Preparing for the
Boilermaker Trade

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About *SkillPlan*

SkillPlan, a joint labour and management initiative of the BC construction industry, was established as a not-for-profit society in March 1991. The Council is the industry’s response to an evolving workplace that requires greater writing, numeracy, problem solving and oral communication skills. SkillPlan believes that a solid foundation of these skills are part of an adult’s life not only at work but in their unions and the wider community.

SkillPlan’s Workplace Educators are privileged to tutor hundreds of building trades apprentices and interact with technical instructors, training coordinators and the contractors who employ them. SkillPlan publications are dependent on this network to accurately reflect the Essential Skills needed on the job. Our thanks are extended to those organizations who allowed us to reprint their materials.
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INTRODUCTION

Who Should Use This Publication?

If you are interested in entering a Boilermaker apprenticeship and want to practice your skills in Reading, Document Use and Numeracy, then this workbook is for you. The purpose of this publication is to give you a quick review of these three Essential Skills.

What are Essential Skills?

Essential Skills are skills that allow workers in every occupation to get the job done. They are not technical skills but the foundation or underlying skills people need to acquire knowledge and complete workplace tasks and daily activities. The nine Essential Skills are Reading, Document Use, Numeracy, Writing, Oral Communication, Working with Others, Thinking Skills, Computer Use and Continuous Learning.

What Skills Does This Publication Cover?

Preparing for the Boilermaker Trade provides practice using Reading, Document Use and Numeracy skills for typical applications in Boilermaking. This publication will help you to successfully prepare for trade assessments which are part of intake requirements for further training.

For example, in one jurisdiction you may be asked to write the Boilermaker Trade Assessment. This assessment, like many others, does not require specific background knowledge about the boilermaker trade.

After you have completed Preparing for the Boilermaker Trade, you are ready to write most assessment tests. If you need more practice, go to Publications at www.skillplan.ca. Measurement and Calculation for the Trades is a helpful resource.
Reading

Reading means reading material that is in the form of sentences and paragraphs. Some examples of Reading are memos, bulletins, textbooks, detailed work orders, reports, journals and manuals. Different trades use specialized trade terms, vocabulary and jargon which makes the reading boilermakers are required to do more complex.

Boilermakers:

- read brief summaries of toolbox safety meetings to review the issues discussed.
- read Material Safety Data sheets (MSDS) to locate information about the safe handling of a substance.
- read reference books (e.g. IPT's Metal Trades Handbook) to review technical procedures, mathematical explanations, first aid instructions, and safety guidelines.

The following box is an example of the kind of text a boilermaker might have to read on the job or during technical training.

### PERSONAL FALL PROTECTION

- must include an adequate fixed support; the harness must be connected to it via a lifeline, or via a lanyard and a lifeline
- must prevent a falling worker from hitting the ground or any object or level below the work
- must not subject a falling worker to a peak fall-arrest force greater than 8 kilonewtons.

The construction regulation (O. Reg. 213/91) requires that:

- all fall protection equipment must be inspected for damage, wear, and obvious defects by a competent worker before each use
- any worker required to use fall protection must be trained in its safe use and proper maintenance.

Any defective component should be replaced by one that meets or exceeds the manufacturer's minimum performance standards for that particular system.

The regulation also requires that any fall-arrest system involved in a fall be removed from service until the manufacturer certifies all components safe for reuse.

For any worker receiving instruction in fall protection, the manufacturer's instructions for each piece of equipment should be carefully reviewed, with particular attention to warnings and limitations.

Components

- free of discolouration and brittleness indicating heat or chemical exposure.

**Lifelines**

There are three basic types of lifelines:

1. **vertical**
2. **horizontal**
3. **retractable**

All lifelines must be inspected daily to ensure that they are:

- free of cuts, burns, frayed strands, abrasions, and other defects or signs of damage
- free of discolouration and brittleness indicating heat or chemical exposure.

**1) Vertical Lifelines**

Vertical lifelines must comply with the current edition of the applicable CSA standard and the following minimum requirements:

- Only one person at a time may use a vertical lifeline.
- A vertical lifeline must reach the ground or a level above ground where the worker can safely exit.
- A vertical lifeline must have a positive stop to prevent the rope grab from running off the end of the lifeline.

Vertical lifelines are typically 16-millimetre (5/8-inch) synthetic rope (polypropylene blends). 

- free of discolouration and brittleness indicating heat or chemical exposure. 

**2) Horizontal Lifelines**

Horizontal lifelines must have:

- a lanyard or a non-retractable part attached to the lifeline at one time
- free of cuts, burns, frayed strands, abrasions, and other defects or signs of damage
- free of discolouration and brittleness indicating heat or chemical exposure.
Document Use

Document Use tasks involve different information displays. Words, numbers and icons are given meaning by their spatial arrangement. Some examples of Document Use are reading prints, drawings, signs, labels, lists and tables.

Boilermakers:

- read tables showing the weights and sizes of steel bars to locate a specific bar size.
- interpret American Welding Society standard welding symbols on blueprints to identify the recommended welding technique.
- interpret blueprints to determine what tasks must be completed and to review material lists.

The following box is an example of the kind of document a boilermaker might refer to on the job or during technical training.
Numeracy

Numeracy refers to using numbers and thinking in quantitative terms on the job and during technical training. On the job, math is used to solve problems that get the work done accurately the first time.

Boilermakers:

- compare pressure gauge readings to stated norms to determine whether pressure adjustments must be made.
- calculate the Working Load Limit for a variety of wire and fibre rope types using a formula to determine which size and type of rope to use when hoisting a load.
- use geometry, such as bisecting angles and constructing a circle from chords, to lay out materials for pressure vessels.
- estimate the load weight to ensure safe rigging operations are being used.

The following box is an example of a document a boilermaker uses to estimate the weight of the load on the sling legs.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sling Angle</td>
</tr>
<tr>
<td>1/4</td>
<td>2,800</td>
<td>2,100</td>
<td>5,600</td>
<td>4,850</td>
</tr>
<tr>
<td>5/8</td>
<td>5,680</td>
<td>4,260</td>
<td>11,360</td>
<td>9,838</td>
</tr>
<tr>
<td>1/2</td>
<td>9,600</td>
<td>7,200</td>
<td>19,200</td>
<td>16,627</td>
</tr>
<tr>
<td>5/8</td>
<td>14,480</td>
<td>10,860</td>
<td>28,960</td>
<td>25,079</td>
</tr>
<tr>
<td>3/4</td>
<td>22,640</td>
<td>16,980</td>
<td>45,280</td>
<td>39,212</td>
</tr>
<tr>
<td>7/8</td>
<td>27,360</td>
<td>20,520</td>
<td>54,720</td>
<td>47,388</td>
</tr>
</tbody>
</table>
How is *Preparing for the Boilermaker Trade* Organized?

There are three sections in *Preparing for the Boilermaker Trade*. Each section is followed by an Answer Key for that section.

- **Section 1: Math Foundations**
  
  Section 1 provides a review of basic math foundations and examples of whole numbers, decimals, fractions, ratio/proportion, percent, averages, measurement, perimeter, area, volume, estimating weight loads and Pythagorean Theorem that you will need during technical training and on the job. There are practice questions for each topic. The Answer Key gives step by step solutions. The material in this section provides practice of skills that you may have forgotten because you have not used them in a long time. You may need to refer to other resources to relearn some topics.

- **Section 2: Word Problems**
  
  Section 2 demonstrates how to solve word problems. A strategy for locating information and rearranging numbers to set up the problem is included. Practice questions are provided. The Answer Key gives step by step solutions.

- **Section 3: Problem Sets**
  
  Section 3 provides practice in Reading, Document Use, and Numeracy. Questions are grouped with documents you might encounter during technical training or in a work situation. All the information needed to answer the questions can be located in the document provided. The Answer Key is included at the end of the section.