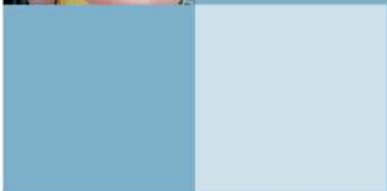
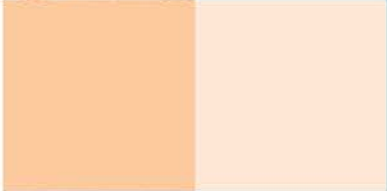
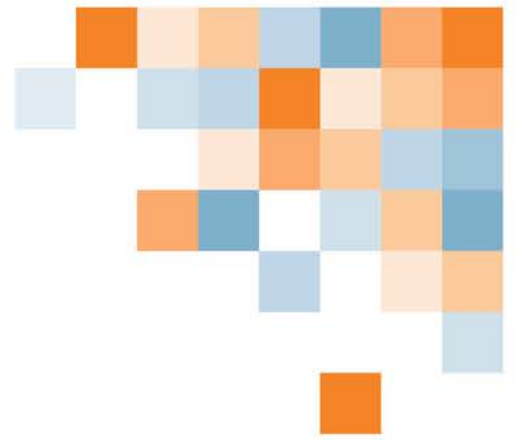


ita
YOUR TICKET.



Architectural Sheet Metal Worker Program Outline



The latest version of this document is available in PDF format on the ITA website
www.itabc.ca

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ARCHITECTURAL SHEET METAL WORKER PROGRAM OUTLINE

**APPROVED BY INDUSTRY
JUNE 2013**

**Developed by
Industry Training Authority
Province of British Columbia**



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Section 1

INTRODUCTION

Architectural Sheet Metal Worker



Foreword

This revised Architectural Sheet Metal Worker Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects updated standards based on the British Columbia industry and subject matter experts.

Practical instruction by demonstration and student participation should be integrated with classroom sessions. Safe working practices, even though not always specified in each operation or topic, are an implied part of the program and should be stressed throughout the apprenticeship.

This Program Outline includes a list of recommended reference textbooks that are available to support the learning objectives and the minimum shop requirements needed to support instruction.

The Program Outline was prepared with the advice and assistance of the Architectural Sheet Metal Worker Review Committee and will form the basis for further updating of the British Columbia Architectural Sheet Metal Worker Program and learning resources on behalf of the Industry Training Authority (ITA).

Each competency is to be evaluated through the use of written examination in which the learner must achieve a minimum of 70% in order to receive a passing grade. The types of questions used on these exams must reflect the cognitive level indicated by the learning objectives and the learning tasks listed in the related competencies.

Achievement Criteria are included for those competencies that require a practical component. The intent of including Achievement Criteria in the program outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply the theory to practice. It is important that these performances be observable and measureable and that they reflect the skills spelled out in the competency as those required of a competent journey person. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the level of expectation of success.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

SAFETY ADVISORY

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>). Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.



Acknowledgements

The Program Outline was prepared with the advice and direction of an industry steering committee convened initially by the BC Construction Industry Training Organization. Members include:

- Ian Ballam – Kerrian Metalhouse
- Shirley Caldwell – RCABC
- Mark Curtis – Sheet Metal Workers Local 276
- Connor Hofler – RCABC
- Judd Martell – SMWTCS
- Chris McBurney – Summit Steel
- Blake Merrick – Flynn Canada Ltd.
- Daryl Morrison – Lam Metals
- Shane Murphy – Crown Roofing
- Bob Pascuzzi – SMWTCS

Industry Subject Matter Experts retained to assist in the development of Program Outline content:

- Jesse Cramp – Summit Steel
- Rick Conniff – Flynn Canada
- Bryan Hignell – Nelson Roofing
- Connor Hofler – RCABC
- Randy Kellen – Lam Metal
- Aaron Laplante – Flynn Canada
- Bob Pascuzzi – SMWTCS
- Ben Yanko – Kerrian Metalhouse

Facilitators:

- Laura Chaston – CITO

The Industry Training Authority would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Architectural Sheet Metal Worker occupation.



How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Program Credentialing Model	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
OAC	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
Program Content	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measurable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels



Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment
Appendix – Glossary of Acronyms			Defines program specific acronyms	



Section 2

PROGRAM OVERVIEW

Architectural Sheet Metal Worker

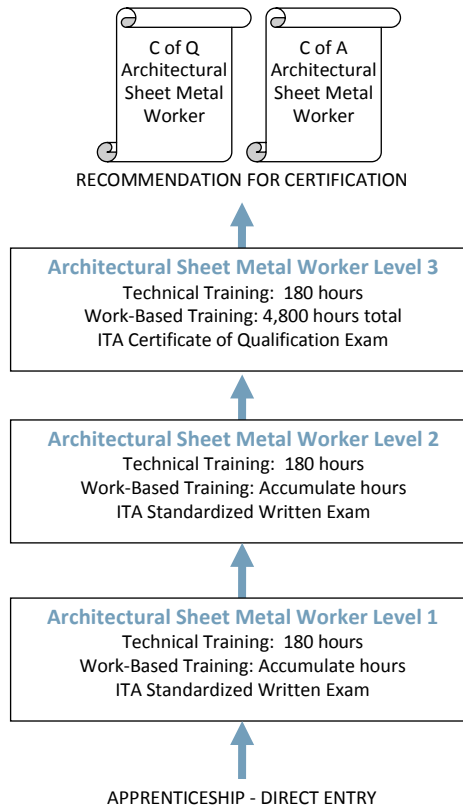


Program Credentialing Model

Apprenticeship Pathway

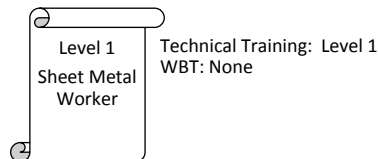
This graphic provides an overview of the Architectural Sheet Metal Worker apprenticeship pathway.

C of Q = Certificate of Qualification
C of A = Certificate of Apprenticeship
C of C = Certificate of Completion
WBT = Work-Based Training



CROSS-PROGRAM CREDITS

Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program

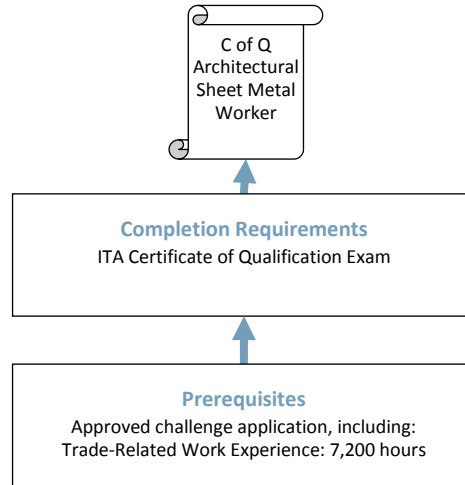




Challenge Pathway

This graphic provides an overview of the Architectural Sheet Metal Worker challenge pathway.

C of Q = Certificate of Qualification



CROSS-PROGRAM CREDITS

Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program

None



Occupational Analysis Chart

ARCHITECTURAL SHEET METAL WORKER

Occupation Description: “Architectural Sheet Metal Worker” means a person who has the product knowledge and skills to prepare, repair and fabricate components for: metal roofs, metal walls and other exterior wall products, composite panels insulation, membranes and waterproofing, ventilators and curbs, flashings, gutters, downspouts, louvers, soffits, skylights and metal doors.

USE SAFE WORK PRACTICES A	Use Personal Protective Equipment A1 1	Use WorkSafeBC Regulations A2 1	Use WHMIS A3 1	Identify Hazards and Emergency Procedures A4 1	Select Fire Extinguishers A5 1	Complete Level 1 First Aid Certification A6 1
USE TOOLS AND EQUIPMENT B	Use Hand Tools B1 1 2	Use Power Tools B2 1 2	Use Powder Actuated Tools B3 1	Use Shop Equipment B4 1 2	Use Ladders, Scaffolds and Platforms B5 1 2	Use Fasteners and Sealants B6 1 2
ORGANIZE WORK C	Interpret Drawings and Specifications C1 1 2 3	Estimate Materials C2 3	Communicate with Others C3 1 2 3	Measure and Sketch Shop Project Components C4 1 2 3	Identify Metals and Properties C5 1 2 3	
USE TRADE MATH D	Use Basic Trade Math D1 1 2 3	Solve Problems Using Formulas D2 1 2 3	Solve Problems Using Pythagorean Theorem D3 1 2 3	Solve Problems Using Trigonometry D4 1 2 3		
EXAMINE SYSTEMS E	Identify Systems E1 1 2 3	Identify Support Structures E2 1 2 3	Identify Building Envelope E3 1 2 3	Examine Wall Systems E4 1 3	Examine Roof Systems E5 1 2	Examine Specialty Products E6 1 2



Examine Specialty System Components/ Accessories				
				E7
	2	3		

FABRICATE PRODUCTS AND COMPONENTS
F

Seams, Locks, Edges and Joints				
				F1
1	2	3		

Fabricate Components				
				F2
1	2	3		

INSTALL PRODUCTS
G

Use Hoisting, Lifting and Rigging Equipment				
				G1
1	2			

Install Roofing and Wall Components				
				G2
1	2	3		

Prepare Substrate				
				G3
1	2	3		

Install Specialty Components				
				G4
	2	3		

LAYOUT AND DEVELOP PATTERNS
H

Use Drafting Equipment for Geometric Construction				
				H1
1				

Draw Orthographic and Pictorial Drawings				
				H2
1	2	3		

Produce Patterns Using Parallel Line Development				
				H3
1	2	3		

Produce Patterns Using Radial Line Development				
				H4
1	2	3		

Produce Patterns Using Triangulation				
				H5
	2	3		

WELD AND SOLDER
I

Cutting Techniques				
				I1
1	2	3		

Select and Use Welding Equipment for SMAW				
				I2
1	2			

Select and Use Welding Equipment for GMAW				
				I3
		3		

Demonstrate Soldering Techniques				
				I4
1	2	3		



Training Topics and Suggested Time Allocation Level 1

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line A	USE SAFE WORK PRACTICES	8%	100%	0%	100%
A1	Use Personal Protective Equipment		✓		
A2	Use WorkSafeBC Regulations		✓		
A3	Use WHMIS		✓		
A4	Identify Hazards and Emergency Procedures		✓		
A5	Select Fire Extinguishers		✓		
A6	Complete Level 1 First Aid Certification		✓		
Line B	USE TOOLS AND EQUIPMENT	12%	100%	0%	100%
B1	Use Hand Tools		✓		
B2	Use Power Tools		✓		
B3	Use Powder Actuated Tools		✓		
B4	Use Shop Equipment		✓		
B5	Use Ladders, Scaffolds and Platforms		✓		
B6	Use Fasteners and Sealants		✓		
Line C	ORGANIZE WORK	5%	70%	30%	100%
C1	Interpret Drawings and Specifications		✓		
C3	Communicate with Others		✓		
C4	Measure and Sketch Shop Project Components		✓	✓	
C5	Identify Metals and Properties		✓		
Line D	USE TRADE MATH	9%	100%	0%	100%
D1	Use Basic Trade Math		✓		
D2	Solve Problems Using Formulas		✓		
D3	Solve Problems Using Pythagorean Theorem		✓		
D4	Solve Problems Using Trigonometry		✓		
Line E	EXAMINE SYSTEMS	10%	100%	0%	100%
E1	Identify Systems		✓		
E2	Identify Support Structures		✓		
E3	Identify Building Envelope		✓		
E4	Examine Wall Systems		✓		
E5	Examine Roof Systems		✓		
E6	Examine Specialty Products		✓		
Line F	FABRICATES PRODUCTS AND COMPONENTS	13%	15%	85%	100%
F1	Seams, Locks, Edges and Joints		✓	✓	
F2	Fabricate Components		✓	✓	
Line G	INSTALL PRODUCTS	20%	15%	85%	100%
G1	Use Hoisting, Lifting and Rigging Equipment		✓		
G2	Install Roofing and Wall Components		✓	✓	
G3	Prepare Substrate		✓		



% of Time Allocated to:

		% of Time	Theory	Practical	Total
Line H	LAYOUT AND DEVELOP PATTERNS	14%	50%	50%	100%
H1	Use Drafting Equipment for Geometric Construction		✓		
H2	Draw Orthographic and Pictorial Drawings		✓	✓	
H3	Produce Patterns Using Parallel Line Development		✓	✓	
H4	Produce Patterns Using Radial Line Development		✓	✓	
Line I	WELD AND SOLDER	9%	35%	65%	100%
I1	Cutting Techniques		✓	✓	
I2	Select and Use Welding Equipment for SMAW		✓	✓	
I4	Demonstrate Soldering Techniques		✓	✓	
Total Percentage for Architectural Sheet Metal Worker Level 1		100%			



Training Topics and Suggested Time Allocation Level 2

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line B	USE TOOLS AND EQUIPMENT	5%	100%	0%	100%
B1	Use Hand Tools		✓		
B2	Use Power Tools		✓		
B4	Use Shop Equipment		✓		
B5	Use Ladders, Scaffolds and Platforms		✓		
B6	Use Fasteners and Sealants		✓		
Line C	ORGANIZE WORK	6%	65%	35%	100%
C1	Interpret Drawings and Specifications		✓		
C3	Communicate with Others		✓		
C4	Measure and Sketch Shop Project Components		✓	✓	
C5	Identify Metals and Properties		✓		
Line D	USE TRADE MATH	8%	100%	0%	100%
D1	Use Basic Trade Math		✓		
D2	Solve Problems Using Formulas		✓		
D3	Solve Problems Using Pythagorean Theorem		✓		
D4	Solve Problems Using Trigonometry		✓		
Line E	EXAMINE SYSTEMS	9%	100%	0%	100%
E1	Identify Systems		✓		
E2	Identify Support Structures		✓		
E3	Identify Building Envelope		✓		
E5	Examine Roof Systems		✓		
E6	Examine Specialty Products		✓		
E7	Examine Specialty Components/Accessories		✓		
Line F	FABRICATES PRODUCTS AND COMPONENTS	20%	15%	85%	100%
F1	Seams, Locks, Edges and Joints		✓	✓	
F2	Fabricate Components		✓	✓	
Line G	INSTALL PRODUCTS	28%	20%	80%	100%
G1	Use Hoisting, Lifting and Rigging Equipment		✓		
G2	Install Roofing and Wall Components		✓	✓	
G3	Prepare Substrate		✓	✓	
G4	Install Specialty Components		✓	✓	
Line H	LAYOUT AND DEVELOP PATTERNS	13%	20%	80%	100%
H2	Draw Orthographic and Pictorial Drawings		✓	✓	
H3	Produce Patterns Using Parallel Line Development		✓	✓	
H4	Produce Patterns Using Radial Line Development		✓	✓	
H5	Produce Patterns Using Triangulation		✓	✓	



% of Time Allocated to:

		% of Time	Theory	Practical	Total
Line I	WELD AND SOLDER	11%	25%	75%	100%
I1	Cutting Techniques		✓		
I2	Select and Use Welding Equipment for SMAW		✓	✓	
I4	Demonstrate Soldering Techniques		✓	✓	
Total Percentage for Architectural Sheet Metal Worker Level 2		100%			



Training Topics and Suggested Time Allocation Level 3

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line C	ORGANIZE WORK	12%	80%	20%	100%
C1	Interpret Drawings and Specifications		✓		
C2	Estimate Materials		✓	✓	
C3	Communicate with Others		✓		
C4	Measure and Sketch Shop Project Components		✓	✓	
C5	Identify Metals and Properties		✓		
Line D	USE TRADE MATH	5%	100%	0%	100%
D1	Use Basic Trade Math		✓		
D2	Solve Problems Using Formulas		✓		
D3	Solve Problems Using Pythagorean Theorem		✓		
D4	Solve Problems Using Trigonometry		✓		
Line E	EXAMINE SYSTEMS	7%	100%	0%	100%
E1	Identify Systems		✓		
E2	Identify Support Structures		✓		
E3	Identify Building Envelope		✓		
E4	Examine Wall Systems		✓		
E7	Examine Specialty System Components/Accessories		✓		
Line F	FABRICATE PRODUCTS AND COMPONENTS	15%	15%	85%	100%
F1	Seams, Locks, Edges and Joints		✓	✓	
F2	Fabricate Components		✓	✓	
Line G	INSTALL PRODUCTS	34%	20%	80%	100%
G2	Install Roofing and Wall Components		✓	✓	
G3	Prepare Substrate		✓	✓	
G4	Install Specialty Components		✓	✓	
Line H	LAYOUT AND DEVELOP PATTERNS	15%	30%	70%	100%
H2	Draw Orthographic and Pictorial Drawings		✓	✓	
H3	Produce Patterns Using Parallel Line Development		✓	✓	
H4	Produce Patterns Using Radial Line Development		✓	✓	
H5	Produce Patterns Using Triangulation		✓	✓	
Line I	WELD AND SOLDER	12%	30%	70%	100%
I1	Cutting Techniques		✓		
I3	Select and Use Welding Equipment for GMAW		✓	✓	
I4	Demonstrate Soldering Techniques		✓	✓	
Total Percentage for Architectural Sheet Metal Worker Level 3		100%			



Section 3

PROGRAM CONTENT

Architectural Sheet Metal Worker



Level 1

Architectural Sheet Metal Worker



Line (GAC): **A USE SAFE WORK PRACTICES**
Competency: **A1 Use Personal Protective Equipment**

Objectives

To be competent in this area, the individual must be able to:

- Describe personal protective equipment.
- Demonstrate proper use of personal protective equipment.

LEARNING TASKS

1. Describe personal protective equipment

2. Use personal protective equipment

CONTENT

- Head protection
- Foot protection
- Eye protection
- Ear protection
- Respiratory protection
- Fall protection
- Hand protection
- Knee protection
- CSA Standards
- WorkSafeBC Standards

- Use
- Inspection
- Maintenance
- Storage



Line (GAC): A USE SAFE WORK PRACTICES

Competency: A2 Use WorkSafeBC Regulations

Objectives

To be competent in this area, the individual must be able to:

- Locate and apply WorkSafeBC and Occupational Health and Safety Regulations.

LEARNING TASKS

1. Define terms used in the Workers' Compensation Act
2. Describe the general duties of employers, employees and others
3. Describe the Workers' Compensation Act requirements for the reporting of accidents
4. Describe the "Core Requirements" of the Occupational Health and Safety Regulation

CONTENT

- Definitions, Section 1 of the Act
- Part 2, Division 3, Sections 115-124 of the Act
- Part 1, Divison 5, Section 53 and 54 of the Act
- Definitions
- Application
- Rights and Responsibilities
 - Health and safety programs
 - Construction Safety Officers (CSO) site safety precedence
 - Investigations and reports
 - Workplace inspections
 - Right to refuse work
- General Conditions
 - Building and equipment safety
 - Emergency preparedness
 - Preventing violence
 - Working alone
 - Ergonomics
 - Illumination
 - Indoor air quality
 - Smoking and lunchrooms
- Confined Spaces
 - Exit Strategy
- Lockout Procedures



Line (GAC): A USE SAFE WORK PRACTICES
Competency: A3 Use WHMIS

Objectives

To be competent in this area, the individual must be able to:

- Describe the purpose of the Workplace Hazardous Materials Information System (WHMIS) Regulations.
- Explain the contents of Material Safety Data Sheets (MSDS)
- Explain the contents of a WHMIS label
- Apply WHMIS Regulations

LEARNING TASKS

1. State the legislation that requires suppliers of hazardous materials to provide MSDSs and label products as a condition of sale and importation

2. State the purpose of the Workplace Hazardous Materials Information System (WHMIS)

3. Describe the key elements of WHMIS

4. Describe the responsibilities of suppliers under WHMIS

5. Describe the responsibilities of employers under WHMIS

CONTENT

- Hazardous Product Act
- Controlled Products Regulations
- Ingredient Disclosure List
- Hazardous Materials Information Review Act
- Hazardous Materials Information Review Regulations

- Protection of Canadian workers from the adverse effects of hazardous materials through the provision of relevant information while minimizing the economic impact on industry and the disruption of trade

- Recognition of rights
 - Workers
 - Employers
 - Suppliers
 - Regulators

- Material safety data sheets (MSDSs)
- Labelling of containers of hazardous materials
- Worker education programs

- Provide:
 - MSDSs
 - Labels

- Provide:
 - MSDSs
 - Labels
 - Work education programs in the workplace



LEARNING TASKS

6. Describe information to be disclosed on a MSDS

7. Identify symbols found on WHMIS labels and their meaning

8. Apply WHMIS regulations as they apply to hazardous materials used in the shop

CONTENT

- Hazardous ingredients
- Preparation information
- Product information
- Physical data
- Fire or explosion
- Reactivity data
- Toxicological properties
- Preventive measures
- First-aid measures

- Compressed gases
- Flammable and combustible materials
- Oxidizing materials
- Poisonous and infectious materials
 - Materials causing immediate and serious toxic effects
 - Materials causing other toxic effects
 - Biohazardous infectious materials
- Corrosive materials
- Dangerously reactive materials

- Use, storage and disposal



Line (GAC): **A USE SAFE WORK PRACTICES**
Competency: **A4 Identify Hazards and Emergency Procedures**

Objectives

To be competent in this area, the individual must be able to:

- Identify and describe workplace hazards.
- To locate and use emergency equipment.

LEARNING TASKS

1. Describe short term hazards

CONTENT

- Ladders
- Scaffolds
- Mobile work platforms
- Working at elevations
- Leading edge work
- Electrical
- Lockout procedures
- Compressed gas
- Explosive material (dust)
- Working with other trades
- Alcohol
- Drugs
- Fire
- Field Level Risk Assessmet (FLRA)
- Debris
- Personal apparel
 - Clothing
 - Hair and beards
 - Jewellery
- Horseplay
- Housekeeping
- Respect for others safety
- Constant awareness of surroundings
- Working below grade
- Control zone awareness
 - Signage
 - Tape
- Site safety orientation



LEARNING TASKS

2. Describe long term hazards

3. Describe safety precautions when working at elevations

4. Demonstrate emergency procedures

CONTENT

- Back and knee injuries
- Repetitive Strain Injuries
 - Carpal tunnel
- Respiratory disease
 - Asbestos
 - Silicosis
- Wind
- Floor openings
- Guard rails
- Safety lines
- Weather
- Stressed cables
- First aid
- Reporting
- Response
- Emergency shutoffs
- Fire control systems
- Eye wash facilities
- Emergency exits
- Emergency contact/phone numbers
- Outside meeting place
- Disaster meeting place



Line (GAC): A USE SAFE WORK PRACTICES

Competency: A5 Select Fire Extinguishers

Objectives

To be competent in this area, the individual must be able to:

- Describe fire prevention precautions and procedures.
- Select the appropriate fire extinguisher for each class of fire.

LEARNING TASKS

1. Describe the conditions necessary to support a fire

2. Describe the fire classes

3. Describe the kinds of fire extinguishers

4. Describe the use of fire extinguishers

5. Describe procedures and equipment related to preventing, detecting and warning of fires

CONTENT

- Air
- Fuel
- Heat

- Class A
- Class B
- Class C
- Class D

- Water
- Foam
- CO2
- All purpose chemical
- Halons
- Extinguisher maintenance
 - Inspection
- Proper use of portable fire extinguisher
- Precautions
- Hazards

- Extinguisher selection
- P.A.S.S
 - Pull
 - Aim
 - Squeeze
 - Sweep

- Fire safety considerations
- Storage of rags
- Welding and cutting
- Fire watch
- Emergency action plan
- Exit strategy
- Fire extinguisher type and location
- Fire safety check-list



Line (GAC): **A USE SAFE WORK PRACTICES**
Competency: **A6 Complete Level 1 First Aid Certification**

Objectives

To be competent in this area, the individual must be able to:

- Attain Level 1 First Aid Training.

LEARNING TASKS

1. Attain Level 1 First Aid Certification

CONTENT

- Arrange with a qualified provider of First Aid Certification



Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B1 Use Hand Tools

Objectives

To be competent in this area, the individual must be able to:

- Select hand tools appropriate to architectural sheet metal processes.
- Use and maintain hand tools.

LEARNING TASKS

1. Describe the use of hand tools

CONTENT

- Layout tools
- Cutting tools
- Forming tools
- Clamping tools
- Hammers
- Measuring tools
- Fastening
- Care and maintenance.
- **

**See Tools and Equipment list in Section 4



Line (GAC): **B USE TOOLS AND EQUIPMENT**
Competency: **B2 Use Power Tools**

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of power tools.

LEARNING TASKS

1. Describe the use of power tools

CONTENT

- Safety
- Maintenance
- Types
 - Cutting
 - Seaming
 - Fastening
 - Drilling
- **

**See Tools and Equipment list in Section 4



Line (GAC): **B USE TOOLS AND EQUIPMENT**

Competency: **B3 Use Powder Actuated Tools**

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of powder actuated tools.

LEARNING TASKS

1. Attain certification for powder actuated tools

CONTENT

- Arrange with a qualified provider for Powder Actuated Tool Certification



Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B4 Use Shop Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of shop equipment.

LEARNING TASKS

1. Describe the use of shop equipment

CONTENT

- Safety
- Maintenance
- Types
- Cutting
 - Shear
 - Slitter
 - Notcher
 - Punching
 - Saws
 - Drilling
- Forming
 - Rotary
 - Hand brakes
 - Roll formers
 - Slip rolls
 - Bar folder
 - Stakes
- Spot welder
- Computer assisted
- **

**See Tools and Equipment list in Section 4



Line (GAC): **B USE TOOLS AND EQUIPMENT**
Competency: **B5 Use Ladders, Scaffolds and Platforms**

Objectives

To be competent in this area, the individual must be able to:

- Describe the procedure for working with ladders.
- Describe the erection requirements for scaffolds.
- Describe the use of swing staging.
- Demonstrate the use of swing staging.

LEARNING TASKS

1. Describe precautions and procedures for working with ladders

2. Describe the erection requirements for scaffolds

3. Describe the use of swing staging safety and training requirements as per WorkSafeBC

CONTENT

- Types
- Set-up
- Maintenance
- WorkSafeBC Requirements
- 3-point contact
- Inspection

- Set-up
- Maintenance
- WorkSafeBC Requirements
- Inspection
- Types
 - Rolling
 - H-Frame
 - Tube and Clamp

- WorkSafeBC Regulations
- Inspection criteria
- Manual must be available
- Employer must keep records of
 - Inspection
 - Maintenance
 - Repair
 - Modification

- All workers must be trained in the operation of swing staging prior to use



Line (GAC): C ORGANIZE WORK
Competency: C1 Interpret Drawings and Specifications

Objectives

To be competent in this area, the individual must be able to:

- Describe the components for a set of shop drawings.

LEARNING TASKS

1. Describe the components of a set of shop drawings

CONTENT

- Lines
- Symbols
- Abbreviations
- Required information
- Scale
- Title blocks
- Dimensioning



Line (GAC): C **ORGANIZE WORK**
Competency: C4 **Measure and Sketch Shop Project Components**

Objectives

To be competent in this area, the individual must be able to:

- Produce a shop drawing.

LEARNING TASKS

1. Produce a shop drawing

CONTENT

- Determine pitch
- Field measuring
- Information required on a drawing
- Measure and sketch
 - Flashings
 - Diverters
 - Standing seam pan
 - Roof jack
 - Scupper

Achievement Criteria

Performance The learner will produce a shop drawing.

Conditions The learner will be given:

- Tools
- Materials
- Project Information/Specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Accuracy
- Proper dimensioning
- Proper usage of lines
- Proper information in title block



Line (GAC): D USE TRADE MATH
Competency: D2 Solve Problems Using Formulas

Objectives

To be competent in this area, the individual must be able to:

- Solve problems using formulas.

LEARNING TASKS

1. Describe math formulas using imperial and metric

2. Solve problems using math formulas

CONTENT

- Perimeter
- Areas
- Volume
 - Liquid measure
- Formula variations
- Trade related math applications
 - Perimeter
 - Area
 - Volume



Line (GAC): **D USE TRADE MATH**
Competency: **D3 Solve Problems Using Pythagorean Theorem**

Objectives

To be competent in this area, the individual must be able to:

- Solve problems using Pythagorean Theorem.

LEARNING TASKS

1. Describe the Pythagorean Theorem
2. Solve problems using Pythagorean Theorem

CONTENT

- Pythagorean Theorem
- Formula variations
- Slope calculations
- Checking for square



Line (GAC): **D USE TRADE MATH**
Competency: **D4 Solve Problems Using Trigonometry**

Objectives

To be competent in this area, the individual must be able to:

- Solve problems using trigonometry.

LEARNING TASKS

1. Examine trigonometry functions

2. Use trigonometry functions

CONTENT

- Tangent
- Sine
- Cosine

- Solve problems using trigonometry functions



Line (GAC): E **EXAMINE SYSTEMS**
Competency: E1 **Identify Systems**

Objectives

To be competent in this area, the individual must be able to:

- Describe various decking, wall and roof systems.

LEARNING TASKS

1. Describe systems

CONTENT

- Decking
 - Materials
 - Flashings
 - Fastenings
 - Seismic requirements
 - Form work
 - Acoustic properties
 - Studs
- Wall and Roof
 - Materials
 - Flashings
 - Fastenings
 - Combined component systems



Line (GAC): E **EXAMINE SYSTEMS**
Competency: E2 **Identify Support Structures**

Objectives

To be competent in this area, the individual must be able to:

- Identify structural steel supports.

LEARNING TASKS

1. Identify structural steel support

CONTENT

- Columns
- Beams
- Joists
- Perlin
- Trusses



Line (GAC): **E** **EXAMINE SYSTEMS**
Competency: **E3** **Identify Building Envelope**

Objectives

To be competent in this area, the individual must be able to:

- Describe building envelop requirements.
- Describe common building envelope systems and materials.

LEARNING TASKS

1. Describe the factors for building envelope

2. Describe common building envelope systems

3. Describe common building envelope materials

CONTENT

- Moisture control
 - Capillary action
 - Wind driven rain
- Air movement
- Pressure differentials
- Temperature control
 - Thermal bridging
- Rainscreens
- Water proof systems
- Vapour barrier systems
- Underlayment
- Vapour barriers
- Air barriers
- Membrane systems
 - Peel and stick
 - Primers and adhesives
 - Spray applied
- Insulations



Line (GAC): **E** **EXAMINE SYSTEMS**
Competency: **E4** **Examine Wall Systems**

Objectives

To be competent in this area, the individual must be able to:

- Describe roll formed and milled cladding.
- Identify sub girt support systems.

LEARNING TASKS

1. Describe roll formed and milled cladding

2. Identify sub girt support systems

CONTENT

- Trapezodial
- Corrugated (Sinusodial)
- Composite metal panel profile
 - Insulated panels
 - Cement based
- Hidden fastener
- Internal system support
 - Hat-bar
 - Z-bar
 - J-channel
 - Clips
 - Thermal



LEARNING TASKS

4. Identify roof drainage components

CONTENT

- Valley
- Gutters
- Down spouts
- Leaders
- Conductor heads
- Scuppers
- Sumps



Line (GAC): E **EXAMINE SYSTEMS**
Competency: E6 **Examine Specialty Products**

Objectives

To be competent in this area, the individual must be able to:

- Describe specialty system components.

LEARNING TASKS

1. Describe specialty system components

CONTENT

- Scupper
- Ventilators
- Penetration
 - Curbs
 - Louvers
 - Roof jacks
- Flashing
 - Through wall
 - Base
 - Counter
 - Coping
 - Step
 - Hip
 - Valley
 - Ridge
 - Fascia
 - Gable
 - Soffit
 - Gravel stop
 - Transitions
 - Diverter
 - Apron
 - Cleat
 - Roof to wall
 - Saddle
 - Hook strip
 - Cricket
 - Expansion joint



Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS
Competency: F1 Seams, Locks, Edges and Joints

Objectives

To be competent in this area, the individual must be able to:

- Describe types of seams, locks, edges and joints.
- Calculate allowances.
- Fabricate seams, locks, edges and joints.

LEARNING TASKS

1. Describe types of seams

2. Describe types of locks

3. Describe types of edges

4. Describe types of joints

5. Calculate allowances

6. Fabricate

CONTENT

- Lap
- Single
- Double
- Standing
- Flat
- Batten

- Dovetail
- Coffin
- Pittsburg

- Hemmed
- Flanges

- Transverse
- Loose lock expansion
- Back-up with cover plate

- Seams
- Locks
- Edges
- Joints

- Select appropriate tools
- Select appropriate materials

Achievement Criteria continued next page



Achievement Criteria

Performance The learner will fabricate seams, locks, edges and/or joints.

Conditions The learner will be given:

- Tools
- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Accuracy/ Conformity to Project Specifications
- Proper tools usage
- Proper materials usage



Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS
Competency: F2 Fabricate Components

Objectives

To be competent in this area, the individual must be able to:

- Describe components for a roof and wall system.
- Fabricate components for a roof and wall system.

LEARNING TASKS

1. Describe components for a roof and wall system

2. Fabricate components for a roof and wall system

CONTENT

- Flashings
- Panels
- Roof jack
- Scupper

- Flashings
- Panels
- Roof jack
- Scupper

Achievement Criteria

Performance The learner will fabricate Flashings.

- Conditions** The learner will be given:
- Tools and equipment
 - Materials
 - Project specifications

- Criteria** The learner will score 70% or better on a rating sheet that reflects the following criteria:
- Safety
 - Conforms to specifications
 - Proper tools usage
 - Proper materials usage

Achievement Criteria continued next page

**Achievement Criteria**

- Performance The learner will fabricate Panels.
- Conditions The learner will be given:
- Tools and equipment
 - Materials
 - Project specifications
- Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:
- Safety
 - Conforms to specifications
 - Proper tools usage
 - Proper materials usage

Achievement Criteria

- Performance The learner will fabricate Roof Jack.
- Conditions The learner will be given:
- Tools and equipment
 - Materials
 - Project specifications
- Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:
- Safety
 - Conforms to specifications
 - Proper tools usage
 - Proper materials usage

Achievement Criteria

- Performance The learner will fabricate Scupper.
- Conditions The learner will be given:
- Tools and equipment
 - Materials
 - Project specifications
- Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:
- Safety
 - Conforms to specifications
 - Proper tools usage
 - Proper materials usage



Line (GAC): **G INSTALL PRODUCTS**
Competency: **G1 Use Hoisting, Lifting and Rigging Equipment**

Objectives

To be competent in this area, the individual must be able to:

- Describe and demonstrate tying knots.
- Describe tie-downs.
- Describe hoisting safety.
- Describe slings and rigging equipment.
- Describe and demonstrate the use of hand signals.

LEARNING TASKS

1. Describe and/or demonstrate tying knots used in rigging
2. Describe tie-downs to secure materials
3. Describe hoisting safety
4. Describe slings and rigging equipment
5. Describe and/or demonstrate the use of hand signals to control hoist operations

CONTENT

- Double figure eight
- Bowline
- Hitches
- Reef and sheet bend
- Ropes
- Cables
- Banding
- Ratchet straps
- As per WorkSafeBC Regulations
- Centre of gravity
- Wind
- Stay clear of the load
- Types of slings
- Sling angles and configurations
- Shackles
- Turn buckles
- Spreader bars
- Cable clips
- Eye bolts
- Tag lines
- Types of hoists
- As per WorkSafeBC Regulations
- Types of hand signals



Line (GAC): **G INSTALL PRODUCTS**
Competency: **G2 Install Roofing, and Wall Components**

Objectives

To be competent in this area, the individual must be able to:

- Describe roofing, wall and decking systems.
- Install roofing and wall systems.

LEARNING TASKS

1. Describe roofing, wall and decking systems

CONTENT

- Layout and mitre techniques
- Types of roof and wall panels
 - Standing beam
 - Batten
 - Snap lock
- Types of fasteners
 - Concealed and exposed
 - Screws
 - Washer nails
 - Cleats
- Consideration for thermal expansion and contraction of materials
- Effect of weather conditions
- Components
 - Expansion joints
 - Flashings
 - Drainage
- Cut, fit and secure components
- Openings and penetrations
- Sealant usage
- Plumb level and square
- Standing seam roof panel
 - Mitre valley and hip
 - Related flashings
- Single skin wall panel
 - Inside and outside corner
 - Related flashings

2. Install roofing and wall systems

Achievement Criteria continued next page

**Achievement Criteria**

Performance The learner will install common types of roofing and wall systems.

Conditions The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
- Mitre development accuracy (skew)
- Proper tools usage
- Proper materials usage



Line (GAC): **G** **INSTALL PRODUCTS**

Competency: **G3** **Prepare Substrate**

Objectives

To be competent in this area, the individual must be able to:

- Describe substrate.
- Describe substrate surface penetration.

LEARNING TASKS

1. Describe substrate

2. Describe substrate surfaces penetration

CONTENT

- Concrete surfaces
- Stone and/or brick surfaces
- Metal (structural steel and stud) surfaces
- Wood (plywood and stud) surfaces
- Composite gypsum product surfaces

- Primer (if required)
- Membranes
- Sub girt fastening and leveling of surfaces
- Sealants



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H1 Use Drafting Equipment for Geometric Construction**

Objectives

To be competent in this area, the individual must be able to:

- Describe drafting equipment.
- Use architect’s scale.
- Describe geometric shapes used in pattern development.
- Develop geometric construction.

LEARNING TASKS

1. Describe drafting equipment
2. Use architect’s scale
3. Describe geometric shapes used in pattern development
4. Develop geometric constructions

CONTENT

- Types
- Imperial
- Metric
- Circle
- Types of angles
- Ellipses
- Polygons
- Types of triangles
- Draw, bisect and divide
 - Lines
 - Arcs
 - Angles
- Parts of a circle
- Ellipses
- Polygons

Achievement Criteria

Performance The learner will develop geometric construction.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to specifications
- Title block
- Proper line usage
- Proper dimensioning



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H2 Draw Orthographic and Pictorial Drawings**

Objectives

To be competent in this area, the individual must be able to:

- Describe and develop pictorial drawings.
- Describe and develop orthographic projections and drawings.

LEARNING TASKS

1. Describe pictorial drawings
2. Develop pictorial drawings
3. Describe orthographic projections
4. Develop orthographic drawings

CONTENT

- Perspective
- Isometric
- Oblique
- Simple three dimensional shape
- 3rd angle
- Simple three dimensional shape

Achievement Criteria

Performance The learner will develop a pictorial drawing.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to specifications
- Title block
- Proper line usage
- Proper dimensioning

Achievement Criteria

Performance The learner will develop an orthographic drawing.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to specifications
- Title block
- Proper line usage
- Proper dimensioning



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H3 Produce Patterns Using Parallel Line Development**

Objectives

To be competent in this area, the individual must be able to:

- Describe and develop patterns using parallel line method

LEARNING TASKS

1. Describe and develop patterns using parallel line method

CONTENT

- Element lines
- Views
- Pattern fabrication requirements
- Math

Achievement Criteria

Performance The learner will develop patterns using parallel lines.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to specifications
- Title block
- Proper line usage
- Proper dimensioning



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H4 Produce Patterns Using Radial Line Development**

Objectives

To be competent in this area, the individual must be able to:

- Describe and develop patterns using radial line development.

LEARNING TASKS

1. Describe and develop patterns using radial line development

CONTENT

- Element lines
- Views
- Patterns fabrication requirements
- Math

Achievement Criteria

Performance The learner will develop patterns using radial lines.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to specifications
- Title block
- Proper line usage
- Proper dimensioning



Line (GAC): I **WELD AND SOLDER MATERIALS**
Competency: I1 **Cutting Techniques**

Objectives

To be competent in this area, the individual must be able to:

- Describe general safety precautions when cutting.
- Describe and demonstrate different types of cutting processes.

LEARNING TASKS

1. Describe general safety precautions

2. Describe and demonstrate the different types of cutting processes

CONTENT

- Electrical shock
- UV
- Heat-light (burn/fire potential)
- Gas cylinders
- Ventilation

- Oxy fuel
- Plasma cutter

Achievement Criteria

Performance The learner will demonstrate cutting using oxy fuel.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
 - Waviness
 - Spatter
- Material usage
- Equipment usage

Achievement Criteria continued next page

**Achievement Criteria**

Performance The learner will demonstrate cutting using a plasma cutter.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications:
 - Waviness
 - Spatter
- Material usage
- Equipment usage



Line (GAC): **I** **WELD AND SOLDER**
Competency: **I2** **Select and Use Welding Equipment for SMAW**

Objectives

To be competent in this area, the individual must be able to:

- Describe equipment for SMAW.
- Set-up and maintain SMAW equipment.
- Interpret welding symbols.
- Demonstrate puddle welding.

LEARNING TASKS

1. Describe equipment for SMAW
2. Set-up and maintain equipment for SMAW
3. Interpret welding symbols
4. Demonstrate puddle welding

CONTENT

- Safety
- Electrode selection
- Settings
- Maintenance
 - Check stinger
 - Check cables and connection
 - Check ground clamp
- Fillet weld
- Spot/puddle weld
- As per CWB certification requirements for W47.1

Achievement Criteria (8 hours to 16 hours)

Performance The learner will demonstrate puddle welding.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
- Material usage
- Equipment usage
- Conforms with WCB requirements for W47.1

**Achievement Criteria**

Performance The learner will demonstrate soldering different types of seams.

Conditions The learner will be given:

- Materials
 - Solder
 - Acid/flux
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
- Aesthetics
- Adhesion (sweating)
- Material usage
- Equipment usage



Level 2

Architectural Sheet Metal Worker



Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B1 Use Hand Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of specialty hand tools.

LEARNING TASKS

1. Describe the use of specialty hand tools

CONTENT

- Layout tools
- Cutting tools
- Forming tools
- Clamping tools
- Hammers
- Measuring tools
- Care and maintenance
- **

**See Tools and Equipment list in Section 4



Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B2 Use Power Tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of power tools.

LEARNING TASKS

1. Describe the use of power tools

CONTENT

- Safety
- Maintenance
- Types
- Cutting
- Seaming
- Fastening
- Drilling
- **

**See Tools and Equipment list in Section 4



Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B4 Use Shop Equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of shop equipment.

LEARNING TASKS

1. Describe the use of shop equipment

CONTENT

- Safety
- Maintenance
- Types
 - Cutting
 - Shear
 - Slitter
 - Notcher
 - Punching
 - Saws
 - Drilling
 - Forming
 - Rotary
 - Hand brakes
 - Roll formers
 - Slip rolls
 - Bar folder
 - Stakes
 - Spot welder
 - Computer assisted
- **



Line (GAC): **B USE TOOLS AND EQUIPMENT**
Competency: **B5 Use Ladders, Scaffolds and Platforms**

Objectives

To be competent in this area, the individual must be able to:

- Describe different types of mobile work platforms.
- Describe material lifting equipment.

LEARNING TASKS

1. Describe different types of mobile work platforms

2. Describe material lifting equipment

CONTENT

- As per WorkSafeBC Regulations
- As per manufacturer specifications
- Scissor
- Boom
- Man lift
- Proper training of workers
 - practical and theory
 - certification
- Manufacturer, employer and employee responsibilities

- As per WorkSafeBC Regulations
- As per manufacturer specifications
- Proper training of workers
 - practical and theory
 - certification
- Manufacturer, employer and employee responsibilities



Line (GAC): **C ORGANIZE WORK**
Competency: **C1 Interpret Drawings and Specifications**

Objectives

To be competent in this area, the individual must be able to:

- Describe the format of specifications.
- Describe types of plans.
- Describe types of lines, symbols and abbreviations.
- Identify sections and elements of a set of plans.
- Use shop drawings and plans.

LEARNING TASKS

1. Describe the format of specifications and the information contained within

2. Describe types of plans

3. Describe the types of lines, symbols and abbreviations commonly used in the trade

4. Identify sections and elements of a set of plans

5. Use shop drawings and plans

CONTENT

- Format
 - CSI Divisions
 - Master format
 - Sections
 - RFI (Request for Information)
 - Addenda/change orders
- Information contained
- Civil
- Architectural
- Structural
- Mechanical
- Shop drawings
- Lines
 - Object
 - Hidden
 - Dimensional
 - Section
 - Direction
- Symbols
- Abbreviations
- Title sheet
- Detail drawings
- Schedules
- Sectional views
- Elevation views
- Title block information
- Determine measurements for layout
- Extract information from reference (IFC) drawings



Achievement Criteria

Performance The learner will use shop drawings and plans to determine measurements for layout.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Accuracy
- Proper measurements
- Proper layout
- Proper line usage
- Title block



Line (GAC): C ORGANIZE WORK
Competency: C4 Measure and Sketch Shop Project Components

Objectives

To be competent in this area, the individual must be able to:

- Measure and sketch shop projects.

LEARNING TASKS

1. Measure and sketch shop projects

CONTENT

- Flashings
- Components

Achievement Criteria

Performance The learner will measure and sketch a shop project.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Accuracy
- Proper dimensioning
- Proper line usage
- Title block



LEARNING TASKS

4. Identify specific properties of zinc

CONTENT

- Finishes
- Malleability (stamped or formed)
- Ductility
- Temperature limitations
- Durability
- Specialty notching
- Compatibility with other materials
 - Back coating
- Storage considerations
- White rust
- Alloy composition
- Expansion and contraction



Line (GAC): **D USE TRADE MATH**
Competency: **D1 Use Basic Trade Math**

Objectives

To be competent in this area, the individual must be able to:

- Describe basic trade math.
- Solve problems using basic trade math.

LEARNING TASKS

1. Describe basic trade math

2. Solve problems using basic trade math

CONTENT

- Imperial
- Metric
- Fractions
- Decimals
- Conversions
- Percentages

- Imperial
- Metric
- Fractions
- Decimals
- Conversions
- Percentages



Line (GAC): D USE TRADE MATH
Competency: D2 Solve Problems Using Formulas

Objectives

To be competent in this area, the individual must be able to:

- Describe formulas using imperial and metric units.
- Explain formula variations
- Solve problems using math formulas

LEARNING TASKS

1. Describe formulas using imperial and metric units
2. Describe formula variations
3. Solve problems using math formulas

CONTENT

- Perimeter
- Areas
- Volume
 - Liquid measure
- Formula variations
- Solve for unknowns using formula variations
- Sample problems incorporating various formulas
- Attic ventilation calculations



Line (GAC): **D USE TRADE MATH**
Competency: **D3 Solve Problems Using Pythagorean Theorem**

Objectives

To be competent in this area, the individual must be able to:

- Describe the Pythagorean Theorem.
- Solve problems using Pythagorean Theorem.

LEARNING TASKS

1. Describe the Pythagorean Theorem
2. Solve problems using Pythagorean Theorem

CONTENT

- Pythagorean Theorem
- Formula variations
- Slope calculations
- Checking for square



Line (GAC): D USE TRADE MATH
Competency: D4 Solve Problems Using Trigonometry

Objectives

To be competent in this area, the individual must be able to:

- Describe trigonometric functions.
- Describe practical layout problems using trigonometry.
- Solve practical problems using trigonometry.

LEARNING TASKS

1. Describe trigonometric functions
2. Describe practical layout problems using trigonometry
3. Solve practical problems using trigonometry

CONTENT

- Tangent
- Sine
- Cosine
- Roof calculations
- Fabrication calculations
- A selection of problems requiring trigonometry functions



Line (GAC): E EXAMINE SYSTEMS
Competency: E1 Identify Systems

Objectives

To be competent in this area, the individual must be able to:

- Identify systems.

LEARNING TASKS

1. Identify systems

CONTENT

- Foam panel
 - Freezer and cold storage applications
 - Continuous vapour barrier tie-ins
 - Insulations
 - Installation method
 - Sealant
 - Side laps
 - Fastening
 - Finishes
- Wall cladding
 - Sandwich panel
 - Liner
 - Sub girts
 - Insulations
 - Clips and fasteners
 - Thermal break
 - Exterior cladding/weather sheet
 - Honeycomb core
 - Span conditions
 - Weather applications
 - Special material
 - Fiberglass
 - PVC
- Roof cladding
 - Self spanning profiles
 - Insulated roof systems



Line (GAC): **E** **EXAMINE SYSTEMS**
Competency: **E2** **Identify Support Structures**

Objectives

To be competent in this area, the individual must be able to:

- Identify steel stud frame systems.
- Identify wood frame systems.

LEARNING TASKS

1. Identify steel stud frame systems

2. Identify wood frame systems

CONTENT

- Standard steel stud framed structures
- Deflection track
- Thermal bridging
- Standard wood framed structures
- Shrinkage (EMC)



Line (GAC): E EXAMINE SYSTEMS
Competency: E3 Identify Building Envelope

Objectives

To be competent in this area, the individual must be able to:

- Describe factors for building envelope.
- Describe specific wall and roof systems and tie-ins.
- Describe building envelope materials.

LEARNING TASKS

1. Describe the factors for building envelope
2. Describe specific wall and roof systems and tie-ins
3. Describe common building envelope materials

CONTENT

- Moisture control
 - Capillary action
 - Wind driven rain
 - Dew point
- Air movement
- Pressure differentials
- Temperature control
- Rainscreens
 - Sandwich panel wall systems
- Underlayment
- Vapour barriers
- Air barriers
- Membrane systems
 - Peel and stick
 - Primers and adhesives
 - Spray applied
- Insulations
- Liner panels



LEARNING TASKS

4. Describe roof slopes and design criteria

CONTENT

- Exposed gutter
 - Styles
 - Components
- Drains
- Sumps
- Overflow scuppers
- Low pitch (less than 3 in 12)
 - Soldered flat seam roof
 - High side lap standing seam
- Mid-pitch (3 in 12 to 6 in 12)
 - Standing seam
 - Batten seam
 - Through fastener (exposed)
 - Tile
 - Shingles
- Steep pitch (greater than 6 in 12)
 - Standing seam
 - Batten seam
 - Through fastener (exposed)
 - Tile
 - Shingles



Line (GAC): E **EXAMINES SYSTEMS**
Competency: E6 **Examine Specialty Products**

Objectives

To be competent in this area, the individual must be able to:

- Describe zinc and copper systems

LEARNING TASKS

1. Describe zinc and copper systems

CONTENT

- Expansion and contraction
- Properties
- Working considerations
- Handling and storage applications



Line (GAC): E **EXAMINE SYSTEMS**
Competency: E7 **Examine Specialty System Components**

Objectives

To be competent in this area, the individual must be able to:

- Identify specialty system components.

LEARNING TASKS

1. Identify specialty system components and their characteristics

CONTENT

- Types of louvers
- Types of snow guards
- Sky lights
- Roof curbs
- Expansion joints
- Flashings
 - Sill
 - Jamb
 - Header
 - Base
 - J-trim
 - Vent
 - Corner
 - Closures
 - Overlap
 - Through wall



Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS

Competency: F2 Fabricate Components

Objectives

To be competent in this area, the individual must be able to:

- Fabricate components.

LEARNING TASKS

1. Fabricate components

CONTENT

- Flashings
 - End dams
 - Cricket (coping)
 - Saddles (coping)
- Components
 - Goose neck
 - Louvre
- Wall shingles

Achievement Criteria

Performance The learner will fabricate flashings and/or components.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage

Achievement Criteria

Performance The learner will fabricate wall shingle.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage



Line (GAC): **G INSTALL PRODUCTS**
Competency: **G2 Install Roofing and Wall Components**

Objectives

To be competent in this area, the individual must be able to:

- Install roofing and wall systems.

LEARNING TASKS

1. Install roofing and wall systems

CONTENT

- Types of wall panels
 - Tiles and/or shingles
 - Standing seam
 - Roll formed products
 - Shop formed products
- Types of fasteners
 - Concealed and exposed
 - Screws
 - Washer nails
 - Cleats
- Layout install techniques for wall and roof penetrations
 - Applicable seals
- Mitre profile sheet
- Consideration for thermal expansion and contraction of materials
- Effect of weather conditions
- Components
 - Expansion joints
 - Flashings
- Openings and penetrations
- Sealant usage

Achievement Criteria

Performance The learner will install roofing and wall systems.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage



Line (GAC): **G INSTALL PRODUCTS**
Competency: **G4 Install Specialty Components**

Objectives

To be competent in this area, the individual must be able to:

- Install specialty components.

LEARNING TASKS

1. Install specialty components

2. Install flashings for openings and penetrations

CONTENT

- Placement
- Cut
- Flash
- Seal

- Windows
- Doors
- Mechanical
- Structural
- End dams
- Stripping in
- Peel and stick

Achievement Criteria

Performance The learner will install specialty components.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage

Achievement Criteria continued next page



Achievement Criteria

Performance The learner will install flashings for opening and penetrations.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H2 Draw Orthographic and Pictorial Drawings**

Objectives

To be competent in this area, the individual must be able to:

- Describe and develop pictorial drawings.
- Describe and develop orthographic drawings.

LEARNING TASKS

1. Describe pictorial drawings
2. Describe orthographic projection
3. Develop pictorial drawings
4. Develop orthographic projections

CONTENT

- Isometric
- Perspective
- Oblique
- 3rd angle
- Isometric
- Orthographic views

Achievement Criteria

Performance The learner will develop pictorial drawings.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to project specifications
- Title block
- Dimensioning usage
- Line usage

Achievement Criteria

Performance The learner will develop an orthographic projection drawing.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to project specifications
- Title block
- Dimensioning usage
- Line usage



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H3 Produce Patterns Using Parallel Line Development**

Objectives

To be competent in this area, the individual must be able to:

- Develop patterns incorporating parallel line.

LEARNING TASKS

1. Develop a pattern incorporating parallel line

CONTENT

- Gutter mitres
- Goose neck
- Mitre down spout
- Round elbow

Achievement Criteria

Performance The learner will develop patterns using parallel line.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning usage



Line (GAC): H LAYOUT AND DEVELOP PATTERNS
Competency: H4 Produce Patterns Using Radial Line Development

Objectives

To be competent in this area, the individual must be able to:

- Develop patterns using radial line development.

LEARNING TASKS

1. Develop a pattern using radial line development techniques

CONTENT

- Round roof jack on a pitch

Achievement Criteria

Performance The learner will develop patterns using radial line development.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning usage



Line (GAC): H LAYOUT AND DEVELOP PATTERNS
Competency: H5 Produce Patterns Using Triangulation

Objectives

To be competent in this area, the individual must be able to:

- Develop patterns using triangulation.

LEARNING TASKS

1. Develop a pattern incorporating triangulation techniques

CONTENT

- Rectangular ventilator cap

Achievement Criteria

Performance The learner will develop patterns using triangulation.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning usage



Line (GAC): I **WELD AND SOLDER**
Competency: I1 **Cutting Techniques**

Objectives

To be competent in this area, the individual must be able to:

- Describe general safety cutting precautions.

LEARNING TASKS

1. Describe general safety cutting precautions

2. Describe different types of cutting processes

CONTENT

- Electrical shock
- UV
- Heat-light (burn/fire potential)
- Gas cylinders

- Oxy fuel
- Plasma



Line (GAC): **I** **WELD AND SOLDER**
Competency: **I2** **Select and Use Welding Equipment for SMAW**

Objectives

To be competent in this area, the individual must be able to:

- Describe equipment for SMAW.
- Set-up and maintain equipment for SMAW.
- Demonstrate SMAW.

LEARNING TASKS

1. Describe equipment for SMAW

2. Set-up and maintain equipment for SMAW

3. Demonstrate SMAW

CONTENT

- Safety
- Electrode selection
- Settings
- Maintenance
 - Check stinger
 - Check cables and connection
 - Check ground clamp
- Polarity
- Position
- Prepare material
- Amperage
- Lap
- Filet
- Outside corner
- Weld coupons of different gauges
- Weld coupons of different positions

Achievement Criteria

Performance The learner will demonstrate a lap weld, filet weld and/or outside corner using weld using coupons of different gauges and positions.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage
- Conforms with CWB

**Achievement Criteria**

Performance The learner will solder different type of seams.

Conditions The learner will be given:

- Materials
 - Solder
 - Acid/flux
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage
- Aesthetics
- Adhesion (sweating)



Level 3

Architectural Sheet Metal Worker



Line (GAC): C **ORGANIZE WORK**
Competency: C1 **Interpret Drawings and Specifications**

Objectives

To be competent in this area, the individual must be able to:

- Use a set of manufacturers' shop drawings
- Identify sections and elements of a set of plans
- Describe the format of specifications and the information contained within
- Interpret a set of plans and specifications

LEARNING TASKS

1. Use a set of manufacturers' and/or shop drawings

2. Identify sections and elements of a set of plans

3. Describe the format of specifications and the information contained within

4. Interpret a set of plans and specifications

CONTENT

- Determine measurements for layout
- Extract information from reference (IFC) drawings

- Title sheet
- Detail drawings
- Schedules
- Sectional views
- Elevation views
- Title block information

- Format
 - CSI Divisions
 - Master format
 - Sections
 - RFI (request for information)
 - Addenda/change orders
- Information contained
- Scope of work

- Use a set of current project plans and specifications



Line (GAC): C **ORGANIZE WORK**
Competency: C2 **Estimate Materials**

Objectives

To be competent in this area, the individual must be able to:

- Estimate materials.

LEARNING TASKS

1. Estimate materials

CONTENT

- Use information taken from plans
- Use information taken from job site
- Use information taken from specifications
- Use material taken off sheets
- Identify drawing component parts
- Use colour coding to mark up a drawing
- Determine scope of work
- Use estimating material guidelines
- Use calculations and formulas

Achievement Criteria

Performance The learner will estimate materials.

Conditions The learner will be given:

- Materials
- Specifications/blueprints

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Accuracy of estimate



Line (GAC): **C** **ORGANIZE WORK**
Competency: **C3** **Communicate with Others**

Objectives

To be competent in this area, the individual must be able to:

- Describe various methods of communication.
- Describe personal conduct.

LEARNING TASKS

1. Describe methods of communication

2. Describe personal conduct

CONTENT

- Listening
- Critical thinking
- Verbal
- Written
- Drawings
- Use of technology
 - Two-way radios
 - Cell phones
 - Fax machines
 - Computers
- Trade terminology
- Project coordination
- Giving instructions
- Interpersonal skills
- Ethics
- Harassment
- Customers
- Industry people
- Apprentice mentoring/monitoring
- General public



Line (GAC): C **ORGANIZE WORK**
Competency: C4 **Measure and Sketch Shop Project Components**

Objectives

To be competent in this area, the individual must be able to:

- Measure and sketch components.

LEARNING TASKS

1. Measure and sketch components

CONTENT

- ACM panels
- Flashings

Achievement Criteria

Performance The learner will measure and sketch shop components.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Accuracy
- Proper dimensioning
- Proper line usage
- Title block



Line (GAC): **D USE TRADE MATH**
Competency: **D1 Use Basic Trade Math**

Objectives

To be competent in this area, the individual must be able to:

- Describe basic trade math.

LEARNING TASKS

1. Describe basic trade math

CONTENT

- Imperial
- Metric
- Fractions
- Decimals
- Conversions
- Percentages



Line (GAC): **D USE TRADE MATH**
Competency: **D2 Solve Problems Using Formulas**

Objectives

To be competent in this area, the individual must be able to:

- Describe math formulas using imperial and metric units.
- Solve problems using math formulas.

LEARNING TASKS

1. Describe math formulas using imperial and metric units

2. Solve problems using math formulas

CONTENT

- Perimeter
- Area
- Volume
 - Liquid measure
- Formula variations
- Arc calculations
- Trade related math applications
 - Perimeter
 - Area
 - Volume
- Attic ventilation calculations



Line (GAC): D USE TRADE MATH
Competency: D3 Solve Problems Using Pythagorean Theorem

Objectives

To be competent in this area, the individual must be able to:

- Describe Pythagorean Theorem.
- Solve problems using Pythagorean Theorem.

LEARNING TASKS

1. Describe the Pythagorean Theorem
2. Solve problems using Pythagorean Theorem

CONTENT

- Pythagorean Theorem
- Formula variations
- Slope calculations
- Fabrication calculations
- Roof calculations
- Check for square



Line (GAC): D USE TRADE MATH
Competency: D4 Solve Problems Using Trigonometry

Objectives

To be competent in this area, the individual must be able to:

- Describe and use trigonometry functions.

LEARNING TASKS

1. Describe trigonometry functions
2. Use trigonometry functions

CONTENT

- Tangent
- Sine
- Cosine
- Solve problems using trigonometry functions



Line (GAC): **E** **EXAMINE SYSTEMS**
Competency: **E1** **Identify Systems**

Objectives

To be competent in this area, the individual must be able to:

- Identify composite panel systems.
- Identify copper and zinc applications.
- Identify other specialty metal applications.

LEARNING TASKS

1. Identify composite panel systems

2. Identify copper and zinc applications

3. Identify other specialty metal applications

CONTENT

- Metal
- Plastics
- Concretes
- Wood
- Rainscreen applications
- Roof
- Walls
- Accessory applications
- Titanium
- Stainless
- Aluminum



Line (GAC): E EXAMINE SYSTEMS
Competency: E2 Identify Support Structures

Objectives

To be competent in this area, the individual must be able to:

- Identify concrete support systems.
- Identify expansion joints.

LEARNING TASKS

1. Identify concrete support systems

2. Identify expansion/contraction joints

CONTENT

- Typical concrete support structures
- Typical concrete issues
 - Spalling
 - Moisture content
 - Settling
- Different expansion/contraction joint system
 - Structural steel
 - Steel stud frame
 - Wood frame
 - Concrete



Line (GAC): E **EXAMINE SYSTEMS**
Competency: E7 **Examine Specialty System Components/Accessories**

Objectives

To be competent in this area, the individual must be able to:

- Identify specialty system components and their characteristics.

LEARNING TASKS

1. Identify specialty system components and their characteristics

CONTENT

- Finial
- Cupola
- Spire
- Cornice
- Crickets
- Chimney caps
- Sun shades and eye brows



Line (GAC): **F** **FABRICATE PRODUCTS AND COMPONENTS**
Competency: **F1** **Seams, Locks, Edges and Joints**

Objectives

To be competent in this area, the individual must be able to:

- Describe seams, locks, edges and joints.
- Fabricate ACM panels.

LEARNING TASKS

1. Describe common seams, locks, edges and joints

2. Fabricate ACM panels

CONTENT

- Allowances
- Forming
- Layout
- Tools
- Materials

- Calculate allowances
- Derive information from drawings

Achievement Criteria

Performance The learner will fabricate ACM panels.

- Conditions** The learner will be given:
- Tools
 - Materials
 - Project specifications

- Criteria** The learner will score 70% or better on a rating sheet that reflects the following criteria:
- Safety
 - Conformity to specifications
 - Tools usage
 - Materials usage



Line (GAC): F **FABRICATE PRODUCTS AND COMPONENTS**
Competency: F2 **Fabricate Components**

Objectives

To be competent in this area, the individual must be able to:

- Identify fabrication techniques for zinc and copper.
- Fabricate components.

LEARNING TASKS

1. Identify fabrication techniques for zinc and copper

2. Fabricate component

CONTENT

- Cutting
- Notching
- Forming
- Handling
- Soldering
 - Changing fluxes
 - Cleaning methods
- Environmental conditions
 - Temperature
- Triangulation
 - Cricket
 - Square to round on pitch
 - Square to round on ridge
 - Round to round off center roof jack
 - Square weather cap
- Parallel line
 - Gutter mitre
 - Mitre down spout
 - Cap flashing
 - Finial structure
 - Conductor head
 - Ridge vent
- Radial line
 - Weather cap
 - On centre round taper roof jack on a pitch
 - Storm collar

Achievement Criteria continued next page



Achievement Criteria

Performance The learner will fabricate component(s).

Conditions The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Tools usage
- Materials usage

**Achievement Criteria**

- Performance The learner will install roofing and/or wall systems.
- Conditions The learner will be given:
- Tools and equipment
 - Materials
 - Project specifications
- Criteria The learner will score 70% or better on a rating sheet that reflects the following:
- Safety
 - Conforms to project specifications
 - Materials usage
 - Tools usage
 - Mitre development accuracy (skew)



Line (GAC): **G** **INSTALL PRODUCTS**

Competency: **G3** **Prepare Substrate**

Objectives

To be competent in this area, the individual must be able to:

- Describe substrate.
- Describe substrate surface preparation.

LEARNING TASKS

1. Describe substrate

2. Describe substrate surfaces preparation

CONTENT

- Concrete surfaces
- Stone and/or brick surfaces
- Metal (structural and steel stud) surfaces
- Wood (plywood and stud) surfaces
- Composite gypsum products surfaces

- Primer (if required)
- Membranes
- Sub grit fastening and leveling of surfaces
- Penetrations
- Sealants
- Compatibility issues
 - Isolation
- Insulations
- Organize job site



Line (GAC): **G INSTALL PRODUCTS**
Competency: **G4 Install Specialty Components**

Objectives

To be competent in this area, the individual must be able to:

- Describe closure strips for pre-formed metal roofing.
- Describe ridge venting.
- Describe snow guards and/or snow fence.
- Describe dormer.
- Describe a cricket.
- Install a specialty component.

LEARNING TASKS

1. Describe openings and penetrations

2. Describe closure strips for pre-formed metal roofing

3. Describe ridge venting

4. Describe snow guards and/or snow fence

CONTENT

- Cut
- Flash
- Seal

- Types
 - Foam
 - Metal
- Purpose
- Location
- Cut, fit and place
- Fasteners
 - Screws
 - Caulking
 - Pop rivets
 - Staples

- Types
 - Pre-formed
 - Hood
 - Custom
- Purpose
- Techniques used
- Determining amount of venting required
- Problems

- Types
 - Metal
 - Plastics
- Purpose
- Fastening methods
- Installation specifications



LEARNING TASKS

5. Describe a dormer

6. Describe a cricket

7. Install a specialty component

CONTENT

- Forming
- Layout
- Flashing tie-ins

- Forming
- Layout
- Flashing tie-ins

- Triangulation
 - Cricket
 - Square to round on pitch
 - Square to round on ridge
 - Round to round off centre roof jack
 - Square weather cap
- Parallel line
 - Gutter mitre
 - Mitre down spout
 - Cap flashing
 - Finial structure
 - Conductor head
 - Ridge vent
- Radial line
 - Weather cap
 - On centre round taper roof jack on a pitch
 - Storm collar
- Organize job site

Achievement Criteria

Performance The learner will install a specialty component.

Conditions The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following:

- Safety
- Conforms to project specifications
- Materials usage
- Tools usage



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H2 Draw Orthographic and Pictorial Drawings**

Objectives

To be competent in this area, the individual must be able to:

- Draw pictorial drawings with circular openings.
- Draw complex objects in orthographic projection.

LEARNING TASKS

1. Draw pictorial drawings with circular openings
2. Draw complex object in orthographic projection

CONTENT

- Isometric
- Isometric circle
- Auxiliary views

Achievement Criteria

Performance The learner will draw pictorial drawings with circular openings.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning

Achievement Criteria

Performance The learner will draw complex objects in orthographic projection.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H3 Produce Patterns Using Parallel Line Development**

Objectives

To be competent in this area, the individual must be able to:

- Develop drawings using parallel line development.

LEARNING TASKS

1. Develop drawings using parallel line development techniques

CONTENT

- Gutter mitre
- Mitre down spout
- Cap flashing
- Finial structure
- Conductor head
- Ridge vent

Achievement Criteria

Performance The learner will develop drawings using parallel line development techniques.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H4 Produce Patterns Using Radial Line Development**

Objectives

To be competent in this area, the individual must be able to:

- Develop drawings using radial line development techniques.

LEARNING TASKS

1. Develop drawings using radial line development techniques

CONTENT

- Weather cap
- On centre round taper roof jack on a pitch
- Storm collar

Achievement Criteria

Performance The learner will develop drawings using radial line techniques.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning



Line (GAC): **H LAYOUT AND DEVELOP PATTERNS**
Competency: **H5 Produce Patterns Using Triangulation**

Objectives

To be competent in this area, the individual must be able to:

- Develop drawings using triangulation techniques.

LEARNING TASKS

1. Develop drawings using triangulation techniques

CONTENT

- Cricket
- Square to round on pitch
- Square to round on ridge
- Round to round off centre roof jack
- Square weather cap

Achievement Criteria

Performance The learner will develop drawings using triangulation.

Conditions The learner will be given:

- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning



Line (GAC): I **WELD AND SOLDER**
Competency: I1 **Cutting Techniques**

Objectives

To be competent in this area, the individual must be able to:

- Describe general safety precautions for cutting techniques.

LEARNING TASKS

1. Describe general safety precautions for oxy fuel and plasma

2. Describe different types of cutting processes

CONTENT

- Electrical shock
- UV
- Heat light (burn/fire potential)
- Gas cylinders
- Ventilation

- Oxy fuel
- Plasma

**Achievement Criteria**

Performance The learner will weld a lap, filet and/or outside corner using weld coupons of different gauges and positions.

Conditions The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following:

- Safety
- Conforms to project specifications
- Tools usage
- Materials usage



Line (GAC): I **WELD AND SOLDER**
Competency: I4 **Demonstrate Soldering Techniques**

Objectives

To be competent in this area, the individual must be able to:

- Describe general safety precautions.
- Describe soldering.
- Demonstrate positional soldering techniques for copper.

LEARNING TASKS

1. Describe general safety precautions

2. Describe soldering

3. Demonstrate positional soldering techniques for copper

CONTENT

- Gas
- Electric
- Acids/flux
- Lead
- MSDS
- Ventilation
- Hard solder
- Soft solder
- Acid/flux
- Sal ammoniac
- Sweating
- Tinning
- Forging
- Select appropriate irons for various positions
- Prepare irons
- Solder vertical joints
- Solder overhead joints

Achievement Criteria continued next page

**Achievement Criteria**

- Performance The learner will demonstrate positional soldering techniques with copper.
- Conditions The learner will be given:
- Tools and equipment
 - Materials
 - Solder
 - Acid/flux
 - Project specifications
- Criteria The learner will score 70% or better on a rating sheet that reflects the following:
- Safety
 - Conforms to project specifications
 - Tools usage
 - Materials usage
 - Aesthetics
 - Adhesion (sweating)



Section 4

TRAINING PROVIDER STANDARDS



Facility Requirements

Classroom Area

- Minimum 30 square feet per student (accommodates drafting tables)
- Comfortable seating and tables suitable for learning
- Compliance with the local and national fire code and occupational safety requirements
- Meets applicable municipal zoning bylaws for technical instruction and education facilities
- Overhead and multimedia projectors
- Whiteboard with marking pens and erasers
- Lighting controls to allow easy visibility of the projection screen while allowing students to take notes
- Windows must have shades or blinds to adjust sunlight
- Heating/air conditioning for comfort all year round
- In-room temperature control to ensure comfortable room temperature
- Acoustics in the room must allow audibility of the instructor
- One drafting table per student

Shop Area

- Minimum 7,000 square feet of shop area including a tool crib and work stations
- 14 foot high ceilings
- Adequate heating, lighting and ventilation
- Refuse and recycling bins for used shop materials
- First-aid facilities
- Portable fire extinguisher as per WorkSafeBC requirements
- Ventilation as per WorkSafeBC requirements
- Posted evacuation plans
- Eye wash stations
- First aid facilities
- One work table per two students
- Outside storage fenced area of 4,000 square feet (or areas suitable for mock-ups)

Lab Requirements

- N/A

Student Facilities

- Adequate lunch room as per WorkSafeBC requirements (4.84 OHS Regulation and Guidelines)
- Adequate washroom facilities per WorkSafeBC requirements (4.85 OHS Regulation and Guidelines)
- Personal storage lockers

Instructor's Office Space

- Desk and filing space
- Computer
- Phone



Tools and Equipment

Shop Tools and Equipment

Required

- Abrasive cut-off saw
- Adjustable wrench
- Allen hex keys
- Angle finder
- Angle grinder
- Aviation snips R.H. and L.H.
- Band saw
- Bar folder
- Beading machine
- Beak horn
- Beam Compass
- Bench grinder
- Blind riveter
- Blow horn
- Box and pan brake
- Burring machine
- Cable
- Candle mould
- Caulking gun
- C-clamp
- Center punch
- Chalk line
- Chipping hammer
- Chisels
- Chokers
- Circular saw
- Circumference Rule
- Claw hammer
- Combination square
- Come-Along
- Common square
- Compass
- Compound mitre saw
- Copper smith
- Cordless drill
- Creasing stake
- Crimping machine
- Divider
- Divider
- Double cutter
- Double seaming
- Drafting Table
- Drill index
- Easy edger
- Electric drill
- Eraser Shield
- Eye Protection
- Eye Wash Station
- Face Shield
- Fall Arrest Equipment
- Files
- Fire Extinguisher
- First Aid Kit
- Folding pliers
- Framing Square
- Gloves
- Groove seamer - hand groover
- Hacksaw
- Hammer drill
- Hand brake
- Hand crimpers
- Hand dollies
- Hand notcher
- Hand Punch
- Hard Hat
- Hatchet
- Hearing Protection
- Hollow mandrel
- Jigsaw
- Ladders
- Laser level
- Levels
- Locking pliers
- Mallet



- Manual shear
- MIG Welding Equipment (GMAW)
- Nibbler
- Oxy-acetylene Welding Equipment
- Parallel Bar/T-square
- Pelican snips (Bavarian Snips)
- Pittsburgh machine
- Plasma cutter
- Pliers
- Plumb bob
- Portable band saw
- Portable plasma cutter
- Power shear
- Prick punch
- Protractor
- Reciprocating saw
- Reflective Vest
- Respiratory Protection
- Rivet set
- Rope
- Router
- Router jig
- Safety Boots
- Scaffolds
- Scale Ruler
- Scraper/ Pry bar
- Scratch awl
- Screwdriver
- Scriber
- Set Square/Triangles
- Setting hammer (Sheet Metal)
- Shackles
- Shielded Metal Arc Welding (SMAW)
- Side cutters
- Slings
- Slip roll former
- Socket set
- Soldering copper
- Soldering equipment
- Spot welder
- Square
- Straight edge
- Tape measure
- Trammel Points
- Turning Machine
- Unishear
- Welding Curtain
- Welding Jacket
- Wire brushes
- Wiring Machine
- Wrenches
- Wuko bending machine

All PPE must comply with WorkSafeBC regulations and facility must supply all equipment for students to complete proper training excluding boots, which shall be the responsibility of the students.

**Recommended**

- Air compressor
- Angle drill
- Angle ruler
- Ball peen hammer
- Banding tools
- Bench rule
- Biscuit jointer
- Bulldog snips
- Bumping hammer
- Caliper
- Combination snip
- Crimper (decking)
- Die-grinder
- Drafting Pencil
- Drift pin
- Drill press
- Elbow Seaming
- Electric seamer
- Fork Lift
- Hydraulic press
- Impact wrench
- Leather Apron
- Micrometer
- Notcher
- Nylon hammer
- Pneumatic drill
- Pneumatic hammer
- Pneumatic riveter
- Powder actuated tool
- Power notcher
- Ring and circle shears
- Riveting hammer
- Roll forming machines
- Slitter
- Trifor
- Turret punch



Reference Materials

Required Reference Materials

- SMACNA Architectural Sheet Metal Manual
- RCABC Roofing Practices Manual
- Sheet Metal, Leo A Myer
- Sheet Metal – Shop Practices, Leo A. Myer
- Mathematics for Sheet Metal Fabrication, Delmar Learners

Recommended Resources

- N/A

Suggested Texts

- Training Provider Learning Resources
- Construction Sector Council – Cladding and Decking
- Alberta Modules

NOTE:

This list of Reference Materials is for training providers. Apprentices should contact their preferred training provider for a list of recommended or required texts for this program.



Instructor Requirements

Occupation Qualification

The instructor must possess:

- Architectural Sheet Metal Worker – Certificate of Qualification Work Experience
- A minimum of five years experience working in the industry as a journeyperson.
- Diverse experience in the industry (incl. residential, commercial and industrial fabrication and installation)

Instructional Experience and Education

It is preferred that the instructor also possesses:

- Canadian Welding Bureau – Welding Supervisor Card (W47.1) or equivalent
- Instructors certificate (minimum 30 hour course); and/or
- Must have or be registered in an Instructor's Diploma program (to be completed within a five year period) or hold a Bachelors or Masters degree in education



APPENDIX A

Assessment Guidelines

**Program: Architectural Sheet Metal Worker**

Training providers delivering Architectural Sheet Metal Worker apprenticeship in-school technical training are required to enter the following information in ITA Direct Access for each apprentice:

- An in-school mark in the form of a percentage

The in-school mark for each level is the result of a combination of theory and practical assessments. This mark is then combined with the ITA Standard Level Examination to determine a final mark for the level.

Training Provider Component: In-School Technical Training

Calculation tables showing the subject competencies, level percentage weightings and level examination weightings are shown in the *Grading Sheet: "Subject Competencies and Weightings"* section of this document.

Architectural Sheet Metal Worker Level 1, 2 & 3 in-school marks are calculated by:

- Totalling the level *theory* competency results as noted in the competencies and weightings tables and multiplying the total by 25% to produce a weighted *theory* result;
- Totalling the level *practical* competency results as noted in the competencies and weightings tables and multiplying the total by 75% to produce a weighted *practical* result; and
- Adding the theory and practical competency results together to determine the final in-school result.

ITA Component: ITA Standardized Level Examinations - Level 1 & 2

ITA Direct Access (ITADA) automatically calculates the final mark for a level once the in-school training and standard level exam marks are entered into the system. This mark is calculated by blending the standardized exam percentage score and the in-school technical training percentage score to determine the final mark for the level.

In-school technical training (combined theory & practical) is weighted at 80% and the ITA standardized exam is weighted at 20%. These two scores are combined to determine the final level mark. This result is the final mark that is recorded in ITA Direct Access.

- A mark of 70% or greater is required to pass the level when combining the final in-school percentage score and the final ITA standardized level exam percentage score.

Architectural Sheet Metal Worker Level 3 - Examinations

Until further notice, apprentices taking Architectural Sheet Metal Worker Level 3 will write the ITA Architectural Sheet Metal Worker Certificate of Qualification (CofQ) examination as the final examination for the Architectural Sheet Metal Worker program.

The instructor is responsible for calculating and reporting the final in-school mark for Level 3 to ITADA.

Refer to the *Grading Sheet Subject Competencies and Weightings* Level 3 table at the end of this document to determine the calculation process for completing the Level 3 in-school final mark.

In order to be eligible to write the ITA Certification of Qualification exam, apprentices must receive a Level 3 in-school technical training final mark of 70% or greater.

A score of 70% or greater is required for a pass on the Architectural Sheet Metal Worker ITA Certificate of Qualification exam.



Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:		ARCHITECTURAL SHEET METAL WORKER LEVEL 1 0153CL01	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	Use Safe Work Practices	8%	8%
B	Use Tools and Equipment	12%	12%
C	Organize Work	5%	5%
D	Use Trade Math	9%	9%
E	Examine Systems	10%	10%
F	Fabricate Products and Components	13%	13%
G	Install Products	20%	20%
H	Layout and Develop Patterns	14%	14%
I	Weld and Solder	9%	9%
	Total	100%	100%
Calculated by the Training Provider ARCHITECTURAL SHEET METAL WORKER in-school theory & practical subject competency weighting		25%	75%
Training Provider enters final in-school mark into ITA Direct Access		IN-SCHOOL%	

Calculated by ITA: In-school Mark ITA Direct Access calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by	80%
Calculated by ITA: Standard Level Exam Mark ITA Direct Access will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by	20%
Calculated by ITA: Final Mark The final mark for determining credit is calculated by ITA Direct Access.	FINAL%



PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:		ARCHITECTURAL SHEET METAL WORKER LEVEL 2 0153CL02	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	Use Tools and Equipment	5%	5%
C	Organize Work	6%	6%
D	Use Trade Math	8%	8%
E	Examine Systems	9%	9%
F	Fabricate Products and Components	20%	20%
G	Install Products	28%	28%
H	Layout and Develop Patterns	13%	13%
I	Weld and Solder	11%	11%
	Total	100%	100%
Calculated by the Training Provider ARCHITECTURAL SHEET METAL WORKER in-school theory & practical subject competency weighting		25%	75%
Training Provider enters final in-school mark into ITA Direct Access		IN-SCHOOL%	

Calculated by ITA: In-school Mark ITA Direct Access calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by	80%
Calculated by ITA: Standard Level Exam Mark ITA Direct Access will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by	20%
Calculated by ITA: Final Mark The final mark for determining credit is calculated by ITA Direct Access.	FINAL%



PROGRAM: IN-SCHOOL TRAINING: ITA DIRECT ACCESS CODE:		ARCHITECTURAL SHEET METAL WORKER LEVEL 3 0153CL03	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
C	Organize Work	12%	12%
D	Use Trade Math	5%	5%
E	Examine Systems	7%	7%
F	Fabricate Products and Components	15%	15%
G	Install Products	34%	34%
H	Layout and Develop Patterns	15%	15%
I	Weld and Solder	12%	12%
	Total	100%	100%

Calculated by the Training Provider:		
ARCHITECTURAL SHEET METAL WORKER in-school theory & practical subject competency weighting	25%	75%
In-school Mark Combined theory and practical subject competency (Minimum 70%)	IN-SCHOOL FINAL %	

All apprentices who complete Level 3 of the Architectural Sheet Metal Worker program with a FINAL level mark of 70% or greater will write the ITA Architectural Sheet Metal Worker Certificate of Qualification (CofQ) examination as their final assessment.

ITA will enter the apprentices' ITA Architectural Sheet Metal Worker Certificate of Qualification (CofQ) examination mark in ITADA. A minimum mark of 70% on the examination is required for a pass.