW)- GMAW, FCAW and SAW- First Period
- Individual Learning Module 120103d- Welder – Flux Cord Arc Welding (FCAW)
- Individual Learning Module 120103c- Welder – GMAW Equipment Maintenance and Troubleshooting

- Individual Learning Module 120201h- Welder – Oxyfuel Welding, Brazing and Braze Welding
- Individual Learning Module 120101g- Welder – Oxyfuel Equipment
- Individual Learning Module 020204h- Welder- Estimating
- Individual Learning Module 120304eA- Welder – Codes and Standards-Part A
- Individual Learning Module 120304eB- Welder – Codes and Standards-Part B
- Individual Learning Module 120303b- Welder – Structural Drawings

Online Resources:

- <http://www.argylesupply.com/ref-chart04.asp> (Creep Test Table)
- http://www.twi.co.uk/content/main_about_us_index.html (World Centre for Materials Joining Technology)
- <http://www.pro-fusiononline.com/welding/troubleshooting.htm> (Troubleshooting Guide for Arc Welding Systems)
- http://www.osha.gov/SLTC/etools/machineguarding/appendices/appendix_g.html (Sample employer self-inspection checklist for safeguards and other hazards)
- www.pprc.org/pubs/workbook/appmetal.pdf (Metal Fabrication Industry- Compliance and Pollution Prevention Workbook)

DU3 Use Forms

Upon completion of this objective, learners will be able to:

- 3.1 define forms
- 3.2 identify purpose
- 3.3 locate information in forms
- 3.4 interpret information in forms
- 3.5 enter information into forms
- 3.6 create forms
- 3.7 evaluate forms for effectiveness

Suggested Strategies and Activities:

- Define entry forms as documents which both share information and require input of information
- Examine structure and components of a variety of forms
- Encourage learners to share their examples of work-related forms
- Identify features common to workplace forms
- Interpret vocabulary of workplace forms
- Use title of form to predict purpose and kinds of information requested
- Distinguish between primary and secondary information
- Analyze forms and determine degree of difficulty (i.e., simple or complex)
- Extract information from forms common to the trade (e.g., accident/incident reports, expense forms, daily time sheets, daily logs, invoices, application forms, purchase orders and material take-off sheets)
- Enter information into forms common to the trade (e.g., accident/incident reports, expense forms, daily time sheets, daily logs, invoices, application forms, purchase orders and material take-off sheets)
- Identify audience for workplace forms

Non-contextualized Resources:

- The Language of Documents- A Guide to Information Display in the Workplace
- Document Use Refresher for Apprentices (Module 6)
- A Tool Box of Reading Activities-Supplementary Teaching Resources- Apprenticeship Branch of Manitoba Competitiveness Training and Trade
- Writing at Work (Module 2-Entry Forms)
- Tools for Success- Soft Skills for the Construction Industry

Technical Resources:

- Individual Learning Module 020204hA - Welder- Estimating – Part A
- Individual Learning Module 120204hB - Welder – Estimating - Part B
- Individual Learning Module 120304eB - Welder – Codes and Standards - Part B
- Individual Learning Module 120303b - Welder – Structural Drawings

Online Resources:

- http://www.gov.pe.ca/photos/original/edu_appl_appren.pdf (Application for Apprenticeship)
- <http://www.wcb.pe.ca/index.php3?number=60190&lang=E> (Workers Compensation Forms)
- <http://www.about-building-in-canada.com/building-permit.html> (Building in Canada: Permits and Codes)
- <http://www.gov.pe.ca/infopei/index.php3?number=13766> (Info PEI-Building Permits)
- <http://www.obc.mah.gov.on.ca/AssetFactory.aspx?did=792> (Building Permits)
- <http://www.abcaforms.com/allstates.html> (Examples of Construction Forms)
- http://books.google.ca/books?id=DBhILgGvCakC&pg=PA36&lpg=PA36&dq=how+to+complete+construction+invoices&source=web&ots=RLEjAHWmQ9&sig=UTLvWpFGyC5mWNYPWNnLOIWY1CU&hl=en&sa=X&oi=book_result&resnum=1&ct=result (Examples of Forms)

DU4 Use Charts

Upon completion of this objective, learners will be able to:

- 4.1 define charts
- 4.2 identify purpose
- 4.3 locate information in charts
- 4.4 interpret information in charts
- 4.5 create charts
- 4.6 evaluate charts for effectiveness

Suggested Strategies and Activities:

- Identify the presence and use of charts in the trade
- Encourage learners to provide examples of charts used in their trade
- Identify the basic types: pie chart, bar graph and line graph, etc. and in what circumstance each may be used
- Discuss the use of charts in a variety of trade-related and safety workplace documents
- Analyze charts and determine degree of difficulty (i.e., simple or complex)
- Examine structure and components of a variety of charts

Non-contextualized Resources:

- The Language of Documents- A Guide to Information Display in the Workplace
- Field Safety, Volume One
- Document Use Refresher for Apprentices (Modules 4 & 5)
- Workplace Communications-The Basics, *3rd Edition* (Chapter 3)
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Modern Welding
- Welding Print Reading
- Individual Learning Module 120304b- Welder – Destructive Testing
- Individual Learning Module 120304c- Welder – Metallurgy
- Individual Learning Module 120304d- Welder – Heat Treatment
- Individual Learning Module 120101g- Welder – Oxyfuel Equipment
- Individual Learning Module 120103a- Welder – Gas Metal Arc Welding (GMAW)
- Individual Learning Module 120102a- Welder – SMAW Equipment

Online Resources:

- https://www.advancededucation.gov.ab.ca/k_12/curriculum/bysubject/ke/ReadtoLive/Tools/Reading%20Diagrams.pdf (Reading Charts and Graphs)
- http://www42.statcan.ca/smr02/smr02_022_e.htm (Statistics Canada)
- <http://www.constructionforecasts.ca/oft/graph?preset=215> (Construction Sector Council Graphs and Tables)
- <http://www.gdsourcing.ca/works/Construct.htm> (Canadian Construction Association)

DU5 Use Graphic Documents

Upon completion of this objective, learners will be able to:

- 5.1 define graphic documents
- 5.2 identify purpose
- 5.3 locate information in graphic documents
- 5.4 interpret information in graphic documents
- 5.5 create graphic documents
- 5.6 evaluate graphic documents for effectiveness

Suggested Strategies and Activities:

- Examine structure and components of a variety of graphic documents
- Encourage learners to share their graphic documents of their trade
- Identify symbols commonly used in the trade including WHMIS
- Interpret signals
- Interpret signs for safety information
- Interpret product or packaging labels
- Recognize lines used on drawings
- Recognize significance of symbols
- Take measurements from drawings
- Distinguish between orthographic, isometric and oblique drawings
- Create schedules to coordinate with other trades
- Make sketches to communicate ideas
- Practice drawing to scale using metric and imperial systems
- Analyze graphic documents and determine degree of difficulty (i.e., simple or complex)

Non-contextualized Resources:

- The Language of Documents- A Guide to Information Display in the Workplace
- Field Safety, Volume One
- Document Use Refresher for Apprentices (Modules 1 & 3)
- Applied Communication Skills for the Construction Trades
- Workplace Communications-The Basics, 3rd Edition (Chapter 3)
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Print Reading for Construction – Residential and Commercial (Unit 18)
- Interprovincial 'Red Seal' Welder Upgrade Program
- IPT's Safety First Handbook (Book One)
- Evaluating Academic Readiness for Apprenticeship Training-Precision Metal Fabricator- Communications Skill #6 (Interpretation of Diagrams)

- Blueprint Fundamentals: Interpreting Symbols and Specs (CD-ROM)

Technical Resources:

- Modern Welding
- Reading Welding Detail Drawings (Module 29202-03)
- Welding Print Reading
- All Individual Learning Modules, especially:
 - Individual Learning Module 120101j- Welder – Materials Handling
 - Individual Learning Module 120101g- Welder – Oxyfuel Equipment
 - Individual Learning Module 120101e- Welder – Power Tools
 - Individual Learning Module 120103g- Welder – Shop/Lab Practices: FCAW Welds on Mild Steel
 - Individual Learning Module 120103f- Welder – Shop/Lab Practices: GMAW Welds on Mild Steel
 - Individual Learning Module 120204d- Welder – Basic Fabrication Layout Practice
 - Individual Learning Module 020204g- Welder- Welding Symbols
 - Individual Learning Module 020204hA – Welder - Estimating – Part A
 - Individual Learning Module 020204hB – Welder – Estimating – Part B
 - Individual Learning Module 120303a- Welder – Introduction to Drawing Interpretation
 - Individual Learning Module 120304b- Welder – Destructive Testing
 - Individual Learning Module 120304d- Welder – Heat Treatment
 - Individual Learning Module 120304eA- Welder – Codes and Standards-Part A
 - Individual Learning Module 120304eB- Welder – Codes and Standards-Part B
 - Individual Learning Module 120303e- Welder – Pressure Vessel Drawings

Online Resources:

- <http://www.tpub.com/content/draftsman/14040/> (Integrated Publishing-Drafting)
- www.gowelding.com/weld/symbol/symbol.htm (Welding Symbols)
- <http://www.khake.com/page89.html> (Various Topics on Blueprint Reading and Symbols)
- http://www.metallicfusion.com/symbols_and_definitions.htm#Welding%20Test%20Positions (Welding Symbols and Definitions)
- http://www.millerwelds.com/pdf/safety/quick_eng_200704.pdf (Safety Quick Guide)

Appendix A

Resource Materials:

Alberta Individual Learning Modules for Welder

Alberta Apprenticeship and Industry Training 1998

Tel: 1-800-232-7215

<http://www.tradesecrets.gov.ab.ca/>

Applied Communications Skills for the Construction Trades

Stephan A. Rigolosi

Pearson Education Inc., 2002

ISBN: 0-13-093355-4

Blueprint Fundamentals: Interpreting Symbols and Specs (CD-ROM)

Shopware, 2004

www.shopware-usa.com

Building Trades Dictionary

Leonard P. Toenjes

American Technical Publishers Inc., 2002

ISBN: 0-8269-0405-X

Document Use Refresher for Apprentices

Nova Scotia Department of Education

Apprenticeship Training and Skills Development

Tel: 902-424-0492

Evaluating Academic Readiness for Apprenticeship Training (EARAT)

Communications for Precision Metal Fabricator Apprentices

Workplace Support Services Branch

Ontario Ministry of Training, Colleges and Universities, October 2000

Tel: 416-325-2929 or 1-800-387-5514

Email: info@edu.gov.on.ca

Field Safety, Volume One

Participant Guide

Contren Learning Series

National Center for Construction Education and Research, 2003

ISBN: 0-13-106760-5

Interprovincial Red Seal Welder Upgrade Program

Books 1-4

CWB Learning Centre, 2008

IPT's Safety First Handbook (Book One)

Bruce M. Basaraba
IPT Publishing and Training Ltd., 1999
ISBN: 0-920855-34-2

Modern Welding

Andrew D. Althouse, Carl H. Turnquist, Kevin E. Bowditch, Mark A. Bowditch,
William A. Bowditch
The Goodheart-Willcox Company Inc., 2004
ISBN: 1-56637-987-3

Modern Welding, Instructor's Manual

Kevin E. Bowditch, Mark A. Bowditch, William A. Bowditch
The Goodheart-Willcox Company Inc., 2004
ISBN: 13-978-1-56637-989-2

Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Jack Martin and Mary Serich
Jack Martin and Associates, 2006
ISBN: 0-9649530-1-3

Print Reading for Construction – Residential and Commercial

Walter C. Brown
Daniel P. Dorfmueller
The Goodheart-Willcox Company Inc., 2005
ISBN: 13-978-1-59070-347-2

Reading Welding Detail Drawings (Module 29202-03)

Welding - Level Two Trainee Guide
AWS Entry Level Welder-Phase Two
National Centre for Construction Education and Research, 2003

The Language of Documents- A Guide to Information Display in the Workplace

Lynda Fownes
Skillplan – The B.C. Construction Industry Skills Improvement Council
ISBN: 0-9685027-0-9

Tools for Success- Soft Skills for the Construction Industry

Stephen A. Rigolosi
Pearson Education Inc., 2004
ISBN: 0-13-160000-1

Welding Print Reading

John R. Walker and W. Richard Polanin
The Goodheart-Willcox Company Inc., 2007
ISBN: 1-59070-642-0
ISBN (Instructor's Guide): 13-978-1-59070-643-5

Workplace Communications-The Basics, 3rd Edition

George J. Searles
Pearson Education Inc., 2006
ISBN: 0-321-33068-4

Writing at Work

Sue Grecki, Sheila Whincup
Skillplan- The B.C. Construction Skills Improvement Council
ISBN: 0-9685027-4-1

Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Jack Martin and Mary Serich
Jack Martin and Associates, 2006
ISBN: 0-9649530-1-3

Print Reading for Industry

Walter C. Brown, Ryan K. Brown
The Goodheart-Willcox Company Inc., 2002
ISBN: 1-56637-807-9
ISBN (Instructor's Guide): 13-978-1-56637-808-6

Technology of Machine Tools, 5th Edition

Steve F. Krar and Albert F. Check
Glencoe McGraw-Hill, 1997
ISBN: 0-02-803071-0

Tools for Success- Soft Skills for the Construction Industry

Stephen A. Rigolosi
Pearson Education Inc., 2004
ISBN: -13-160000-1

Welding Print Reading (and Instructor's Guide)

John R. Walker and W. Richard Polanin
The Goodheart-Willcox Company Inc., 2007
ISBN: 1-59070-642-0
ISBN: (Instructor's Guide): 13-978-1-59070-643-5

Workplace Communications-The Basics, 3rd Edition

George J. Searles

Pearson Education Inc., 2006

ISBN: 0-321-33068-4

Writing at Work

Sue Grecki, Sheila Whincup

Skillplan- The B.C. Construction Skills Improvement Council

ISBN: 0-9685027-4-1

All online resources listed in this document were operational at time of publication.

Principles of Mathematics (PM) Learning Outcome – Learners will understand, interpret and manipulate mathematical concepts in order to solve problems and complete job tasks.

PM1 Use Calculators

1.1 Identify the benefits and risks involved in using calculators in the trade	1.2 Describe how calculators are used in the trade	1.3 Determine the best calculator for the trade	1.4 Use calculators to solve problems
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PM2 Use Positive and Negative Numbers

2.1 Read positive and negative numbers	2.2 Write positive and negative numbers	2.3 Round positive and negative numbers	2.4 Estimate positive and negative numbers	2.5 Order positive and negative numbers	2.6 Compare positive and negative numbers
2.7 Add positive and negative numbers	2.8 Subtract positive and negative numbers	2.9 Multiply positive and negative numbers	2.10 Divide positive and negative numbers	2.11 Use knowledge of positive and negative numbers to solve problems	

PM3 Use Order of Operations

3.1 Identify the necessary steps in performing order of operations	3.2 Calculate answers Using correct order of operations	3.3 Use order of operations to solve problems
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PM4 Use Fractions

4.1 Read fractions	4.2 Write fractions	4.3 Compare fractions	4.4 Round fractions	4.5 Simplify fractions	4.6 Add fractions
4.7 Subtract fractions	4.8 Multiply fractions	4.9 Divide fractions	4.10 Use knowledge of fractions to solve problems		

PM5 Use Mixed Numbers

5.1 Read mixed numbers	5.2 Write mixed numbers	5.3 Compare mixed numbers	5.4 Round mixed numbers	5.5 Simplify mixed numbers	5.6 Add mixed numbers
5.7 Subtract mixed numbers	5.8 Multiply mixed numbers	5.9 Divide mixed numbers	5.10 Use knowledge of mixed numbers to solve problems		

PM6 Use Decimals

6.1 Read decimals	6.2 Write decimals	6.3 Estimate decimals	6.4 Round decimals	6.5 Add decimals	6.6 Subtract decimals
6.7 Multiply decimals	6.8 Divide decimals	6.9 Use knowledge of decimals to solve problems			

PM7 Use Percent

7.1 Use formulae to calculate percent	7.2 Use knowledge of percent to solve problems
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PM8 Use Conversion

8.1 Explain the purpose of mathematical conversion	8.2 Convert among fractions, decimals, and percent	8.3 Use automatic recall of decimal and percent equivalents of common fractions	8.4 Use knowledge of conversion to solve problems
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PM9 Use Measurement Systems	9.1 Demonstrate uses of specific measurements	9.2 Perform conversions within the metric measurement system	9.3 Perform conversions within the imperial measurement system	9.4 Perform conversions between the metric and imperial measurement systems	9.5 Perform time conversions	9.6 Use knowledge of measurement and time conversion to solve problems
PM10 Use Rate, Ratio, and Proportion	10.1 Describe the differences among rate, ratio, and proportion	10.2 Give examples of how rate, ratio, and proportion, are used in the trade	10.3 Write numbers as proportions	10.4 Use knowledge of rate to solve problems	10.5 Use knowledge of ratio to solve problems	10.6 Use knowledge of proportion to solve problems
PM11 Use Square Root and Exponents	11.1 Determine square root of positive numbers that are perfect squares	11.2 Determine approximate square root of positive numbers that are not perfect squares	11.3 Use knowledge of square root to solve problems	11.4 Use knowledge of exponent laws to solve problems	11.5 Determine significant digits	11.6 Use knowledge of scientific notation to solve problems
PM12 Solve Equations	12.1 Write variable expressions and equations from sentences	12.2 Simplify variable expressions	12.3 Write equations from sentences	12.4 Solve one-step equations	12.5 Solve two-step equations	12.6 Solve multi-step equations
PM13 Use Trade-Related Formulae	13.1 Identify formulae common to the trade	13.2 Solve problems using formulae as written	13.4 Solve problems by rearranging formulae			

PM14 Use Estimation	14.1 Identify estimation rules	14.2 Use estimation rules to solve single-step problems	14.3 Use estimation rules to solve multi-step problems		
PM15 Use Angles	15.1 Identify various types of angles common to the trade	15.2 Compare angles common to the trade	15.3 Measure angles	15.4 Use knowledge of angles to solve problems	
PM16 Use Geometric Shapes	16.1 Identify geometric shapes	16.2 Use knowledge of geometric shapes to solve problems			
PM17 Use Trigonometry	17.1 Identify the value of trigonometry in the trade	17.2 Set Up trigonometric ratios	17.3 Use trigonometric functions to solve problems		
PM18 Analyze Numerical Data	18.1 Identify ways to organize data	18.2 Organize information into charts and graphs	18.3 Extract information from charts and graphs	18.4 Evaluate information found in charts and graphs	18.5 Make predictions and draw conclusions

	Automotive Service Tech	Carpenter	Cabinet Maker	Construction Electrician	Cook	Industrial Electrician	Machinist
PM1 Use Calculators	✓	✓	✓	✓	✓	✓	✓
PM2 Use Positive and Negative Numbers	✓	✓	Whole numbers only	✓	✓	✓	✓
PM3 Use Order of Operations	✓	✓	✓	✓	✓	✓	✓
PM4 Use Fractions	✓	✓	✓	✓	✓	✓	✓
PM5 Use Mixed Numbers	✓	✓	✓	✓	✓	✓	✓
PM6 Use Decimals	✓	✓	✓	✓	✓	✓	✓
PM7 Use Percent	✓	✓	✓	✓	✓	✓	✓
PM8 Use Conversion	✓	✓	✓	✓	✓	✓	✓
PM9 Use Measurement Systems	✓	✓	✓	✓	✓	✓	✓
PM10 Use Rate, Ratio and Proportion	✓	✓	✓	✓	✓	✓	✓
PM11 Use Square Root and Exponents	✓	✓	-	✓	-	✓	✓
PM12 Solve Equations	✓	✓	✓	✓	✓	✓	✓
PM13 Use Trade-Related Formulae	✓	✓	✓	✓	✓	✓	✓
PM14 Use Estimation	✓	✓	✓	✓	✓	✓	✓
PM15 Use Angles	✓	✓	✓	✓	✓	✓	✓
PM16 Use Geometric Shapes	✓	✓	✓	✓	-	✓	✓
PM17 Use Trigonometry	✓	✓	✓	✓	-	✓	✓
PM18 Analyze Numerical Data	✓	-	-	-		-	✓

	Metal Fabricator	Plumber	Refrigeration & Air Conditioning Mechanic	Oil Burner Mechanic	Steamfitter/ Pipefitter	Welder
PM1 Use Calculators	✓	✓	✓	✓	✓	✓
PM2 Use Positive and Negative Numbers	✓	✓	✓	✓	✓	✓
PM3 Use Order of Operations	✓	✓	✓	✓	✓	✓
PM4 Use Fractions	✓	✓	✓	✓	✓	✓
PM5 Use Mixed Numbers	✓	✓	✓	✓	✓	✓
PM6 Use Decimals	✓	✓	✓	✓	✓	✓
PM7 Use Percent	-	-	✓	✓	✓	✓
PM8 Use Conversion	-	✓	✓	✓	✓	✓
PM9 Use Measurement Systems	✓	✓	✓	✓	✓	✓
PM10 Use Rate, Ratio and Proportion	-	No proportion	✓	✓	✓	No proportion
PM11 Use Square Root and Exponents	-	-	✓	✓	✓	✓
PM12 Solve Equations	-	Plus quadratic equations	✓	✓	✓	✓
PM13 Use Trade-Related Formulae	✓	✓	✓	✓	✓	✓
PM14 Use Estimation	✓	✓	✓	✓	✓	✓
PM15 Use Angles	✓	✓	✓	✓	✓	✓
PM16 Use Geometric Shapes	✓	✓	✓	✓	✓	✓
PM17 Use Trigonometry	✓	✓	✓	✓	✓	✓
PM18 Analyze Numerical Data	-	-	✓	✓	-	-

The following checklist represents an overview of the Essential Skills necessary for Metal Fabricator/Welder apprentices and identifies areas requiring review.

Learner's Name: _____

Instructor's Name: _____

Inventory Date: _____

Post-inventory Date: _____

	(Assessor Use) Learning Needs Indicated from ES inventory	(Instructor Use) Learning Needs Identified by Instructor	Learning Needs Addressed Through Instruction	(Assessor Use) Learning Needs Require More Review	Skill Level Meets Trade Requirements (Post-Inventory)
PRINCIPLES OF MATHEMATICS					
OBJECTIVE 1: USE CALCULATORS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.1 Identify the risks and benefits involved in using calculators in the trade					
1.2 Describe how calculators are used in the trade					
1.3 Determine the best calculator for the trade					
1.4 Use knowledge of calculators to solve problems					
OBJECTIVE 2: USE POSITIVE AND NEGATIVE NUMBERS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.1 Read positive and negative numbers					
2.2 Write positive and negative numbers					
2.3 Round positive and negative numbers					
2.4 Estimate positive and negative numbers					
2.5 Order positive and negative numbers					
2.6 Compare positive and negative numbers					
2.7 Add positive and negative numbers					
2.8 Subtract positive and negative numbers					
2.9 Multiply positive and negative numbers					
2.10 Divide positive and negative numbers					
2.11 Use knowledge of positive and negative numbers to solve problems					
OBJECTIVE 3: USE ORDER OF OPERATIONS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.1 Identify the necessary steps in performing order of operations					
3.2 Calculate answers using correct order of operations					
3.3 Use order of operations to solve problems					

	(Assessor Use) Learning Needs Indicated from ES inventory	(Instructor Use) Learning Needs Identified by Instructor	Learning Needs Addressed Through Instruction	(Assessor Use) Learning Needs Require More Review	Skill Level Meets Trade Requirements (Post-Inventory)
PRINCIPLES OF MATHEMATICS					
OBJECTIVE 4: USE FRACTIONS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.1 Read fractions					
4.2 Write fractions					
4.3 Compare fractions					
4.4 Round fractions					
4.5 Simplify fractions					
4.6 Add fractions					
4.7 Subtract fractions					
4.8 Multiply fractions					
4.9 Divide fractions					
4.10 Use knowledge of fractions to solve problems					
OBJECTIVE 5: USE MIXED NUMBERS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.1 Read mixed numbers					
5.2 Write mixed numbers					
5.3 Compare mixed numbers					
5.4 Round mixed numbers					
5.5 Simplify mixed numbers					
5.6 Add mixed numbers					
5.7 Subtract mixed numbers					
5.8 Multiply mixed numbers					
5.9 Divide mixed numbers					
5.10 Use knowledge of mixed numbers to solve problems					
OBJECTIVE 6: USE DECIMALS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.1 Read decimals					
6.2 Write decimals					
6.3 Estimate decimals					
6.4 Round decimals					
6.5 Add decimals					
6.6 Subtract decimals					
6.7 Multiply decimals					
6.8 Divide decimals					
6.9 Use knowledge of decimals to solve problems					
OBJECTIVE 7: USE PERCENT (Welder Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.1 Use formulae to calculate percent					
7.2 Use knowledge of percent to solve problems					
OBJECTIVE 8: USE CONVERSION (Welder Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.1 Explain the purpose of mathematical conversion					
8.2 Convert among fractions, decimals and percents					
8.3 Use automatic recall of decimal and percent equivalents of common fractions					
8.4 Use knowledge of conversion to solve problems					

	(Assessor Use) Learning Needs Indicated from ES inventory	(Instructor Use) Learning Needs Identified by Instructor	Learning Needs Addressed Through Instruction	(Assessor Use) Learning Needs Require More Review	Skill Level Meets Trade Requirements (Post-Inventory)
PRINCIPLES OF MATHEMATICS					
OBJECTIVE 9: USE MEASUREMENT SYSTEMS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.1 Demonstrate uses of specific measurements					
9.2 Perform conversions within the Metric Measurement System					
9.3 Perform conversions within the Imperial Measurement System					
9.4 Perform conversions between the Metric and Imperial Measurement Systems					
9.5 Perform time conversions					
9.6 Use knowledge of conversion to solve problems					
OBJECTIVE 10: USE RATE, RATIO AND PROPORTION (Welder Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.1 Describe the differences among rate, ratio and proportion					
10.2 Give examples of how rate, ratio and proportion are used in the trade					
10.3 Write numbers as proportions					
10.4 Use knowledge of rate to solve problems					
10.5 Use knowledge of ratio to solve problems					
10.6 Use knowledge of proportion to solve problems					
OBJECTIVE 11: USE SQUARE ROOT AND EXPONENTS (Welder Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.1 Determine the square root of positive numbers that are perfect squares					
11.2 Determine approximate square root of positive numbers that are not perfect squares					
11.3 Use knowledge of square root to solve problems					
11.4 Use knowledge of exponent laws to solve problems					
11.5 Determine significant digits					
11.6 Use knowledge of scientific notation to solve problems					
OBJECTIVE 12: SOLVE EQUATIONS (Welder Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.1 Write variable expressions and equations from sentences					
12.2 Simplify variable expressions					
12.3 Write equations from sentences					
12.4 Solve one-step equations					
12.5 Solve two-step equations					
12.6 Solve multi-step equations					
OBJECTIVE 13: USE TRADE-RELATED FORMULAE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.1 Identify formulae common to the trade					
13.2 Solve problems using formulae as written					
13.3 Solve problems by rearranging formulae					

	(Assessor Use) Learning Needs Indicated from ES inventory	(Instructor Use) Learning Needs Identified by Instructor	Learning Needs Addressed Through Instruction	(Assessor Use) Learning Needs Require More Review	Skill Level Meets Trade Requirements (Post-Inventory)
PRINCIPLES OF MATHEMATICS					

OBJECTIVE 14: USE ESTIMATION

- 14.1 Identify estimation rules
- 14.2 Use estimation rules to solve single-step problems
- 14.3 Use estimation rules to solve multi-step problems

OBJECTIVE 15: USE ANGLES

- 15.1 Identify various types of angles
- 15.2 Compare angles common to the trade
- 15.3 Accurately measure angles
- 15.4 Use knowledge of angles to solve problems

OBJECTIVE 16: USE GEOMETRIC SHAPES

- 16.1 Identify geometric shapes
- 16.2 Use knowledge of geometric shapes to solve problems

OBJECTIVE 17: USE TRIGONOMETRY

- 17.1 Identify the value of trigonometry in the trade
- 17.2 Set up trigonometric ratios
- 17.3 Use trigonometric functions to solve problems

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Assessor/s Signature

Date

Learners will understand, interpret, and manipulate mathematical concepts in order to solve problems and complete tasks.

Introduction

The Principles of Mathematics (PM) is an introduction to the foundational math skills necessary for successful technical training and effective job task completion. The intent of the unit is two-fold: to review and to further develop the concepts and strategies necessary for solving problems and completing tasks in the metal fabricating and welding trades.

The following guide outlines a list of recommended resources (see Appendix A) for each objective in the Mathematics curriculum framework and, where possible, includes online website materials that complement these resources. Three formats are provided to allow learners the opportunity to review competencies in a way that best suits their needs. These resources are categorized as follows:

- **Non-contextualized** - Curriculum resources that are **not** related to any trade or occupation. These resources may be used to review the competencies in a stand-alone manner before transferring the skill to trade-related materials.
- **Contextualized** - Curriculum resources that provide Essential Skills applications in the context of a specific trade or occupation.
- **Technical** - Trade training materials from which Essential Skills are extracted. For the purpose of the Trade Essentials project, **Individual Learning Modules** from Alberta Advanced Education and **Modern Welding** by Andrew D. Althouse, Carl H. Turnquist, and William A. Bowditch were used as the primary technical resource.

Note: Though only some modules are outlined as resources for specific objectives, all Individual Learning Modules can be used for the instruction of Essential Skills.

The information presented here has been designed to act only as a guide and may, therefore, need to be adapted to meet the needs of individuals or groups. It is the role of you, the instructor, to choose materials and deliver the content as it best suits individual learner needs. A variety of materials are listed under each set of competencies for this purpose.

Welders, Metal Fabricators and Numeracy

Welders and Metal Fabricators often use the skills outlined in the Principles of Mathematics on a daily basis to complete job tasks. The complexity of these tasks, according to Human Resources and Skills Development Canada's Essential Skills profile (<http://srv108.services.gc.ca/>), varies slightly between Welders and Metal Fabricators. The complexity of tasks performed by Welders ranges from simple, clearly-defined mathematical operations (e.g., measuring degrees of angles using a level) to tasks that involve multiple steps of calculation (e.g., using trigonometric constants to calculate offsets).

The complexity of tasks performed by metal fabricators ranges from simple, clearly-defined mathematical operations (e.g., take payment and provide change) to tasks that involve multiple steps of calculation and advanced mathematical techniques (i.e., calculate dimensions for some element missing from a blueprint by using a combination of scale drawings and constructed three-dimensional components).

Contextualized Online Resources:

- [http://www.rtc.edu/CCE/Resources/Products/MathToolBox/files/MATH%20BOOK 1017.A.pdf](http://www.rtc.edu/CCE/Resources/Products/MathToolBox/files/MATH%20BOOK%201017.A.pdf) (Laying the Foundation: Construction Math)
- <http://www.gowelding.com/calcs/> (Welding Calculations)
- <http://www.grbwelding.com/content/study/math-formulas.htm> (Welding Formulas)
- <http://www.swtc.edu:8082/mscenter/apldmath.htm> (Applied Math Workbook)

PM1 Use Calculators

Upon completion of this objective, learners will be able to:

- 1.1 identify the risks and benefits involved in using calculators in the trade
- 1.2 describe how calculators are used in the trade
- 1.3 determine the best calculator for the trade
- 1.4 use knowledge of calculators to solve problems

*Note: Calculators are used to improve speed and accuracy of calculations, however, it is important to note that calculators are tools and are only accurate if they are used properly. It is very important to have an understanding of **order of operations** when using calculators.*

Only resources that specifically refer to calculators are outlined here; however, calculator-use skills should be practiced with all identified resources.

Non-contextualized Resources:

- *Introductory Technical Mathematics, 5th Edition (pp.xx-xxi)*
- *Fundamentals of Mechanical and Electrical Mathematics*
- *Mathematics for Carpentry and the Construction Trades*
- *NWT Apprenticeship Support Materials Module 1 (Foundations)*

Online Resources:

- <http://www.shodor.org/unchem/math/calc/index.html>
- <http://www.how2begin.com/business/how-to-use-a-scientific-calculator-3.html>
- <http://www.uccs.edu/~energy/courses/calculator.html>
- <http://www.khake.com/page89.html>

PM2 Use Positive and Negative Numbers

Upon completion of this objective, learners will be able to:

- 2.1 read positive and negative numbers
- 2.2 write positive and negative numbers
- 2.3 round positive and negative numbers
- 2.4 estimate positive and negative numbers
- 2.5 order positive and negative numbers
- 2.6 compare positive and negative numbers
- 2.7 add positive and negative numbers
- 2.8 subtract positive and negative numbers
- 2.9 multiply positive and negative numbers
- 2.10 divide positive and negative numbers
- 2.11 use knowledge of positive and negative numbers to solve problems

Non-contextualized Resources:

- Introductory Technical Mathematics, *5th Edition*
- Fundamental Mathematics, *4th Edition*
- Measurement and Calculation for the Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Practical Problems in Mathematics for Welders, *5th Edition*
- Math for Welders
- EARAT (Mathematics for Precision Metal Fabricators: Skill #1)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Welding Print Reading
- Modern Welding (Text and Instructor's Manual)
- All Individual Learning Modules

Online Resources:

- <http://www.math.com/school/subject1/lessons/S1U1L11DP.html>
- <http://www.mathleague.com/help/integers/integers.htm#subtractingintegers>
- <http://www.math.com/school/subject1/lessons/S1U1L12DP.html>
- <http://www.mathleague.com/help/integers/integers.htm#dividingintegers>
- <http://www.khake.com/page89.html>
- <http://www.math-drills.com/orderofoperations.shtml>
- <http://www.mathleague.com/help/integers/integers.htm#multiplyingintegers>
- <http://www.kutasoftware.com/free.html>

PM3 Use Order of Operations

Upon completion of this objective, learners will be able to:

- 3.1. identify the necessary steps in performing order of operations
- 3.2. calculate answers using correct order of operations
- 3.3. use order of operations to solve problems

Non-contextualized Resources:

- Fundamental Mathematics, *4th Edition*
- Introductory Technical Mathematics, *5th Edition*
- Mathematics for Carpentry and the Construction Trades
- NWT Apprenticeship Support Materials Module 1 (Foundations)

Contextualized Resources:

- Individual Learning Module 120104d Welder – Geometric Formulas
- EARAT (Mathematics for Precision Metal Fabricators: Skill #2)

Online Resources:

- <http://www.tpub.com/math2/index.htm>
- <http://www.khake.com/page89.html>
- <http://www.kutasoftware.com/free.html>
- <http://www.purplemath.com/modules/orderops.htm>
- <http://www.math-drills.com/orderofoperations.shtml>
- http://amby.com/educate/ord-op/ex_set-1.html

PM4 Use Fractions

Upon completion of this objective, learners will be able to:

- 4.1 read fractions
- 4.2 write fractions
- 4.3 compare fractions
- 4.4 round fractions
- 4.5 simplify fractions
- 4.6 add fractions
- 4.7 subtract fractions
- 4.8 multiply fractions
- 4.9 divide fractions
- 4.10 use knowledge of fractions to solve problems

Non-contextualized Resources:

- Fundamental Mathematics, *4th Edition*
- Introductory Technical Mathematics, *5th Edition*
- Math to Build On-A Book for Those Who Build
- Mathematics for Carpentry and the Construction Trades
- NWT Apprenticeship Support Materials Module 1 (Foundations)
- Measurement and Calculation for the Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104a- Welder – Fractions
- Practical Problems in Mathematics for Welders, *5th Edition*
- Mathematics for Sheet Metal Fabrication
- Math for Welders
- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill # 3)

Technical Resources:

- Individual Learning Module 120204hA - Welder – Estimating – Part A
- Individual Learning Module 120204hB - Welder – Estimating – Part B
- Individual Learning Module 120204f- Welder – Pipe Layout
- Welding Print Reading
- Modern Welding (Text and Instructor's Manual)

Online Resources:

- <http://mathforum.org/%7esarah/hamilton/>
- <http://www.khake.com/page89.html>
- <http://www.math-drills.com/fractions.shtml>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM5 Use Mixed Numbers

Upon completion of this objective, learners will be able to:

- 5.1 read mixed numbers
- 5.2 write mixed numbers
- 5.3 compare mixed numbers
- 5.4 round mixed numbers
- 5.5 simplify mixed numbers
- 5.6 add mixed numbers
- 5.7 subtract mixed numbers
- 5.8 multiply mixed numbers
- 5.9 divide mixed numbers
- 5.10 use knowledge of mixed numbers to solve problems

Non-contextualized Resources:

- Fundamental Mathematics, *4th Edition*
- Introductory Technical Mathematics, *5th Edition*
- Math to Build On-A Book for Those Who Build
- Mathematics for Carpentry and the Construction Trades
- NWT Apprenticeship Support Materials Module 1 (Foundations)
- Measurement and Calculation for the Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104a- Welder – Fractions
- Practical Problems in Mathematics for Welders, *5th Edition*
- Mathematics for Sheet Metal Fabrication
- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill # 3)

Technical Resources:

- Individual Learning Module 120204hA - Welder – Estimating – Part A
- Individual Learning Module 120204hB - Welder – Estimating – Part B
- Individual Learning Module 120204f - Welder – Pipe Layout
- Welding Print Reading
- Modern Welding (Text and Instructor's Manual)

Online Resources:

- <http://mathforum.org/%7esarah/hamilton/>
- <http://www.khake.com/page89.html>
- <http://www.math-drills.com/fractions.shtml>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM6 Use Decimals

Upon completion of this objective, learners will be able to:

- 6.1 read decimals
- 6.2 write decimals
- 6.3 estimate decimals
- 6.4 round decimals
- 6.5 add decimals
- 6.6 subtract decimals
- 6.7 multiply decimals
- 6.8 divide decimals
- 6.9 use knowledge of decimals to solve problems

Non-contextualized Resources:

- Introductory Technical Mathematics, *5th Edition*
- Fundamental Mathematics, *4th Edition*
- Math to Build On-A Book for Those Who Build
- Mathematics for Carpentry and the Construction Trades
- Measurement and Calculation for the Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104b- Welder – Decimals
- Practical Problems in Mathematics for Welders, *5th Edition*
- Mathematics for Sheet Metal Fabrication
- Math for Welders
- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill #4)

Technical Resources:

- Individual Learning Module 120204hA - Welder – Estimating- Part A
- Individual Learning Module 120204hB - Welder – Estimating- Part B
- Welding Print Reading
- Modern Welding (Text and Instructor's Manual)

Online Resources:

- <http://mathforum.org/%7esarah/hamilton/>
- <http://www.khake.com/page89.html>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM7 Use Percent

Upon completion of this objective, learners will be able to:

- 7.1 use formulae to calculate percent
- 7.2 use knowledge of percent to solve problems

Non-contextualized Resources:

- Introductory Technical Mathematics, *5th Edition*
- Fundamental Mathematics, *4th Edition*
- Mathematics for Carpentry and the Construction Trades
- Measurement and Calculation for the Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104c- Welder – Percentage and Ratios
- Practical Problems in Mathematics for Welders, *5th Edition*
- Mathematics for Sheet Metal Fabrication
- Math for Welders
- EARAT (Mathematics for Precision Metal Fabricators: Skill #5)
- Interprovincial 'Red Seal' Welder Upgrade Program

Technical Resources:

- Individual Learning Module 120204hA - Welder – Estimating – Part A
- Individual Learning Module 120204hB - Welder – Estimating – Part B
- Individual Learning Module 120301b - Welder – Nickel Alloys and Clad Steels
- Individual Learning Module 120301a - Welder – Stainless Steel

Online Resources:

- <http://www.khake.com/page89.html>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM8 Use Conversion

Upon completion of this objective, learners will be able to:

- 8.1 explain the purpose of mathematical conversion
- 8.2 convert among fractions, decimals and percent
- 8.3 use automatic recall of decimal and percent equivalents of common fraction
- 8.4 use knowledge of conversion to solve problems

Non-contextualized Resources:

- Introductory Technical Mathematics, *5th Edition*
- Fundamental Mathematics, *4th Edition*
- Mathematics for Carpentry and the Construction Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104c - Welder – Percentage and Ratios
- Individual Learning Module 120104b- Welder
- Practical Problems in Mathematics for Welders, *5th Edition*
- Math for Welders
- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill #6)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Welding Print Reading
- Modern Welding (Text and Instructor's Manual)

Online Resources:

- <http://www.khake.com/page89.html>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM9 Use Measurement Systems

Upon completion of this objective, learners will be able to:

- 9.1 demonstrate uses of specific measurements
- 9.2 perform conversions within the metric measurement system
- 9.3 perform conversions within the imperial measurement system
- 9.4 perform conversions between the metric and imperial measurement systems
- 9.5 perform time conversions
- 9.6 use knowledge of conversion to solve problems

Non-contextualized Resources:

- Introductory Technical Mathematics, *5th Edition*
- Math to Build On-A Book for Those Who Build
- Measurement and Calculation for the Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104e- Welder – Metric and Imperial Measurement
- Practical Problems in Mathematics for Welders, *5th Edition*
- Math for Welders
- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill #8, 9, 10)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- IPT's Metal Trades and Welding Handbook
- Individual Learning Module 120204hA - Welder – Estimating – Part A
- Individual Learning Module 120204hB - Welder – Estimating – Part B
- Individual Learning Module 120204a- Welder – Introduction to Pattern Development
- Individual Learning Module 120304d- Welder – Heat Treatment
- Individual Learning Module 120301c- Welder – SMAW Welds and Oxyfuel Cutting on Mild Steel
- Welding Print Reading
- Modern Welding (Text and Instructor's Manual)

Online Resources:

- <http://www.khake.com/page89.html>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM10 Use Rate, Ratio and Proportion

Upon completion of this objective, learners will be able to:

- 10.1 describe the differences among rate, ratio and proportion
- 10.2 give examples of how rate, ratio and proportion are used in the trade
- 10.3 write numbers as proportions
- 10.4 use knowledge of rate to solve problems
- 10.5 use knowledge of ratio to solve problems
- 10.6 use knowledge of proportion to solve problems, for example,
 - solve problems that involve writing proportions and solving unknown quantities
 - distinguish between direct and indirect proportion
 - describe and calculate mechanical advantage

Non-contextualized Resources:

- Fundamental Mathematics, *4th Edition*
- Introductory Technical Mathematics, *5th Edition*
- Mathematics for Carpentry and the Construction Trades
- NWT Apprenticeship Support Materials Module 1 (Foundations)
- Measurement and Calculation for the Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104c- Welder – Percentage and Ratios
- Mathematics for Sheet Metal Fabrication
- EARAT (Mathematics for Precision Metal Fabricators: Skill #7)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Individual Learning Module 120204hA - Welder – Estimating – Part A
- Individual Learning Module 120204hB - Welder – Estimating – Part B
- Individual Learning Module 120204a- Welder – Introduction to Pattern Development

Online Resources:

- <http://www.khake.com/page89.html>
- <http://www.mathleague.com/help/ratio/ratio.htm#ratio>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM11 Use Square Root and Exponents

Upon completion of this objective, learners will be able to:

- 11.1 determine the square root of positive numbers that are perfect squares
- 11.2 determine approximate square root of positive numbers that are not perfect squares
- 11.3 use knowledge of square root to solve problems
- 11.4 use knowledge of exponent laws to solve problems
- 11.5 determine significant digits
- 11.6 use knowledge of scientific notation to solve problems

Non-contextualized Resources:

- Math to Build On-A Book for Those Who Build
- Introductory Technical Mathematics, *5th Edition* (Unit 13)
- NWT Apprenticeship Support Materials Module 1 (Foundations)
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill #13, 14)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Modern Welding (Text and Instructor's Guide)

Online Resources:

- <http://mathforum.org/%7esarah/hamilton/>
- <http://www.khake.com/page89.html>
- <http://www.kutasoftware.com/free.html>

PM12 Solve Equations

Upon completion of this objective, learners will be able to:

- 12.1 write variable expressions and equations from sentences
- 12.2 simplify variable expressions
- 12.3 write equations from sentences
- 12.4 solve one-step equations
- 12.5 solve two-step equations
- 12.6 solve multi-step equations

Non-contextualized Resources:

- Introductory Technical Mathematics, *5th Edition*
- NWT Apprenticeship Support Materials Module 3 (Variables and Equations)
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104d- Welder – Geometric Formulas
- Mathematics for Sheet Metal Fabrication
- EARAT (Mathematics for Precision Metal Fabricators: Skill #12)

Technical Resources:

- Individual Learning Module 120204a- Welder – Introduction to Pattern Development
- Modern Welding (Text and Instructor's Manual)

Online Resources:

- <http://www.khake.com/page89.html>
- <http://www.kutasoftware.com/free.html>

PM13 Use Trade-Related Formulae

Upon completion of this objective, learners will be able to:

- 13.1 identify formulae common to the trade
- 13.2 solve problems using formulae as written
- 13.3 solve problems by rearranging formulae

Resources:

- Mathematics for Sheet Metal Fabrication (Section 10)
- Modern Welding (Text and Instructor's Manual)
- IPT's Metal Trades and Welding Handbook

Perimeter, Area and Circumference

Non-contextualized Resources:

- Introductory Technical Mathematics, *5th Edition* (Units 8-9; 25-30)
- NWT Apprenticeship Support Materials Module 4 (Measuring Time, Shapes, and Space)
- Mathematics for Carpentry and the Construction Trades
- Formulas at Work (SkillPlan)
- Measurement and Calculation for the Trades
- Math to Build On-A Book for Those Who Build

Contextualized Resources:

- Individual Learning Module 120104d- Welder – Geometric Formulas
- Practical Problems in Mathematics for Welders, *5th Edition*
- Mathematics for Sheet Metal Fabrication
- Math for Welders
- EARAT (Mathematics for Precision Metal Fabricators: Skill #16, 17)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Individual Learning Module 120204f - Welder – Pipe Layout
- Individual Learning Module 120204e - Welder – Plate Layout
- Individual Learning Module 120204b - Welder – Geometric Construction
- Individual Learning Module 120303b - Welder – Structural Drawings
- Modern Welding (Text and Instructor's Manual)

Volume and Surface Area**Non-contextualized Resources:**

- Introductory Technical Mathematics, *5th Edition*
- Math to Build On-A Book for Those Who Build
- NWT Apprenticeship Support Materials Module 4 (Measuring Time, Shapes, and Space)
- Mathematics for Carpentry and the Construction Trades
- Formulas at Work (SkillPlan)
- Measurement and Calculation for the Trades

Contextualized Resources:

- Individual Learning Module 120104d- Welder – Geometric Formulas
- Practical Problems in Mathematics for Welders, *5th Edition*
- Mathematics for Sheet Metal Fabrication
- Math for Welders
- EARAT (Mathematics for Precision Metal Fabricators: Skill #17)
- Interprovincial Red Seal Welder Upgrade Program

Pythagorean Theorem

Learners should be able to apply the Pythagorean Theorem to determine whether or not a triangle is a right triangle, to determine the measure of the third side of a right triangle when the measures are given for the two other sides, and to determine the distance between two points on a coordinate plane.

Non-contextualized Resources:

- Math to Build On-A Book for Those Who Build
- Introductory Technical Mathematics, *5th Edition*
- Mathematics for Carpentry and the Construction Trades
- NWT Apprenticeship Support Materials Module 4 (Measuring Time, Shapes, and Space)
- Formulas at Work (SkillPlan)
- Measurement and Calculation for the Trades

Contextualized Resources:

- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill #15)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- Individual Learning Module 120204e- Welder – Plate Layout
- Individual Learning Module 120204hA- Welder – Estimating – Part A
- Individual Learning Module 120204hB- Welder – Estimating – Part B
- Welding Print Reading

Online Resources:

- <http://www.grbwelding.com/content/study/math-formulas.htm>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>
- <http://www.swtc.edu:8082/mscenter/tutorial.htm#Formulas>
- <http://www.khake.com/page89.html>

PM14 Use Estimation

Upon completion of this objective, learners will be able to:

- 14.1 identify estimation rules
- 14.2 use estimation rules to solve single-step problems
- 14.3 use estimation rules to solve multi-step problems

Non-contextualized Resources:

- Fundamental Mathematics, *4th Edition*
- Introductory Technical Mathematics, *5th Edition*
- Mathematics for Carpentry and the Construction Trades
- NWT Apprenticeship Support Materials Module 4 (Measuring Time, Shapes and Space)

Contextualized Resources:

- Individual Learning Module 120204hA- Welder – Estimating – Part A
- Individual Learning Module 120204hB- Welder – Estimating - Part B

Technical Resources:

- Individual Learning Module 120204hA- Welder – Estimating – Part A
- Individual Learning Module 120204hB- Welder – Estimating - Part B
- Modern Welding (Text and Instructor's Manual)

Online Resources:

- <http://www.welding-advisers.com/Welding-cost.html>

PM15 Use Angles

Upon completion of this objective, learners will be able to:

- 15.1 identify various types of angles
- 15.2 compare angles common to the trade
- 15.3 measure angles
- 15.4 use knowledge of angles to solve problems

Non-contextualized Resources:

- Introductory Technical Mathematics, *5th Edition*
- Mathematics for Carpentry and the Construction Trades
- Measurement and Calculation for the Trades
- Math to Build On-A Book for Those Who Build
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120204b Welder – Geometric Construction
- Practical Problems in Mathematics for Welders, *5th Edition*
- Mathematics for Sheet Metal Fabrication
- Math for Welders
- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill #14)
- Interprovincial 'Red Seal' Welder Upgrade Program

Technical Resources:

- IPT's Metal Trades and Welding Handbook
- Individual Learning Module 120101h - Welder – Oxyfuel Welding, Brazing and Braze Welding
- Individual Learning Module 120102d - Welder – Shop/Lab Practices: SMAW Welds on Mild Steel Plate
- Individual Learning Module 120202d - Welder – GTAW Welds on Mild Steel
- Individual Learning Module 120204f - Welder – Pipe Layout
- Individual Learning Module 120204e - Welder – Plate Layout
- Individual Learning Module 120204b - Welder – Geometric Construction
- Individual Learning Module 120204a - Welder – Introduction to Pattern Development
- Individual Learning Module 020204hA - Welder- Estimating – Part A
- Individual Learning Module 020204hB - Welder- Estimating – Part B
- Individual Learning Module 120301d- Welder – SMAW Welds on Mild Steel Pipe

- Individual Learning Module 120301c- Welder – SMAW Welds and Oxyfuel Cutting on Mild Steel
- Individual Learning Module 120303d- Welder – Pipe Drawings
- Welding Print Reading
- Modern Welding (Text and Instructor's Manual)

Online Resources:

- <http://mathforum.org/%7esarah/hamilton/>
- <http://www.khake.com/page89.html>
- <http://www.math-drills.com/orderofoperations.shtml>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM16 Use Geometric Shapes

Upon completion of this objective, learners will be able to:

- 16.1 identify geometric shapes
- 16.2 use knowledge of geometric shapes to solve problems

Learners should identify and name the various types of triangles and understand the concept of similar triangles.

Non-contextualized Resources:

- Math to Build On-A Book for Those Who Build
- Introductory Technical Mathematics, *5th Edition*
- Mathematics for Carpentry and the Construction Trades
- Measurement and Calculation for the Trades
- Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Contextualized Resources:

- Individual Learning Module 120104d Welder – Geometric Formulas
- Individual Learning Module 120204b Welder – Geometric Construction
- Mathematics for Sheet Metal Fabrication
- Math for Welders
- Welding Print Reading
- EARAT (Mathematics for Precision Metal Fabricators: Skill #15)
- Interprovincial Red Seal Welder Upgrade Program

Technical Resources:

- IPT's Metal Trades and Welding Handbook
- Individual Learning Module 120204e- Welder – Plate Layout
- Individual Learning Module 120204c- Welder – Isometric and Oblique Drawings
- Individual Learning Module 120204b- Welder – Geometric Construction
- Individual Learning Module 120204a- Welder – Introduction to Pattern Development- Pattern Development and Drawing Interpretation- Second Period
- Individual Learning Module 120204hA - Welder – Estimating – Part A
- Individual Learning Module 120204hB - Welder – Estimating – Part B
- Individual Learning Module 120303d- Welder – Piping Drawings
- Individual Learning Module 120303b- Welder – Structural Drawings
- Welding Print Reading
- Welding Print Reading, Instructor's Guide

Online Resources:

- <http://www.tpub.com/math2/index.htm>
- <http://www.khake.com/page89.html>
- <http://xpmath.com/careers/jobsresult.php?groupID=7&jobID=16>

PM17 Use Trigonometry

Upon completion of this objective, learners will be able to:

- 17.1 identify the value of trigonometry in the trade
- 17.2 set up trigonometric ratios
- 17.3 use trigonometric functions to solve problems

Non-contextualized Resources:

- Math to Build On-A Book for Those Who Build
- Introductory Technical Mathematics, *5th Edition* (Section VII)
- Measurement and Calculation for the Trades

Contextualized Resources:

- Mathematics for Sheet Metal Fabrication
- EARAT (Mathematics for Precision Metal Fabricators: Skill #17)

Technical Resources:

- Individual Learning Module 120204f - Welder – Pipe Layout
- Individual Learning Module 120204e - Welder – Plate Layout
- Individual Learning Module 120204hA - Welder – Estimating – Part A
- Individual Learning Module 120204hB - Welder – Estimating – Part B

Online Resources:

- <http://www.jimdesu.us/pages/trigonometry.html>
- <http://www.swtc.edu:8082/mscenter/tutorial.htm#Introduction%20to%20Trigonometry>
- <http://www.tpub.com/math2/index.htm>
- <http://www.onlinemathlearning.com/basic-trigonometry.html>
- <http://mathforum.org/%7esarah/hamilton/>
- <http://www.khake.com/page89.html>
- http://www.funmaths.com/worksheets/math_trigonometry_05.htm
- <http://www.xpmath.com/exercises/files/sincos.pdf>
- <http://www.xpmath.com/exercises/files/tan.pdf>

Appendix A

Resource Materials:

Alberta Individual Learning Modules for Welders

Alberta Apprenticeship and Industry Training, 1998

Tel: 1-800-232-7215

<http://www.tradesecrets.gov.ab.ca>

Evaluating Academic Readiness for Apprenticeship Training (EARAT)

Mathematics for Precision Metal Fabricator Apprentices

Workplace Support Services Branch

Ontario Ministry of Training, Colleges and Universities, October 2000

Tel: 416-325-2929 or 1-800-387-5514

Email: info@edu.gov.on.ca

Formulas at Work: Tradesworkers on the Job

Sue Grecki

SkillPlan: B.C. Construction Industry Skills Improvement Council, 2007

ISBN: 978-0-9739232-6-1

www.skillplan.ca

Fundamental Mathematics, 4th Edition

Marvin L. Bittinger

Pearson Education Inc., 2007

ISBN: 0-321-31907-9

Fundamentals of Mechanical and Electrical Mathematics

National Centre for Construction Education and Research

Prentice Hall Inc., 1996

ISBN: 0-13-910142-X

Interprovincial Red Seal Welder Upgrade Program

Books 1-4

CWB Learning Centre, 2008

Introductory Technical Mathematics, 5th Edition

Robert Smith and John C. Peterson

Thomson Delmar Learning, 2007

ISBN: 1-4180-1543-1

www.delmarlearning.com

IPT's Metal Trades and Welding Handbook

Ronald G. Garby and Bruce J. Ashton
IPT Publishing and Training Ltd., 1993
ISBN: 978-0-92855-19-5

Math to Build On -A Book for Those Who Build

Johnny and Margaret Hamilton
Construction Trades Press, 1993
ISBN: 0-9624197-1-0
www.pipefitter.com

Mathematics for Carpentry and the Construction Trades, 2nd Edition

Alfred Webster and Kathryn B. Judy
Pearson Education Inc., 2002
ISBN: 0-13-163305-8

Mathematics for Sheet Metal Fabrication

Delmar Thompson Learning, 1970
ISBN: 0-8273-0295-9

Math for Welders

Nino Marion
Goodheart Willcox Company Inc., 2006
ISBN: 978-1-59070-583-1

Measurement and Calculation for the Trades

Sue Grecki and Bob Whitaker
SkillPlan: B.C. Construction Industry Skills Improvement Council, 2006
ISBN: 0-9685027-9-2
www.skillplan.ca

Modern Welding

Andrew D. Althouse, Carl H. Turnquist and William A. Bowditch
Goodheart-Willcox Publishing, 2004
ISBN: 978-1-56637-987-8

Modern Welding, Instructor's Manual

William A. Bowditch, Kevin E. Bowditch and Mark A. Bowditch
Goodheart-Willcox Publishing, 2004
ISBN: 978-1-56637-987-8

NWT Apprenticeship Support Materials

Thomas O'Connor
Genesis Group Ltd., Yellowknife, NWT, 2003

Practical Problems in Mathematics for Welders, 5th Edition

Robert Chasan

Delmar Publishing, 1996

ISBN: 13-978-1-4018-7215-1

Pre-Apprentice Training-A Test Preparation Manual for the Skilled Trades

Jack Martin and Mary Serich

Jack Martin and Associates, 2006

ISBN: 0-9649530-1-3

Welding Print Reading

John R. Walker and W. Richard Polanin

The Goodheart-Willcox Company Inc., 2007

ISBN: 1-59070-642-0

Welding Print Reading, Instructor's Guide

John R. Walker and W. Richard Polanin

The Goodheart-Willcox Company Inc., 2007

ISBN: 13-978-1-59070-643-5

All online resources listed in this document were operational at time of publication.

Oral Communication (OC) Learning Outcome: Learners will perform tasks which use speech to give and exchange thoughts and information.

OC1 Demonstrate an Understanding of Oral Communication	1.1 Differentiate between oral and other forms of communication	1.2 Identify purpose of oral communication	1.3 Identify the benefits of effective oral communication	1.4 Identify barriers to effective oral communication	1.5 Identify the risks associated with ineffective oral communication	1.6 Outline ways to reduce the risk of ineffective communication
OC2 Communicate Effective Messages	2.1 Identify audience	2.2 Identify the purpose of communicating effective messages	2.3 Organize thoughts and ideas	2.4 Communicate effectively to a variety of audiences		
OC3 Listen Effectively	3.1 Identify the difference between listening and active listening	3.2 Identify the purpose of effective listening	3.3 Identify active listening strategies	3.4 Implement active listening strategies		
OC4 Respond to Oral Communication	4.1 Identify the main idea	4.2 Interpret verbal messages	4.3 Clarify received verbal messages	4.4 Respond appropriately to verbal messages		

Learners will perform tasks which use speech to give and exchange thoughts and information

Introduction

Success in technical training and effective job performance requires strong Essential Skills. Although all Essential Skills contribute to success, this guide is intended to help apprentices develop positive oral communication for their trade. Competence in oral communication provides the foundation for better performance in technical training, on the job and when mentoring new apprentices.

Strong oral communication skills are required in every occupation. In fact, many surveys indicate that it is one of the most highly valued skills among employers as it is intimately tied to everyday workplace functions. Oral communication in trade occupations may be presented face-to-face, by telephone or by two-way radio with a number of factors affecting the transfer of the message.

The following guide is an introduction to the basic principles and methods of oral communication with an emphasis on the importance of speaking, listening and interacting in the context of customer service and interpersonal communication.

A list of resources (see Appendix A) has been outlined for each objective in the Oral Communication Curriculum Framework and, where possible, includes online website materials that complement these resources. All information is presented in a generic manner; the contextualization to specific trades will be found in the expected tasks of each trade as determined by the instructor.

The list of resources has been designed to act only as a guide and may, therefore, need to be adapted to meet the needs of individuals or groups. It is the role of you, the instructor, to choose materials and deliver the content as it best suits individual learner needs. A variety of materials are listed under each set of competencies for this purpose.

Oral Communication in Trades Occupations

To make the most of technical training, apprentices need to develop strategies for effective listening, as well as the confidence and speaking skills to ask for help. These same strategies are used in the workplace to interact with co-workers, supervisors, workers in other trades, suppliers and customers. Understanding the many elements in the communication process helps apprentices send clear messages and understand the messages received.

Tradespeople communicate orally on a daily basis to complete job tasks. The complexity of these tasks, according to Human Resources and Skills Development Canada's Essential Skills Profiles (http://www10.hrsdc.gc.ca/es/english/ES_Profiles.aspx), varies slightly among the 13 trades outlined in the Trade Essentials project (see Curriculum Guidebook). However, all 13 trades describe the least complex oral communication tasks as those containing some or all of the following characteristics:

- Limited oral communication demands;
- Narrow range of subject matter;
- Familiar topic;
- One main issue;
- Factual, literal, or concrete language;
- Narrow range of content and context-specific or technical vocabulary;
- Clearly defined role of speaker;
- Interaction with one person at a time;
- Low risk;
- Brief exchange (less than 10 minutes);

The most difficult tasks vary among the trades. The most complex tasks performed by cooks, welders, carpenters, automotive service technicians, steamfitters-pipefitters, cabinetmakers, machinists, industrial and construction electricians and metal fabricators contain some or all the following characteristics:

- Extensive oral communication demands;
- Significant range of subject matter;
- Professional, organizational, theoretical social issues;
- Abstract and conceptual language;
- Extensive range of technical vocabulary and idiom;
- Complex and detailed information content;
- Unpredictable context;
- Various communication venues used;
- Significant range of formats and styles;
- Communicator may have more than one role;
- New and unfamiliar situation and setting;
- Medium to extended (30+ minutes) exchange;
- Significant noise or interference;
- Significant level of risk;

The most complex oral communication tasks performed by plumbers, oil burner mechanics, and refrigeration and air conditioning mechanics contain some or all of the following characteristics:

- Moderate oral communication demands;
- Narrow range of subject matter;

- Familiar topic;
- Usually one main issue;
- Factual or concrete and abstract language;
- Moderate range of general and context-specific or technical vocabulary and idiom;
- Moderately complex and detailed content;
- Less predictable context;
- Interaction is frequently one-on-one or with several people;
- Give a short talk or give directions to a small group;
- Select from a moderate range of formats and styles;
- Established rules;
- Brief to moderate (10-30 minutes) exchange;
- Physical conditions may impede communication;
- Moderate level of risk;
- May be one-on-one hostility.

Upon completion of this course, apprentices will better understand how communication skills impact safety, productivity, job satisfaction and job progression. Effective communication skills will benefit apprentices as they reach journey person status and accept additional responsibility for supervising and mentoring new employees.

For specific information and examples of the use of oral communication for each trade, instructors should refer to the Essential Skills Profile and the National Occupational Analysis. It should be noted that, according to HRSDC's Essential Skills profiles, oral communication is one of the most important Essential Skills for cooks, plumbers and automotive service technicians as these tradespeople interact frequently with customers.

Note: It is intended that the Oral Communication curriculum be embedded in other Essential Skills curriculum where possible. Many of the competencies in Oral Communication and the five other essential skills may be mastered concurrently.

General Online Resources:

Essential Skills Profile and Readers Guide

Human Resources and Skills Development Canada

http://srv108.services.gc.ca/english/general/home_e.shtml

National Occupational Analysis

http://www.red-seal.ca/Site/trades/analist_e.htm

OC1 Demonstrate an Understanding of Oral Communication

Upon completion of this objective, learners will be able to:

- 1.1 differentiate between oral and other forms of communication
 - distinguish between verbal and non-verbal communication
- 1.2 identify the purpose of oral communication
- 1.3 identify the benefits of effective oral communication
 - project a professional image through oral communication
- 1.4 identify barriers to effective oral communication
 - identify how the following can produce barriers: sender, listener, content, environment
 - outline personal habits that may interfere with effective oral communication: tone, volume, voice speed, facial expression, eye contact, etc.
- 1.5 identify the risks associated with ineffective oral communication
- 1.6 outline ways to reduce the risk of ineffective oral communication

Suggested Strategies and Activities:

- Hold a general discussion on benefits of effective oral communication
- Ask learners for examples of workplace communication, both effective and ineffective, and the consequences of each
- Refer to Essential Skills profile for the trade and find examples of the various types of communication and the purpose of each
- Discuss the factors that determine whether the communication is either simple or complex
- Explain the elements of communication
- Discuss the difference between, and the importance of, both verbal and non-verbal communication
- Discuss specific, common barriers as they relate to the trade
- Provide learners with an opportunity to assess areas of strength and those areas where they should improve
- Establish some rules for effective communication in class
- Have learners reflect upon communicative challenges in everyday life

Resources:

- Applied Communication Skills for the Construction Trades
- Tools for Success: *Soft Skills for the Construction Industry*
- Business English and Communication, 5th Canadian Edition

- Effective Workplace Communication, *3rd Edition*
- Communicating in the Workplace, *6th Canadian Edition*
- HVACR 101 (Chapter 10)

Online Resources:

- <https://www.lseducation.org.uk/user/order.aspx?code=060014> (Teaching speaking and listening; a toolkit for practitioners)
- <http://www.mindtools.com/page8.html> (Mind Tools: Communication Skills)
- <http://www.khake.com/page66.html>
- <https://www.lseducation.org.uk/user/login.aspx?code=078838&P=078838PD&action=pdfdl&src=XOWEB> (Key Skills Support Program: Communication)

OC2 Communicate Effective Messages

Upon completion of this objective, learners will be able to:

- 2.1 identify audience
- 2.2 identify purpose
- 2.3 organize thoughts and ideas
- 2.4 communicate effectively to a variety of audiences
 - use non-verbal techniques to reinforce the verbal message
 - use appropriate terminology
 - communicate one-on-one
 - participate in group discussions
 - present information to groups

Suggested Strategies and Activities:

- Ask learners to identify the different people they speak with at work (e.G., project managers, supervisors, foremen, co-workers, workers in other trades, customers, suppliers)
- Discuss the differences in communicating with each
- Ask learners to think about the jargon, technical language and abbreviations that are used in their trade and the appropriateness of using this language with each audience
- Increase awareness of poor speech habits by creating a list of those that learners have observed
- Identify and discuss significance of non-verbal communication such as facial expression, posture and gestures
- Identify strategies for effective telephone communication, use of cellular telephone and two-way radio
- Provide opportunities for learners to give instructions in class setting by giving oral instructions to others one-on-one or to the group
- Provide opportunities for engaging learners in discussion
- Encourage speaking in class to increase learner confidence
- Hand out materials on effective participation in meetings and group discussions
- Provide opportunities for learners to share information in the form of a short presentation on a topic that they are comfortable with using a visual aid such as a picture, sketch or diagram to increase understanding
- Use the process of giving and receiving of feedback as a communication activity
- Create a safe atmosphere for giving and receiving feedback on communication style
- Assign learners the task of leading the class through some of the assigned material

Resources:

- Tools for Success: *Soft Skills for the Construction Industry*
- Applied Communications Skills for the Construction Trades
- Business English and Communication, *5th Canadian Edition*
- Communicating in the Workplace, *6th Canadian Edition*
- HVACR 101 (Chapter 10)
- Effective Workplace Communication, *3rd Edition*

Online Resources:

- <https://www.lseducation.org.uk/user/order.aspx?code=060014> (Teaching speaking and listening: a toolkit for practitioners)
- <https://www.lseducation.org.uk/user/login.aspx?code=078838&P=078838PD&action=pdfdl&src=XOWEB> (Key Skills Support Program: Communication)
- <http://www.mindtools.com/page8.html> (Mind Tools: Communication Skills)
- <http://www.khake.com/page66.html>

OC3 Listen Effectively

Upon completion of this objective, learners will be able to:

- 3.1 identify the difference between listening and active listening
- 3.2 identify the purpose of active listening
- 3.3 identify active listening strategies
- 3.4 implement active listening strategies

Suggested Strategies and Activities:

- Discuss the importance of good listening skills in a variety of situations at work
- Define active listening
- Identify barriers to effective listening
- Have learners think about and monitor their listening skills
- Identify strategies for active listening including paraphrasing, questioning and note-taking
- Practice strategies for active listening
- Encourage learners to implement active listening strategies during training and on the job
- Have learners receive and follow-up on messages and instruction

Resources:

- Effective Workplace Communication, *3rd Edition*
- Tools for Success: *Soft Skills for the Construction Industry*
- Applied Communications Skills for the Construction Trades
- Business English and Communication, *5th Canadian Edition*
- Communicating in the Workplace, *6th Canadian Edition*
- HVACR 101 (Chapter 10)

Online Resources:

- <https://www.lseducation.org.uk/user/order.aspx?code=060014> (Teaching speaking and listening; a toolkit for practitioners)
- <https://www.lseducation.org.uk/user/login.aspx?code=078838&P=078838PD&action=pdfdl&src=XOWEB> (Key Skills Support Program: Communication)
- <http://www.mindtools.com/page8.html> (Mind Tools: Communication Skills)
- <http://www.khake.com/page66.html>
- http://www.cte.uwaterloo.ca/teaching_resources/teaching_tips/tips_challenges/effective_communication.pdf (Teaching Tips)

OC4 Respond to Oral Communication

Upon completion of this objective, learners will be able to:

- 4.1 identify the main idea
- 4.2 interpret verbal messages
 - differentiate among fact, opinion and feeling
 - distinguish between relevant and irrelevant information
 - identify the role of non-verbal messages in oral communication
- 4.3 clarify received messages
 - ask questions to understand
 - summarize and restate information
- 4.4 respond appropriately to verbal messages

Suggested Strategies and Activities:

- Discuss the role of intonation, posture, gestures, tone of voice, facial expression and eye movement
- Have learners recognize and interpret visual cues (e.g., gestures, facial expression) to help understand messages
- Discuss 'vocally produced noises' (e.g., ah)
- Have learners brainstorm common 'vocally produced noises'
- Discuss how emotion can impact oral communication
- Have learners listen and respond to the viewpoints of others by asking relevant questions, offering opinions, and/or interpretations
- Use suitable resources for discussion (e.g., newspaper or magazine article on trade-related material)
- Have learners judge what information is relevant in verbal messages and trade-related material

Resources:

- Applied Communication Skills for the Construction Trades
- Tools for Success: *Soft Skills for the Construction Industry*
- Effective Workplace Communication, 3rd Edition
- Business English and Communication, 5th Canadian Edition
- Communicating in the Workplace, 6th Canadian Edition

Online Resources:

- <http://www.khake.com/page66.html>

Appendix A

Resources:

Applied Communications Skills for the Construction Trades

Stephan A. Rigolosi
Pearson Education Inc., 2002
ISBN: 0-13-093355-4

Business English and Communication, 5th Canadian Edition

Lyn R. Clark et al
McGraw-Hill Ryerson Limited, 1996
ISBN: 0-07-551777-9 (Teacher's Edition)

Communicating in the Workplace, 6th Canadian Edition

Margaret Dombek et al
McGraw-Hill Ryerson Limited, 2003
ISBN: 978-0-07090-814-7

Effective Workplace Communications-Skills for Success in Life and on the Job, 3rd Edition

Marsha Ludden
JIST Works, 2007
ISBN: 978-1-59357-433-8
www.jist.com

HVACR 101

Air Conditioning Contractors of America
PHCC Educational Foundation
Refrigeration Service Engineers Society
Delmar CENGAGE Learning, 2009
ISBN: 13-978-1-4180-663-5

Tools for Success- Soft Skills for the Construction Industry, 2nd Edition

National Centre for Construction Education and Research
Pearson Education Inc., 2004
ISBN: 0-13-109194-8

All online resources listed in this document were operational at time of publication.

Computer Use (CU) Learning Outcome: Learners will use computer technology to access and interpret information and to communicate.

**CU1 Use
Computer
Operations**

1.1 Identify the primary components of a computer	1.2 Describe the function of the primary components of a computer	1.3 Start up the computer, monitor and printer	1.4 Shut down the computer, monitor and printer	1.5 Log onto a network using a personal password	1.6 Demonstrate basic troubleshooting strategies
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**CU2 Use Word
Processing Skills**

2.1 Open and close software	2.2 Create written documents	2.3 Create tables, graphs and charts	2.4 Open existing written documents, tables, graphs and charts	2.5 Save written documents, tables, graphs and charts	2.6 Preview and print written documents, tables, graphs and charts
2.7 Copy and move text	2.8 Delete text	2.9 Format text	2.10 Set tabs	2.11 Set margins	2.12 Add and delete headers and footers
2.13 Add and delete page numbers	2.14 Set page layout	2.15 Check and correct spelling	2.16 Check and correct grammar	2.17 Use thesaurus	

**CU3 Use File
Management
Skills**

3.1 Distinguish between files and folders	3.2 Create files and folders	3.3 Save files	3.4 Copy files and folders	3.5 Move files and folders	3.6 Organize files and folders
3.7 Rename files and folders	3.8 Delete files and folders				

**CU4 Use
Spreadsheets**

4.1 Identify the purpose of spreadsheets in the trade	4.2 Interpret information in existing spreadsheets	4.3 Enter data into existing spreadsheets	4.4 Manipulate data within existing spreadsheets	4.5 Create spreadsheets	4.6 Create and copy formulas to perform calculations
4.7 Print spreadsheets	4.8 Print selected parts of spreadsheets				

**CU5 Read and
Write E-mail
Messages**

5.1 Open messages	5.2 Reply to messages	5.3 Write, send and forward messages	5.4 Print messages	5.5 Add attachments to messages	5.6 Delete messages
5.7 Create folders	5.8 Move messages to folders	5.9 Delete folders	5.10 Identify and manage common email problems		

**CU6 Use Web
Search Skills**

6.1 Define web browser	6.2 Access a specific website	6.3 Use a search engine	6.4 Evaluate information found on the World Wide Web	6.5 Download information from the World Wide Web	6.6 Copy information from the World Wide Web
6.7 Save information from the World Wide Web	6.8 Share information from the World Wide Web	6.9 Print information from the World Wide Web			

Learners will use computer technology to access and interpret information and to communicate

Introduction

The workforce is constantly changing. Today's employees are highly mobile, expect continuous learning to be an integral part of their job and are adapting to a technological world. In fact, technology has changed the very fabric of the workplace and, as a result, workers are expected to acquire a broad range of skills if they are to remain current, accurate and competitive. Trades occupations are no exception. For example: automation in plants and factories has demanded an increased knowledge of networking and software use; lathes and cutting tools are often linked to computers; and entrepreneurs require skills in word processing, accounting, email and Internet use, and database management.

This Computer Use (CU) course has been designed to help workers adapt to this ever-changing society. It is intended for individuals who are inexperienced computer users but who want to gain some hands-on skill and confidence. It assumes no previous knowledge of computers and will provide learners with a broad overview of computer and Internet technology. The following major topic areas are explored:

- Computer Operations
- Word Processing
- File Management
- Spreadsheets
- Email
- Web Browsing
- Safe Use of Computers

This following guide outlines a list of recommended resources (see Appendix A) for each objective in the Computer Use curriculum framework and, where possible, includes online website materials that complement these resources. Because computer skills are generic in the workplace, this course is not contextualized to specific trades. Apprentices, however, should be provided with examples of how computers are used in their respective trade. Contextualized website lists are provided in Appendix B.

The list of resources has been designed to act only as a guide and may, therefore, need to be adapted to meet the needs of individuals or groups. It is the role of you, the instructor, to choose materials and deliver the content as it best suits individual learner needs. A variety of materials are listed under each set of competencies for this purpose.

Note: *The computer use curriculum can be used in one of two ways: as a stand-alone course or embedded in other Essential Skills curriculum. For instance, computer use competencies (e.g., email, word processing) and writing competencies may be mastered concurrently.*

CU1 Use Computer Operations

Upon completion of this objective, learners will be able to

- 1.1 identify the primary components of a computer – monitor, keyboard, mouse, system unit, ports, disk drives, printers
- 1.2 describe the function of the primary components of a computer
- 1.3 start up the computer, monitor and printer
- 1.4 shut down the computer, monitor and printer
- 1.5 log onto a network using a personal password
- 1.6 demonstrate basic troubleshooting strategies
 - protect and care for flash drives, CD ROMs and other media
 - clean computer components
 - maintain back-up copies of documents
 - perform basic maintenance

Resources:

- Essential Skills for Digital Literacy- IC3 Module A ~ Courseware 2105-2 - Computing Fundamentals using Windows XP

Online Resources:

- www.ctdlc.org/remediation/indexComputer.html
- www.homepages.ed.ac.uk/calarks/arks/materials.html
- www.functionx.com/windows/Lesson01.htm
- www.bcot1.com/

CU2 Use Word Processing Skills

Upon completion of this objective, learners will be able to:

- 2.1 open and close software
- 2.2 create written documents
- 2.3 create tables, graphs, and charts
- 2.4 open existing written documents, tables, graphs, and charts
- 2.5 save written documents, tables, graphs, and charts
- 2.6 preview and print written documents, tables, graphs, and charts
- 2.7 copy and move text
- 2.8 delete text
- 2.9 format text
 - change font
 - highlight text
 - italicize, bold, and underline text
- 2.10 set tabs
- 2.11 set margins
- 2.12 add and delete headers and footers
- 2.13 add and delete page numbers
- 2.14 set page layout
- 2.15 check and correct spelling
- 2.16 check and correct grammar
- 2.17 use thesaurus

Resources:

- Essential Skills for Digital Literacy IC3 Module B ~ Courseware 2109-2 - Key Applications using Microsoft Office 2003

Online Resources:

- <http://www.baycongroup.com/wlesson0.htm>
- www.ctdlc.org/remediation/indexWord.html
- www.shaunakelly.com/word/concepts/starttyping/index.html
- www.baycongroup.com/tutorials.htm
- www.itrainonline.org/itrainonline/english/computers.shtml
- www.homepages.ed.ac.uk/calarks/arks/materials.html
- www.hilc.ns.ca/downloads/pdfs/resources/TheESLComputerBookWord2003.Pdf
- www.nald.ca/library/learning/WPerfect/WP8.pdf
- www.bcot1.com/

CU3 Use File Management Skills

Upon completion of this objective, learners will be able to:

- 3.1 distinguish between files and folders
- 3.2 create files and folders
- 3.3 save files
- 3.4 copy files and folders
- 3.5 move files and folders
- 3.6 organize files and folders
- 3.7 rename files and folders
- 3.8 delete files and folders

Resources:

- Essential Skills for Digital Literacy- IC3 Module A ~ Courseware 2105-2 - Computing Fundamentals Using Windows XP

Online Resources:

- www.onlinecomputertips.com/tutorials/file_mgmt.html
- www.inet4.swtjc.net/nmasters/Orientation/Topic05.htm
- www.cter.ed.uiuc.edu/tutorials/filemanagmt/
- www.facweb.furman.edu/~pecoy/mfl195/tutorial/index.htm
- www.bcot1.com/

CU4 Use Spreadsheets

Upon completion of this objective, learners will be able to:

- 4.1 identify the purpose of spreadsheets in the trade
- 4.2 interpret information in existing spreadsheets
- 4.3 enter data into existing spreadsheets
- 4.4 manipulate data within an existing spreadsheet
- 4.5 create a spreadsheet
- 4.6 create and copy formulas to perform calculations
- 4.7 print spreadsheets
- 4.8 print selected parts of spreadsheets

Resources:

- Essential Skills for Digital Literacy- IC3 Module B ~ Courseware 2109-2 - Key Applications Using Microsoft Office 2003

Online Resources:

- <http://www.baycongroup.com/el0.htm>
- www.homepages.ed.ac.uk/calarks/arks/Materials/it2001/Database_2001.pdf
- <http://www.swtc.edu:8082/mscenter/tutorial.htm#Editing%20in%20Excel>
- www.nald.ca/CLR/Excel2k2/Excel2k2.pdf
- www.wcu.edu/ccenter_inf/CatOnline/MSEX/index.html
- www.bcot1.com/

CU5 Read and Write Email Messages

Upon completion of this objective, learners will be able to:

- 5.1 open messages
- 5.2 reply to messages
- 5.3 write, send and forward messages
- 5.4 print messages
- 5.6 add attachments to messages
- 5.7 delete messages
- 5.8 create folders
- 5.9 move messages to folders
- 5.10 delete folders
- 5.11 identify and manage common email problems

Resources:

- Essential Skills for Digital Literacy- IC3 Module C ~ Courseware 2118-2 - Living Online Using Windows XP
- Tools for Success Soft Skills for the construction Industry, *2nd Edition*, Module 6
- Effective Workplace Communications-Skills for Success in Life and on the Job, *3rd Edition* (Chapter 7)

Online Resources:

- www.ctdlc.org/remediation/indexe-mail.html (tutorial)
- www.scs.nevada.edu/support/tutorials/nettutor/20_mailaddresses.html
- www.colc.co.uk/new/index.html (tutorial)
- www.homepages.ed.ac.uk/calarks/arks/Materials/it2001/e-mail.pdf
- www.misa.ns.ca/downloads/pdfs/resources/newESLComputerBookTheInternet.pdf
- www.bcot1.com/

CU6 Use Web Search Skills

Upon completion of this objective, learners will be able to:

- 6.1 define web browser
- 6.2 access a specific website
- 6.3 use a search engine
- 6.4 evaluate information found on the World Wide Web
- 6.5 download information from the World Wide Web
- 6.6 copy information from the World Wide Web
- 6.7 save information from the World Wide Web
- 6.8 share information from the World Wide Web
- 6.9 print information from the World Wide Web

Resources:

- Essential Skills for Digital Literacy- IC3 Module C ~ Courseware 1103-1 - Living Online Using Windows XP
- Applied Communication Skills for the Construction Trades (Module 6)

Online Resources:

- www.ctdlc.org/remediation/indexWeb.html (tutorial)
- www.scs.nevada.edu/support/tutorials/nettutor/20_mailaddresses.html
- www.colc.co.uk/new/index.html (tutorial)
- www.homepages.ed.ac.uk/calarks/arks/Materials/it2001/internet_explorer.pdf
- www.nald.ca/CLR/Internet/internet.pdf
- www.bcot1.com/
- http://www.newbie.org/internet_explorer/

General Search Engines:

- www.a9.com (Powered by Amazon)
- www.google.ca/ (Google Canada)
- www.live.com/ (MSN Search)
- ca.yahoo.com/?p=us (Yahoo)
- en-us.start.mozilla.com (Firefox)

Appendix A

Resources:

Effective Workplace Communications-Skills for Success in Life and on the Job, 3rd Edition

Marsha Ludden

JIST Works, 2007

ISBN: 978-1-59357-433-8

www.jist.com

Essential Skills for Digital Literacy- IC3 Module A ~ Courseware 2105-2 - Computing Fundamentals Using Windows XP

CCI Learning Solutions Inc., 2004

ISBN: 1-55332-086-7

www.ccilearning.com

Essential Skills for Digital Literacy- IC3 Module B ~ Courseware 2109-2 - Key Applications Using Microsoft Office 2003

CCI Learning Solutions Inc., 2004

ISBN: 1-55332-087-5

www.ccilearning.com

Essential Skills for Digital Literacy- IC3 Module C ~ Courseware 2118-2 - Living Online Using Windows XP

CCI Learning Solutions Inc., 2004

ISBN: 1-55332-088-3

www.ccilearning.com

Tools for Success- Soft Skills for the Construction Industry, 2nd Edition

National Centre for Construction Education and Research

Pearson Education Inc., 2004

ISBN: 0-13-109194-8

Appendix B

General Websites

- www.red-seal.ca/Site/index_e.htm (The Interprovincial Standards Red Seal Program)
- www.ccohs.ca/ (Canadian Centre for Occupational Health and Safety)
- trades.exambank.com/index.html (Trades Exam Bank)
- www.hrsdc.gc.ca/en/labour/workplace_health/index.shtml (Workplace Health and Safety)
- www.hrsdc.gc.ca/en/hip/hrp/essential_skills/essential_skills_index.shtml (Human Resources and Social Development Canada-Essential Skills Website)
- www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index-eng.php (WHMIS)
- www.wcb.pe.ca/index.php3?number=60189 (Worker's Compensation Board of PEI)
- www.gov.pe.ca/educ/index.php3?number=74951 (PEI Apprenticeship Training)
- www.irc.nrc-cnrc.gc.ca/codes/home_E.shtml (Canadian Codes Centre)
- www.jobsafecanada.ca/en/default.html (Job Safety Information)
- www.canoshweb.org/ (Canada's National Occupational Health and Safety Website)
- www.oshweb.com/ (Index of Occupational Health and Safety Resources)
- www.iapa.on.ca/about_iapa/about_intro.asp (Industrial Accident Prevention Association)
- www.cos-mag.com/ (Canadian Occupational Safety Magazine)
- www.nationalcodes.ca/ (National Code Documents)
- www.theglobeandmail.com/ (The Globe and Mail)
- www.nationalpost.com/ (The National Post)
- www.theguardian.pe.ca/ (The Guardian)
- www.cbc.ca/pei/ (CBC-PEI)
- www.cbc.ca (CBC-National)

Websites for Metal Fabricators and Welders

- www2.thefabricator.com/ (Metal Fabrication-related Information on Various Topics)
- www.khake.com/page89.html (Metal Fabrication/Welding-related Information on Various Topics)
- www.twi.co.uk/j32k/index.xtp (Metal Fabrication/Welding-related Information on Various Topics)
- www.welding.com/ (Metal Fabrication/Welding-related Information on Various Topics)
- www.cipmetalworking.com/FAB/FABCurrent.htm (Fabricating Information)
- www.welding.org/newsletters/current/index.html (Fabricating Information)
- www.gowelding.com/weld/symbol/symbol.htm (Welding Symbols)

- www.metalwebnews.com/wc.html (Metal Web News)
- www.metalinfo.com/partners/AMM/metalglossary.cfm (Metal Glossary)
- www.aws.org/w/a/ (American Welding Society)
- www.cwa-acs.org/ (Canadian Welding Association)
- www.cwbgroup.org/ (Canadian Welding Bureau)
- www.mcac.ca/ (Mechanical Contractors Association of Canada)
- www.creativeglossary.com/welding/ (Glossary of Welding Terms)

All online resources listed in this document were operational at time of publication.

Writing (W) Learning Outcome: Learners will write to communicate for a variety of purposes.

**W1 Plan the
Writing Process**

1.1 Identify purpose	1.2 Identify audience	1.3 Identify the most effective writing format for task
----------------------	-----------------------	---

W2 Write Clear Words, Sentences and Paragraphs

2.1 Use words effectively	2.2 Write effective sentences	2.3 Write effective paragraphs
---------------------------	-------------------------------	--------------------------------

W3 Use Correct Mechanics

3.1 Use correct spelling	3.2 Use correct punctuation	3.3 Use correct capitalization	3.4 Use correct grammar
--------------------------	-----------------------------	--------------------------------	-------------------------

W4 Write Business Communications

4.1 Write lists	4.2 Complete forms	4.3 Write notes	4.4 Write memos	4.5 Write letters	4.6 Write resumés
4.7 Write reports					

W5 Edit Business Communications

5.1 Proofread for clarity, tone, accuracy and brevity	5.2 Rewrite for clarity, tone, accuracy and brevity
---	---

Learners will write to communicate for a variety of purposes

Introduction

Effective written communication is the backbone of any workplace or organization. More specifically, good communication skills reduce the chance of faulty interpretation which, in turn, allows for maximum productivity.

As the economy changes, so too does the workplace. Necessary reorganization and technological change demand that workers who would generally not be responsible for a high level of workplace writing are now expected to communicate internally and externally on a regular basis through memos, emails, faxes and reports.

The following guide is an introduction to the key writing skills workers need to deal effectively with everyday written correspondence and business communications and provides strategies to help learners improve their ability to write.

A list of resources (see Appendix A) has been outlined for each objective in the Writing Curriculum Framework and, where possible, includes online website materials that complement these resources. All information is presented in a generic manner; the contextualization to specific trades will be found in the expected writing tasks of each trade as determined by the instructor.

The following information has been designed to act as a guide only and may, therefore, need to be adapted to meet the needs of individuals or groups. It is the role of you, the instructor, to choose materials and deliver the content as it best suits individual learner needs. A variety of materials are listed under each set of competencies for this purpose.

Outlined below are examples of writing tasks performed by tradespeople. These tasks may be used as a basis for writing expectations.

Examples of Writing Tasks

- | | |
|--|-----------------------------------|
| ✓ Incident/accident reports | ✓ Emails/memos |
| ✓ Detailed lists of materials needed for a job | ✓ Quotations |
| ✓ Inventory lists | ✓ Material requests |
| ✓ Brief descriptions of work for invoices | ✓ Daily logbook |
| ✓ Progress notes | ✓ Informative notes to co-workers |
| ✓ Proposals | ✓ Safety guidelines |
| ✓ Meeting minutes | ✓ Technical service reports |

WR1 Plan the Writing Process

Upon completion of this objective, learners will be able to:

- 1.1. identify purpose
- 1.2. identify audience
- 1.3. identify the most effective writing format for task

Resources:

- Making Choices: Teaching Writing in the Workplace
- Applied Communication Skills for the Construction Trades
- Write for Business: A Compact Guide to Writing & Communicating in the Workplace
- Successful Technical Writing- A Practical Approach
- Workplace Communications- The Basics, Third Edition

Online Resources:

- <http://www.scribd.com/doc/63429/GP-BUSINESS-WRITING>
- <http://www.keyskillssupport.net/teacandlearresoa/>
- <http://www.learnatest.com/LearningExpressEBooks/download.cfm?b=1576854647&CFID=11332069&CFTOKEN=e85e76858482c2-E02C2DF7-BCDF-04A2-B71D21CCD13D388C>
- <http://www.khake.com/page66.html>

WR2 Write Clear Words, Sentences and Paragraphs

Upon completion of this learning objective, learners will be able to:

- 2.1 use words effectively
- 2.2 write effective sentences
- 2.3 write effective paragraphs

Resources:

- Applied Communication Skills for the Construction Trades
- Write for Business: A Compact Guide to Writing & Communicating in the Workplace
- Workplace Communications- The Basics, *3rd Edition*

Online Resources:

- <http://www.scribd.com/doc/63429/GP-BUSINESS-WRITING>
- <http://www.keyskillssupport.net/teacandlearresoa/>
- <http://www.learnatest.com/LearningExpressEBooks/download.cfm?b=1576854647&CFID=11332069&CFTOKEN=e85e76858482c2-E02C2DF7-BCDF-04A2-B71D21CCD13D388C>
- <http://www.khake.com/page66.html>

WR3 Use Correct Mechanics

Upon completion of this objective, learners will be able to:

- 3.1 use correct spelling
- 3.2 use correct punctuation
- 3.3 use correct capitalization
- 3.4 use correct grammar

Resources:

- Applied Communication Skills for the Construction Trades
- Write for Business: A Compact Guide to Writing & Communicating in the Workplace
- Successful Technical Writing- A Practical Approach
- Workplace Communications- The Basics, 3rd Edition

Online Resources:

- <http://www.scribd.com/doc/63429/GP-BUSINESS-WRITING>
- <http://www.keyskillssupport.net/teacandlearresoa/>
- <http://www.learnatest.com/LearningExpressEBooks/download.cfm?b=1576854647&CFID=11332069&CFTOKEN=e85e76858482c2-E02C2DF7-BCDF-04A2-B71D21CCD13D388C>
- <http://www.ucalgary.ca/UofC/eduweb/grammar/>
- <http://www.khake.com/page66.html>

WR4 Write Business Communications

Upon completion of this objective, learners will be able to:

- 4.1 write lists
- 4.2 complete forms
- 4.3 write notes
- 4.4 write memos
- 4.5 write letters
- 4.6 write resumés
- 4.7 write reports

Resources:

- Making Choices: Teaching Writing in the Workplace
- Applied Communication Skills for the Construction Trades
- Tools for Success: Soft Skills for the Construction Industry, *2nd Edition*
- Write for Business: A Compact Guide to Writing & Communicating in the Workplace
- Effective Workplace Communications-Skills for Success in Life and on the Job, *3rd Edition* (Chapter 6)
- Successful Technical Writing- A Practical Approach
- Workplace Communications- The Basics, *3rd Edition*

Online Resources:

- http://oregonstate.edu/dept/eli/buswrite/Business_Writing_Help.html
- <http://www.scribd.com/doc/63429/GP-BUSINESS-WRITING>
- <http://www.keyskillssupport.net/teacandlearresoa/>
- <http://www.learnatest.com/LearningExpressEBooks/download.cfm?b=1576854647&CFID=11332069&CFTOKEN=e85e76858482c2-E02C2DF7-BCDF-04A2-B71D21CCD13D388C>
- <http://www.khake.com/page66.html>

WR5 Edit Business Communications

Upon completion of this objective, learners will be able to:

- 5.1 proofread written work
- 5.2 rewrite written work for clarity, tone, accuracy and brevity

Resources:

- Applied Communication Skills for the Construction Trades
- Write for Business: A Compact Guide to Writing & Communicating in the Workplace
- Successful Technical Writing- A Practical Approach
- Workplace Communications- The Basics, *3rd Edition*

Online Resources:

- <http://www.scribd.com/doc/63429/GP-BUSINESS-WRITING>
- <http://www.keyskillssupport.net/teacandlearresoa/>
- <http://www.learnatest.com/LearningExpressEBooks/download.cfm?b=1576854647&CFID=11332069&CFTOKEN=e85e76858482c2-E02C2DF7-BCDF-04A2-B71D21CCD13D388C>
- <http://www.khake.com/page66.html>

Appendix A

Resource Materials:***Applied Communication Skills for the Construction Trades***

Steven A. Rigolosi
Pearson Education Inc., 2002
ISBN: 0-13-093355-4

Effective Workplace Communications-Skills for Success in Life and on the Job, 3rd Edition

Marsha Ludden
JIST Works, 2007
ISBN: 978-1-59357-433-8
www.jist.com

Making Choices: Teaching Writing in the Workplace

Diane Millar
Grass Roots Press, 2002
Instructional Activities Manual (ISBN: 1-894593-13-8)
Reference Manual (ISBN: 1-894593-12-X)

Successful Technical Writing- A Practical Approach

Bill Wesley Brown
The Goodheart-Willcox Company Inc., 2000
ISBN: 1-56637-696-3
ISBN (Instructor's Guide): 13-978-1-56637-697-6

Tools for Success: Soft Skills for the Construction Industry, 2nd Edition

National Centre for Construction Education and Research
Contren Learning Series
Pearson Education Inc., 2004
ISBN: 0-13-160000-1

Workplace Communications- The Basics, 3rd Edition

George J. Searles
Pearson Education Inc., 2006
ISBN: 0-321-33068-4

Write for Business: A Compact Guide to Writing & Communicating in the Workplace

Verne Meyer, Pat Sebranek, John Van Rys

UpWrite Press, 2004

ISBN (hardcover): 1-932436-00-6

ISBN (spiral): 1-932436-01-4

All online resources listed in this document were operational at time of publication.

TABLE OF CONTENTS

METAL FABRICATOR NOC 7263

SECTION	PAGE
1. Introduction	228
2. National Occupational Analysis (NOA) – Technical Skills Inventory (TSI) Diagram	229
3. Assessor's Guide	230
4. Learners' Guide	240
5. Technical Skills Inventory (TSI)	242
6. TSI Group Summary Spreadsheet	247
7. Group Learning Plan and Pie Chart (Sample)	250
8. Individual Learning Plan and Pie Chart (Sample)	252

SECTION 1 - INTRODUCTION

Points to Consider

- 80% of learning in a trade happens in the workplace.
- Every workplace in every province and territory has its own unique learning culture.
- Each journeyperson has their individual approach to guiding an apprentice.
- Every apprentice will write the **same** National exam.

Background

The road to a trade certification has many paths. For an apprentice who has not taken the pre-apprentice training and Block/Period/Level in-school route, it can be a difficult road to navigate. The primary focus appears to be accumulating enough hours for eligibility to challenge the Interprovincial (Red Seal) exam.

The one tool that is available, if an apprentice chooses the Block/Period/Level route, is the Provincial Log Book. This Log Book tracks the Blocks, Tasks and Sub-tasks that an apprentice has learned in the workplace. For apprentices who have chosen the route on which 100% of their learning happens in the workplace, it can be difficult to “know what you don’t know.” On this path the apprentices never had a Log Book so in order to challenge, they have their journeyperson sign off on the Blocks when they have accumulated the hours required to challenge the IP certification exam in their trade.

Provincial/Territorial Log Books are developed from the National Occupational Analysis (NOA) in a trade. Most apprentices are never introduced to the NOA of their trade even though it is used to develop trades curriculum, block/period/level tests and the IP exam.

Technical Skills Inventory (TSI)

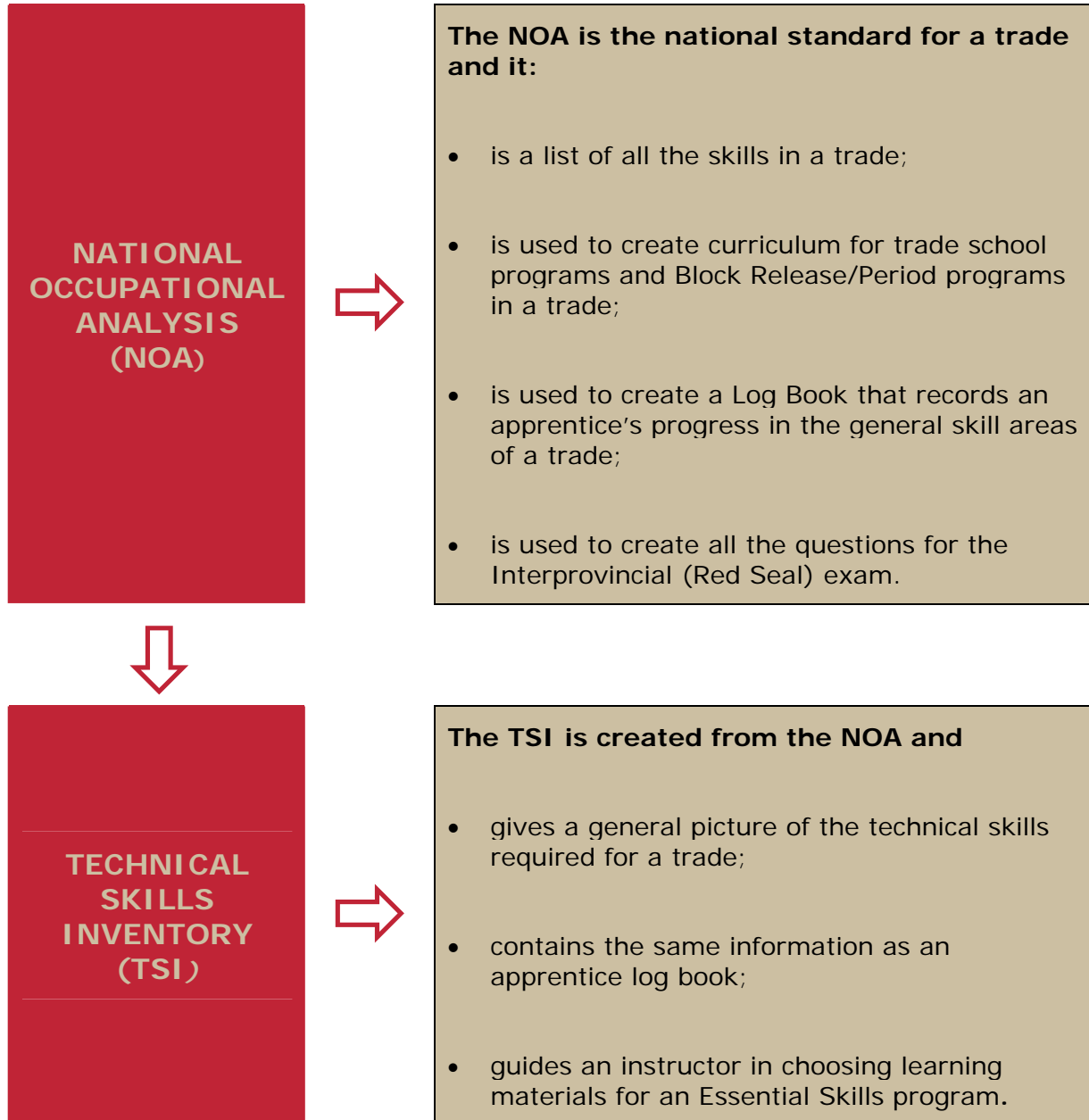
The Technical Skills Inventory (TSI) is created from the NOA. It is a self-assessment tool designed to give the apprentices the opportunity to reflect on their technical skills, identify skills gaps and make a plan to fill those gaps, **before** they challenge the IP exam.

The TSI also provides information for Essential Skills assessors to create technical skills learning plans for individual apprentices and Essentials Skills program instructors. These learning plans are used by the instructor and the apprentice to select technical skills resources that support Essential Skills learning programs.

Feature

The TSI “Group Summary” has formulas imbedded so data can be easily extracted and manipulated for presentation in a pie chart format.

**SECTION 2 - NATIONAL OCCUPATIONAL ANALYSIS (NOA) –
TECHNICAL SKILLS INVENTORY (TSI) DIAGRAM**



SECTION 3 - ASSESSOR'S GUIDE

STEP ONE: INTRODUCE PARTICIPANTS TO THE NATIONAL OCCUPATIONAL ANALYSIS (NOA)

Rationale

National Occupational Analysis (NOA)

The NOA is recognized as the national standard for all trades. There is an NOA for each trade in Canada and, although the NOAs are readily accessible online, few tradespeople take advantage of this information. (To access NOAs on line, go to www.red-seal.ca and click on national occupational analysis)

NOA Background

An NOA is reviewed and revised at least every 5 years. Each NOA is developed by a Joint Planning Committee and the Interprovincial Program Guide Working Group, comprised of industry and instructional representatives in a specific trade from each province and territory in Canada. All Joint Planning Committees operate under the auspices of the Canadian Council of Directors of Apprenticeship (CCDA) who recognize the NOA as the key document in an occupation. The CCDA consists of directors/managers of apprenticeship from every province and territory in Canada.

The NOA:

- Lists every technical skill requirement in a trade;
- Is used to create the Apprentice Log Book in a trade;
- Is used to develop curriculum for trades training programs; and
- Is used to develop the questions for Inter Provincial Exam (Red Seal).

Activity

Preparation

Have an NOA printed for each participant. Ensure each NOA has page indicators at these sections:

- Analysis
- Tools and Equipment
- Glossary
- Exam Components

NOTE: Move Pie Chart to the first page of the Exam Component section.

Timeline

The first night of class

Direction

Ask the participants if they have ever used or worked in an NOA before. If so, engage him/her in a discussion of where they used it and in what context. Then:

- Distribute an NOA to each participant;
- Review the development and layout of the document;
- Emphasize the use of the document, e.g., creating a log book, curriculum, possible exam questions, etc.; and
- Review each section of the document with particular attention to the Blocks, Tasks and sub-tasks in the Analysis section.

STEP TWO: INTRODUCTION TO THE TECHNICAL SKILLS INVENTORY (TSI)

Rationale

Technical Skills Inventory (TSI)

The TSI is created from the NOA. It gives a general picture of the technical skills required for a trade by listing the **Blocks**, **Tasks** and **Sub-tasks** in the trade. The TSI:

- Contains the same information as the Apprentice Log Book in a trade;
- Provides the participant with an opportunity to **self-assess** his/her general skills in their trade; and
- Guides the instructor in choosing contextualized resources for the Essential Skills program.

TSI Terminology

Two sets of terms can be used depending on where a participant learns and works in their trade. In this TSI Document, you will find the **common terminology** listed first. It is followed by the **competency-based terminology** in italics and underlined.

TSI Terminology

Blocks - Learning Categories: Tasks - Learning Outcomes:
Sub-tasks - Learning Objectives

By completing this Technical Skills Inventory (TSI) the participant will:

- be introduced to the **blocks** (*learning categories*), the **tasks** (*learning outcomes*), and the **sub-tasks** (*learning objectives*) in the NOA;
- reflect on his/her technical skills, then list what he/she knows and can do;
- document any technical skills gaps the participant may have;
- help create a group learning needs profile to assist curriculum developers and the instructor gather learning materials specific to a trade for an Essential Skills Program; and
- help the participant make a plan for any technical skills they may need to learn or improve

Activity

Preparation

Print an NOA Analysis Diagram for each participant.

Print a Learners Guide – Technical Skills Inventory (TSI).

Print a personalized TSI for each participant.

Timeline

The first night of class

Direction

Distribute an NOA Analysis Diagram to each participant in the program and review the content with him/her. Then:

- Distribute the Learner's Guide – Technical Skills Inventory (TSI) to each participant;
- Distribute the personalized TSI to each participant;
- Summarize the directions for completing the TSI;
- Advise the participants to review each sub-task and put a ✓ in the column that best describes their self-assessment of their skill:
 - Yes, I did this
 - I need to work on this
 - Not sure what this means
- Advise participants to include any comments they may have; and
- Collect TSIs when participants have completed them.

It should take approximately 20 minutes for a participant to complete their individual TSI. If some take longer, do not rush them.

Advise participants that you will meet with them at the **half-way** point of the program to give them feedback on their TSI. Advise them that in the meantime, you will be collecting the information from each TSI and compiling it for the instructor so he/she can prepare materials for the Essential Skills Program.

STEP THREE: COMPILE DATA FOR THE INSTRUCTOR

Rationale

The Essential Skills Programs at Trade Essentials are contextualized to the trade. This results in participants being easily engaged in their learning because they relate to the materials that support concepts and applications in their trade. Data collected through the TSI guides the instructor as to what contextual and technical resources will best engage his/her participants.

Timeline

Within 24 to 48 hours of the participants completing the TSI, provide the instructor with a **TSI Group Summary Chart** and **Group Learning Plan**.


Activity

Preparation

Develop a TSI Group Summary Chart

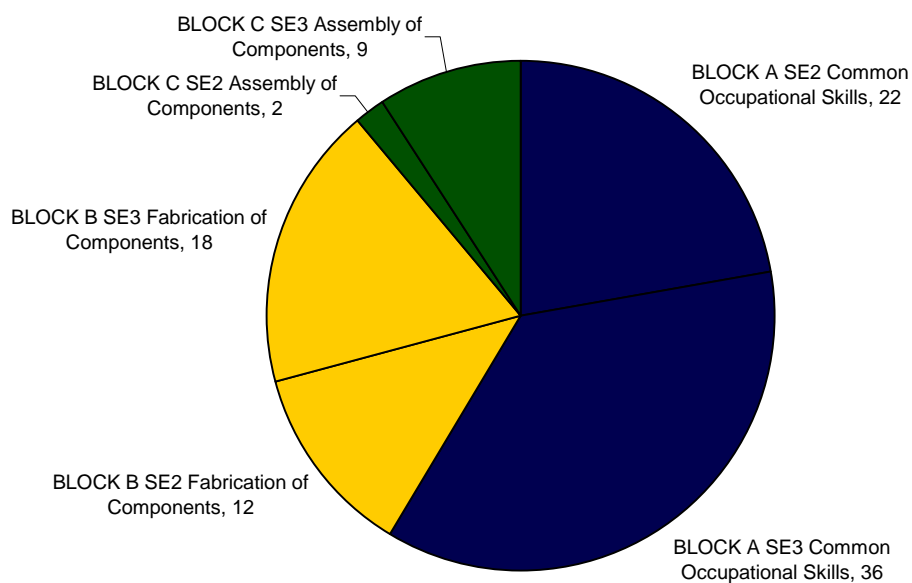
- Complete an Excel spreadsheet assigning one column to each participant;
- Assign the number code to each TSI column
 - 0 to the first column – Yes, I did this
 - 2 to the second column – I need to work on this
 - 3 to the third column – Not sure what this means
- Collect the data from the TSI and transfer it to the spreadsheet; and
- The 2s will automatically highlight in **yellow** and the 3s in **blue** so the instructor can easily identify a participant who has a learning need that differs significantly from the group;
- A group summary chart will appear at the bottom of your spreadsheet.

Direction

- Create a Pie Chart to produce a visual depiction of a group's learning needs
 - Highlight the entire "Summary Chart" on the last page of your spreadsheet.
 - On the tool bar, choose the "Chart Wizard" (Microsoft Office Excel 2003) 
 - Under chart "Chart type" choose "Pie"
 - Under "Chart Sub-Type" choose the first Pie picture
 - Click "Next"
 - Choose "Data Range" and "Columns" then click "Next"
 - Choose "Titles" and fill in "Chart Name" (Group Location and Trade)
 - On the same tool bar, choose "Legend" then "Bottom"
 - On the same tool bar choose "Data Labels" then choose "Category Name," "Value," and "Legend Key," then click "Next"
 - Under Chart Location choose "As New Sheet" and click "Finish"
 - To change a colour of a piece of the pie chart so 2s and 3s in the same piece of the pie match,
 - click inside the pie
 - click on the piece of pie you want to change
 - double click on that same piece and the colour chart will appear
 - choose your colour
 - To move or adjust items in the pie chart, right click on the pie chart, choose "Edit" then choose the item you want to adjust or move. Click outside the chart when you are finished
 - Choose "Edit", then "Copy" the pie chart and "Paste" it into the "Group Learning Plan"
- Provide the instructor with a copy of both the **TSI Group Summary Chart** and the **Group Learning Plan** within 24 to 48 hours so he/she can choose appropriate learning resources; and put one copy of the TSI Group Summary and the Group Learning Plan Pie Chart in the office files.

Sample Pie Chart

Group Learning Plan Metal Fabricator (Fitter) Summerside



■ BLOCK A SE2 Common Occupational Skills
 ■ BLOCK A SE3 Common Occupational Skills
 ■ BLOCK B SE2 Fabrication of Components
 ■ BLOCK B SE3 Fabrication of Components
 ■ BLOCK C SE2 Assembly of Components
 ■ BLOCK C SE3 Assembly of Components

STEP FOUR: ASSIST THE PARTICIPANT TO DEVELOP AN INDIVIDUAL TECHNICAL SKILLS LEARNING PLAN

Rationale

Information from the TSI is used to create an individual report for each participant. This report includes:

- Information on the TSI so the participant has a record of how he/she completed this tool;
- A Pie Chart that provides a visual depiction of the participant's learning needs; and
- A series of questions that result in each participant developing an individual technical skills learning plan.

Timeline

At the **mid-point** of the Essential Skills Program, provide participants with feedback on their TSI. This timeline:


- gives the participant an opportunity to focus entirely on their Essential Skills for the first few weeks of the program;
- gives the participant time to evaluate if, through their Essential Skills studies, they have discovered that their technical learning needs are more extensive than they previously assessed through their TSI;
- creates an opportunity for the participant to share how they are adjusting to a learning environment with someone other than the instructor; and
- provides an opportunity for the assessor to gather information from each participant to determine if resources and instruction are meeting their learning needs.

Activity

Preparation

Develop an Individual Learning Needs Plan Pie Chart for each participant to produce a visual depiction of a participant's learning needs.

Direction

- Transfer each participant's total for each Block both SE 2 - I need to work on this and SE 3 - Not sure what this means into a Pie Chart;
 - Highlight all of the Block titles in the "Summary Chart" on the last page of the spreadsheet
 - Hold down the Control Key (Ctrl) on your keyboard
 - Highlight one client column
 - On the tool bar, choose the "Chart Wizard" (Microsoft Office Excel 2003) 
 - Under chart "Chart type" choose "Pie"
 - Under "Chart Sub-Type" choose the first Pie picture
 - Click "Next"
 - Choose "Data Range" and "Columns" then click "Next"
 - Choose "Titles" and fill in "Chart Name" (Client name and Trade)
 - On the same tool bar, choose "Legend" then "Bottom"
 - On the same tool bar choose "Data Labels" then choose "Category Name," "Value," and "Legend Key," then click "Next"
 - Under Chart Location choose "As New Sheet" and click "Finish"
 - To change a colour of a piece of the pie chart so 2s and 3s in the same piece of the pie match,
 - click inside the pie
 - click on the piece of pie you want to change
 - double click on that same piece and the colour chart will appear
 - choose your colour
 - To move or adjust items in the pie chart, right click on the pie chart, choose "Edit" then choose the item you want to adjust or move. Click outside the chart when you are finished.
 - Choose "Edit", then "Copy" the pie chart and "Paste" it into the "Individual Learning Plan"

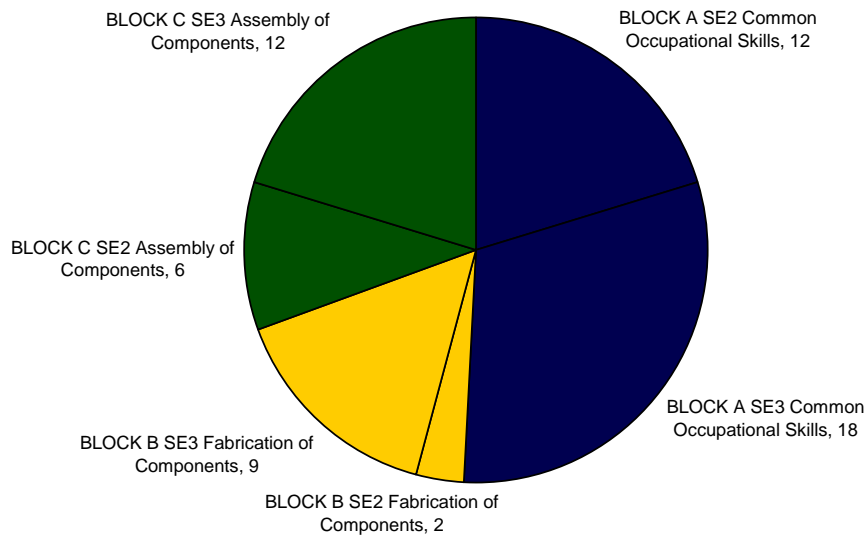
Feedback

- Schedule a one-on-one TSI feedback appointment with each participant during which you compare and discuss their Individual Learning Needs Pie Chart with the group Learning Needs Pie Chart
- Complete the **Individual Learning Plan** with the participant.
- Make 2 copies of the Individual Learning Plan. Put one copy in office file and one copy in your files.
- Give the original TSI and the original Individual Learning Plan back to the participant.

Each one-on-one meeting with a client should average 20 to 30 minutes.

Sample Pie Chart

J. Doe - Individual Learning Plan Metal Fabricator (Fitter) Summerside



■ BLOCK A SE2 Common Occupational Skills
 ■ BLOCK A SE3 Common Occupational Skills
 ■ BLOCK B SE2 Fabrication of Components
 ■ BLOCK B SE3 Fabrication of Components
 ■ BLOCK C SE2 Assembly of Components
 ■ BLOCK C SE3 Assembly of Components

SECTION 4 - LEARNER'S GUIDE

Key Document in your Trade

The National Occupational Analysis (NOA) is a trade document approved nationally and used in each Province and Territory across Canada. The NOA lists every technical skill required to be successful in your trade. Each NOA is used to:

- create the Apprentice Log Book in your trade;
- develop curriculum for trades training programs; and
- prepare questions for Red Seal exams.

Technical Skills Inventory (TSI)

The TSI is created from the NOA. It gives a general overview of the technical skills required for your trade by listing the Blocks, Tasks and Sub-Tasks in your trade. The TSI:

- contains the same information as the Apprentice Log Book in your trade; and
- gives you the opportunity to self-assess your general skills in your trade.

TSI Terms

Two sets of terms can be used depending on where you learn and work in your trade. In this TSI document you will find the **common terms** listed first. It is followed by the **competency-based terms** in italics and underlined. *(In the future, all NOA updates will be using competency-based terms.)*

TSI Terms

Common Terms

Competency-based Terms

Blocks _____ *Learning Categories*

Tasks _____ *Learning Outcomes*

Sub-tasks _____ *Learning Objectives*

Why complete a TSI?

By completing this Technical Skills Inventory (TSI) you will:

- be introduced to the **blocks** (*learning categories*), the **tasks** (*learning outcomes*), and the **sub-tasks** (*learning objectives*) in the NOA;
- help you think about your technical skills, then help you list what you know and can do;
- help you highlight any technical skills gaps you may have;
- help create a group learning needs profile to assist the instructor gather learning materials specific to your trade and your learning needs for your Essential Skills Program; and
- help you make a plan to get any technical skills you may need to learn or skills you may want to improve.

Directions

Review each sub-task and put a ✓ in the column that best describes your self-assessment of your skills:

- Yes, I did this
- I need to work on this
- Not sure what this means

Include any comments that may help the instructor choose learning materials for you.

NAME:

DATE:

Block A – *Learning Category*
COMMON OCCUPATIONAL SKILLS

Task 1 – Block A <i>Learning Outcome</i> Maintains and uses tools and equipment		Yes I did this	I need to work on this	Not sure what this means	Comments
A 1.01	Maintains hand tools				
A 1.02	Maintains power tools				
A 1.03	Maintains stationary machinery				
A 1.04	Maintains layout and measuring tools				
A 1.05	Maintains cutting and welding equipment				
A 1.06	Uses access equipment				
A 1.07	Uses personal protective equipment (PPE) and safety equipment				
Task 2 – Block A <i>Learning Outcome</i> Organizes work					
A 2.01	Interprets plans, drawings and specifications				
A 2.02	Uses documentation and reference material				
A 2.03	Communicates with others				
A 2.04	Organizes project tasks				
A 2.05	Maintains safe work environment				

Task 3 – Block A <u>Learning Outcome</u> Performs quality assurance		Yes I did this	I need to work on this	Not sure what this means	Comments
A 3.01	Performs visual inspections				
A 3.02	Verifies measurements				
A 3.03	Performs post-welding checks				
A 3.04	Marks materials and parts				
A 3.05	Verifies layout				
Task 4 – Block A <u>Learning Outcome</u> Handles materials					
A 4.01	Obtains materials				
A 4.02	Verifies piece marks				
A 4.03	Determines weights				
A 4.04	Identifies lifting points				
A 4.05	Operates material handling equipment				

Block B – *Learning Category*
FABRICATION OF COMPONENTS

Task 5 – Block B <i>Learning Outcome</i> Performs layout		Yes I did this	I need to work on this	Not sure what this means	Comments
B 5.01	Determines layout methods				
B 5.02	Performs pattern development				
B 5.03	Calculates material allowances for various processes				
B 5.04	Determines dimensions				
B 5.05	Transfers dimensions				
B 5.06	Makes templates				
B 5.07	Assembles jigs				
Task 6 – Block B <i>Learning Outcome</i> Cuts materials					
B 6.01	Cuts material using plasma cutting equipment				
B 6.02	Cuts material using oxy-fuel cutting equipment				
B 6.03	Cuts material using shears				
B 6.04	Cuts material using saws				
B 6.05	Cuts material using ironworkers				
B 6.06	Drills holes				
B 6.07	Cuts threads				
B 6.08	Prepares joints				

Task 7 – Block B <u>Learning Outcome</u> Forms materials		Yes I did this	I need to work on this	Not sure what this means	Comments
B 7.01	Forms material using plate rollers				
B 7.02	Forms material using shape rollers				
B 7.03	Forms material using brake presses				
B 7.04	Forms material using benders				
B 7.05	Applies heat for forming				

Block C – *Learning Category*
ASSEMBLY OF COMPONENTS

Task 8 – Block C <i>Learning Outcome</i> Fits and fastens sub-components and components		Yes I did this	I need to work on this	Not sure what this means	Comments
C 8.01	Determines proper sequence for assembly				
C 8.02	Assembles sub-components and components				
C 8.03	Sets fabricated component in place				
C 8.04	Fastens components on-site				
Task 9 – Block C <i>Learning Outcome</i> Performs welding activities					
C 9.01	Applies heat prior to tack welding				
C 9.02	Performs tack welding				
C 9.03	Minimizes welding distortions				
C 9.04	Welds using wire-feed processes				
C 9.05	Corrects welding distortions				
Task 10 – Block C <i>Learning Outcome</i> Prepares products for finishes					
C 10.01	Completes project				
C 10.02	Prepares material for finishing				

Trade Essentials

Technical Skills Inventory (TSI) Group Summary

Metal Fabricator (Fitter) - (NOA) National Occupational Analysis 2008)

NOC 7263 (National Occupational Classification)



		Client 1	Client 2	Client 3	Client 4	Client 5	Client 6	Client 7	Client 8	Client 9	Client 10		
BLOCK A (Learning Category) COMMON OCCUPATIONAL SKILLS													
Task 1 (Learning Outcome) - Maintains and uses tools and equipment													
Sub-Tasks (Learning Objectives)												TOTALS	
A 1.01	Maintains hand tools											0	A 1.01
A 1.02	Maintains power tools											0	A 1.02
A 1.03	Maintains stationary machinery											0	A 1.03
A 1.04	Maintains layout and measuring tools											0	A 1.04
A 1.05	Maintains cutting and welding equipment											0	A 1.05
A 1.06	Uses access equipment											0	A 1.06
A 1.07	Uses personal protective equipment (PPE) and safety equipment											0	A 1.07
Task 2 (Learning Outcome) - Organizes work												Task Total	0
Sub-Tasks (Learning Objectives)													
A 2.01	Interprets plans, drawings and specifications											0	A 2.01
A 2.02	Uses documentation and reference material											0	A 2.02
A 2.03	Communicates with others											0	A 2.03
A 2.04	Organizes project tasks											0	A 2.04
A 2.05	Maintains safe work environment											0	A 2.05
Task 3 (Learning Outcome) - Performs quality assurance												Task Total	0
Sub-Tasks (Learning Objectives)													
A 3.01	Performs visual inspections											0	A 3.01
A 3.02	Verifies measurements											0	A 3.02
A 3.03	Performs post-welding checks											0	A 3.03
A 3.04	Marks materials and parts											0	A 3.04
A 3.05	Verifies layout											0	A 3.05
Task 4 (Learning Outcome) - Handles materials												Task Total	0
Sub-Tasks (Learning Objectives)													
A 4.01	Obtains materials											0	A 4.01
A 4.02	Verifies piece marks											0	A 4.02
A 4.03	Determines weights											0	A 4.03
A 4.04	Identifies lifting points											0	A 4.04
A 4.05	Operates material handling equipment											0	A 4.05
												Task Total	0
BLOCK A TOTALS		0	0	0	0	0	0	0	0	0	0	0	0
SE 2		0	0	0	0	0	0	0	0	0	0	0	
SE 3		0	0	0	0	0	0	0	0	0	0	0	

Date:

Group Identification:

Instructor:

METAL FABRICATOR (FITTER)

Technical Skills Inventory
Self-Assessment Rating

0 - Yes, I did this
2 - I need to work on this
3 - Not sure what this means

		Client 1	Client 2	Client 3	Client 4	Client 5	Client 6	Client 7	Client 8	Client 9	Client 10		
BLOCK B (Learning Category) FABRICATION OF COMPONENTS													
Task 5 (Learning Outcome) - Performs layout													
Sub-Tasks (Learning Objectives)												TOTALS	
B 5.01	Determines layout methods											0	B 5.01
B 5.02	Performs pattern development											0	B 5.02
B 5.03	Calculates material allowances for various processes											0	B 5.03
B 5.04	Determines dimensions											0	B 5.04
B 5.05	Transfers dimensions											0	B 5.05
B 5.06	Makes templates											0	B 5.06
B 5.07	Assembles jigs											0	B 5.07
Task 6 (Learning Outcome) - Cuts materials												Task Total	0
Sub-Tasks (Learning Objectives)													
B 6.01	Cuts material using plasma cutting equipment											0	B 6.01
B 6.02	Cuts material using oxy-fuel cutting equipment											0	B 6.02
B 6.03	Cuts material using shears											0	B 6.03
B 6.04	Cuts material using saws											0	B 6.04
B 6.05	Cuts material using ironworkers											0	B 6.05
B 6.06	Drills holes											0	B 6.06
B 6.07	Cuts threads											0	B 6.07
B 6.08	Prepares joints											0	B 6.08
Task 7 (Learning Outcome) - Forms materials												Task Total	0
Sub-Tasks (Learning Objectives)													
B 7.01	Forms material using plate rollers											0	B 7.01
B 7.02	Forms material using shape rollers											0	B 7.02
B 7.03	Forms material using brake presses											0	B 7.03
B 7.04	Forms material using benders											0	B 7.04
B 7.05	Applies heat for forming											0	B 7.05
BLOCK B TOTALS		0	0	0	0	0	0	0	0	0	0	0	0
SE 2		0	0	0	0	0	0	0	0	0	0	0	0
SE 3		0	0	0	0	0	0	0	0	0	0	0	0

Date:
Group Identification:
Instructor:
METAL FABRICATOR (FITTER)

Technical Skills Inventory
Self-Assessment Rating

0 - Yes, I did this
2 - I need to work on this
3 - Not sure what this means

		Client 1	Client 2	Client 3	Client 4	Client 5	Client 6	Client 7	Client 8	Client 9	Client 10		
BLOCK C (Learning Category) ASSEMBLY OF COMPONENTS													
Task 8 (Learning Outcome) - Fits and fastens sub-components and components													
Sub-Tasks (Learning Objectives)												TOTALS	
C 8.01	Determines proper sequence for assembly											0	C 8.01
C 8.02	Assembles sub-components and components											0	C 8.02
C 8.03	Sets fabricated component in place											0	C 8.03
C 8.04	Fastens components on-site											0	C 8.04
Task 9 (Learning Outcome) - Performs welding activities												Task Total	0
Sub-Tasks (Learning Objectives)													
C 9.01	Applies heat prior to tack welding											0	C 9.01
C 9.02	Performs tack welding											0	C 9.02
C 9.03	Minimizes welding distortions											0	C 9.03
C 9.04	Welds using wire-feed processes											0	C 9.04
C 9.05	Corrects welding distortions											0	C 9.05
Task 10 (Learning Outcome) - Prepares products for finishes												Task Total	0
Sub-Tasks (Learning Objectives)													
C 10.01	Completes project											0	C 10.01
C 10.02	Prepares material for finishing											0	C 10.02
BLOCK C TOTALS		0	0	0	0	0	0	0	0	0	0	Task Total	0
SE 2		0	0	0	0	0	0	0	0	0	0	0	
SE 3		0	0	0	0	0	0	0	0	0	0	0	

Group Summary Chart

BLOCK A SE2 Common Occupational Skills	0	0	0	0	0	0	0	0	0	0	0	0
BLOCK A SE3 Common Occupational Skills	0	0	0	0	0	0	0	0	0	0	0	0
BLOCK B SE2 Fabrication of Components	0	0	0	0	0	0	0	0	0	0	0	0
BLOCK B SE3 Fabrication of Components	0	0	0	0	0	0	0	0	0	0	0	0
BLOCK C SE2 Assembly of Components	0	0	0	0	0	0	0	0	0	0	0	0
BLOCK C SE3 Assembly of Components	0	0	0	0	0	0	0	0	0	0	0	0

Date:
Group Identification:
Instructor:
METAL FABRICATOR (FITTER)

Technical Skills Inventory
Self-Assessment Rating

0 - Yes, I did this
2 - I need to work on this
3 - Not sure what this means

SECTION 7 - GROUP LEARNING PLAN AND PIE CHART (SAMPLE)

Group Learning Plan – Group ID	
Date TSI Completed	
Instructor	

The Technical Skills Inventory (TSI) is designed to:

- introduce apprentices to the blocks (*learning categories*), the tasks (*learning outcomes*), and sub-tasks (*learning objectives*) in the National Occupational Analysis (NOA).
- have apprentices **reflect** and then **self-assess** their tasks (*learning outcomes*) and sub-tasks (*learning objectives*) in their trade.
- compile information from the TSI to **create a group profile** of technical skills learning needs.
- provide information from the TSIs to assist instructors in choosing contextualized and technical skills resources to support Essential Skills curriculum that will support client needs.

The TSI assessment tool lists the block (*learning categories*), tasks (*learning outcomes*) and sub-tasks (*learning objectives*) identified in the National Occupational Analysis (NOA) of each trade. The TSI is a **self-assessment** tool through which an apprentice reflects and records their personal evaluation on each task and sub-task. Self Evaluation (SE) categories for the tasks (*learning outcomes*) and sub-tasks (*learning objectives*) are:

- SE 0 – Yes, I did this
- SE 2 – I need to work on this
- SE 3 – Not sure what this means

GENERAL GROUP PROFILE: Metal Fabricator (Fitter) Group Summerside

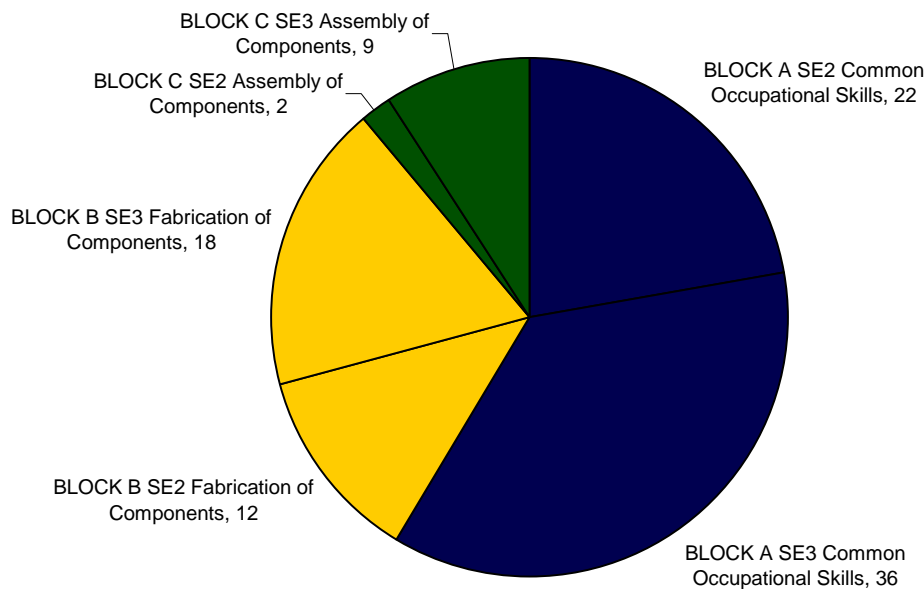
Ten Metal Fabricator learners are participating in this program. The geographic territory covers from the central part to the Western tip of PEI. Trade expertise within the group ranges from those working in specific sections of the trade to those who own their own business. Two have previously challenged but were unsuccessful in the Red Seal exam. All have attended pre-apprenticeship training in a post-secondary institution.

Group Learning Plan Pie Chart Technical Skills Inventory (TSI) Group Learning Needs Profile

NOTE: Any divided sections with the same colour that may occur in the chart, highlights where both SE 2 and SE 3 are recorded in the same block.

Self-evaluation (SE)	0 – Yes, I can do this
Self-evaluation (SE)	2 – I need to work on this
Self-evaluation (SE)	3 – Not sure what this means

Group Learning Plan Metal Fabricator (Fitter) Summerside



■ BLOCK A SE2 Common Occupational Skills	■ BLOCK A SE3 Common Occupational Skills	■ BLOCK B SE2 Fabrication of Components
■ BLOCK B SE3 Fabrication of Components	■ BLOCK C SE2 Assembly of Components	■ BLOCK C SE3 Assembly of Components

SECTION 8 - INDIVIDUAL LEARNING PLAN AND PIE CHART (SAMPLE)

The Technical Skills Inventory (TSI) is designed to:

- introduce you to the **blocks** (*learning categories*), the **tasks** (*learning outcomes*), and **sub-tasks** (*learning objectives*) in the National Occupational Analysis (NOA).

These three sections of the NOA are used in provinces and territories to create an Apprenticeship Log Book. The log book is used by apprentices and journeypersons to record and sign- off technical skill areas learned on the job.

- help you **think about** your technical skills, then help you **list** what you know and can do;
- help you **know what technical skills to focus** on as you go through both your **school training** and while you are working under the **direction of a journeyperson**
- help you make a **technical skills learning plan** to highlight your technical skills learning needs
- help you prepare to complete a Professional Skills Record (PSR) (if needed) which lists the details and all the skill requirements in your trade

Self-Assessment (SE) ratings assigned to interpret and record data are:

- SE 0 – Yes, I did this
- SE 2 – I need to work on this
- SE 3 – Not sure what this means

Through the completion of your TSI, you have indicated you do not have any immediate learning needs in the following block(s):

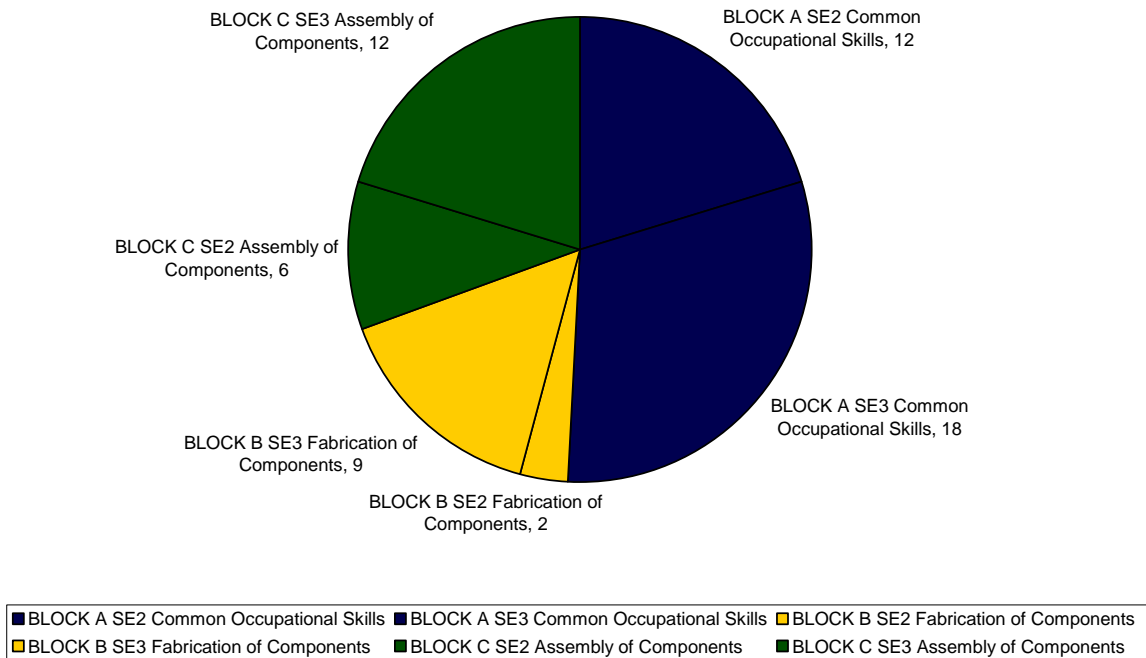
- **Block ...**

Individualized Learning Plan

The pie chart represents the learning needs you have identified in your TSI are listed from the most need to the least need.

NOTE: Any divided section of the same colour, that may occur in your chart, highlights where you recorded both SE 2 and SE 3 in the same block.

J. Doe - Individual Learning Plan Metal Fabricator (Fitter) Summerside



Technical Skills Personal Learning Plan _____ NAME _____

Technical Skills Goal:

Path to reach goal	Yes	No	How will I reach my goal?
Enter an apprenticeship Block Release program			
Enter a 6-week IP exam preparation (technical skills trade refresher program)			
Technical skills self-study			
Other (explain)			

NOTE: To complete an in-depth, detailed self-assessment of technical skills in a trade, a Professional Skills Record (PSR) is available. (A PSR is the self-assessment tool used in a Recognizing Prior Learning (RPL) Assessment Process). Information on this process is available through the Apprenticeship Section through the Department of Innovation and Advanced Learning. This document is designed to be used by an Apprentice in the workplace and must be signed off by a Licensed Journeyperson.)

Additional Comments:

Apprentice Signature

Date

Trade Essential Signature(s)

