

SKILLED**TRADES**^{BC}

PROGRAM OUTLINE

Glazier

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GLAZIER PROGRAM OUTLINE

**APPROVED BY INDUSTRY
JUNE 2021**

**BASED ON
RSOS 2020**

**Developed by
SkilledTradesBC
Province of British Columbia**

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Section 1

INTRODUCTION

Glazier

Foreword

This revised Glazier 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 standards based on the 2020 Red Seal Occupational Standard (RSOS) as well input from British Columbia industry and instructor 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.

Competencies are to be evaluated through written exams and practical assessments. A passing grade is achieved by getting an overall mark of 70%. See the Assessment Guidelines for more details. 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 assessment. 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 measurable, 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 evaluation criteria.

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

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

- Jeff Anderson Flynn Canada Ltd.
- Mark Longmore Finishing Trades Institute
- Marv Magnison IUPAT DC 38
- Patrick Byrne Finishing Trades Institute
- Rob Webster Alternate Glazing Systems
- Sean Seaton DBH Glazing

SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry and training provider representatives appointed to identify the training requirements of the Glazier 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	Communicates program length and structure, and all pathways to completion	Illustrates the length and structure of the program	Illustrates the length and structure of the program, and pathway to completion	Illustrates the challenger pathway to Certificate of Qualification
OAC	Communicates the competencies that industry has defined as representing the scope of the occupation	Displays the competencies that an apprentice is expected to demonstrate in order to achieve certification	Displays the competencies apprentices will achieve as a result of program completion	Displays the competencies challengers 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	Shows 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	Shows 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	Shows 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
Assessment Guidelines	Shows the general areas of competency covered in each level of technical training, the theory and practical grading weight, and the calculation method for final percentage marks	Shows the general areas of competency covered in the technical training, the grading weight for each GAC, and the percentage of that time spent on theory versus practical application	Shows the general areas of competency covered in each level of technical training, the theory and practical grading weight, and the calculation method for final percentage marks	Shows the relative weightings of various general areas of competency within the occupation on which assessment is based

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

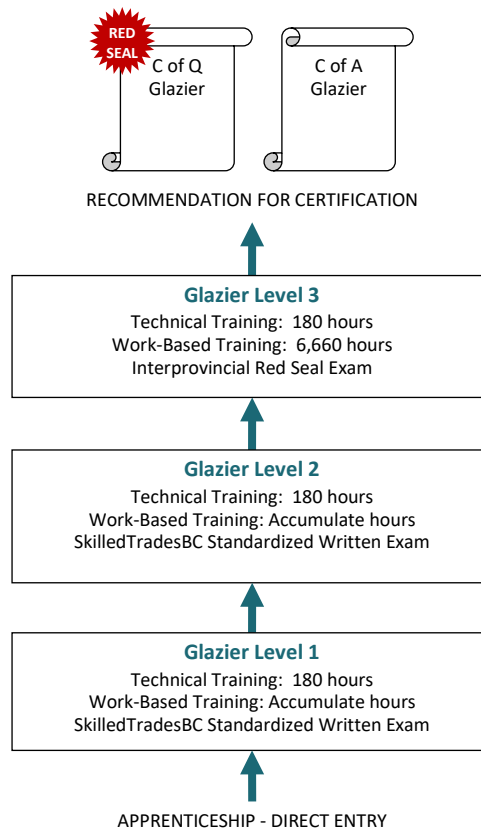
Glazier

Program Credentialing Model

Apprenticeship Pathway

This graphic provides an overview of the Glazier apprenticeship pathway.

*C of Q = Certificate of Qualification
C of A = Certificate of Apprenticeship
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

None

Occupational Analysis Chart

GLAZIER

Occupation Description: Glaziers measure, handle, cut, prepare, fit, install, replace and repair all types of glass and glass substitutes, typically in industrial, commercial, institutional, and residential applications. In commercial applications, they fabricate, lay out, and install curtain wall framing, aluminum storefront frames and entrances, structural silicone glazing (SSG), skylights and sloped glazing. In residential applications, they install doors and windows. Glaziers also install specialty glass products such as glass railings, smoke baffles, shower enclosures, and glass and mirror walls. Other duties include layout, preparation, fabrication, and replacement of architectural metal components in systems such as entranceways, windows, skylights, and curtain walls.

USE SAFE WORK PRACTICES A	Control workplace hazards A1	Apply OHS regulations and WorkSafeBC standards A2	Use Global Harmonized System 2015 (WHIMIS) Certification A3	Use personal protective equipment A4	Practice fire prevention A5	Apply Level 1 First Aid practices A6
	1	1	1	1	1	1
	Use fall protection systems A7					
	1					
ORGANIZE WORK B	Interpret drawings and specifications B1	Use codes, regulations, and standards B2	Apply manufacturer and supplier documentation B3	Apply trade math B4	Plan sequence of work B5	Handle materials B6
	1 2 3	1 3	1 3	1 2 3	1 3	1
	Communicate with others B7					
	1 3					

Program Overview

USE TOOLS AND EQUIPMENT C	Use hand tools C1 1	Use portable power tools C2 1	Use stationary power tools C3 1	Use layout and measuring equipment C4 1 3	Use ladders and scaffolds C5 1	Use rigging and hoisting equipment C6 1 3
	Operate mobile access equipment C7 1					
FABRICATE COMMERCIAL SYSTEMS D	Fabricate storefront systems D1 1 2	Fabricate window systems D2 1 2	Fabricate curtain walls D3 2 3	Fabricate skylights and sloped glazing systems D4 3	Fabricate commercial entrance systems D5 2 3	Fabricate guardrail, handrail, and balustrade systems D6 2 3
	Perform glass cutting and edge treatment D7 1 2 3					
INSTALL COMMERCIAL SYSTEMS E	Install storefront systems E1 1 2	Install strip window systems E2 1 2	Install curtain walls E3 1 2 3	Install skylights and sloped glazing systems E4 3	Install commercial entrance systems E5 3	Install guardrail, handrail, and balustrade systems E6 2 3
	Install building envelope membranes E7 1 3	Install flashing E8 2 3	Use caulking and sealants E9 1 2 3			

Program Overview

INSTALL RESIDENTIAL SYSTEMS F	Layout residential window and door systems F1				
		2			
	Glaze residential windows and doors F2				
		2	3		
	Install residential skylights and solariums F3				
			3		
	Install shower enclosures, mirrors, and back-painted glass F4				
	1	2	3		
	Install guardrail, handrail, and balustrade systems F5				
			3		
	Install residential windows, doors, frames, and hardware F6				
		2			
INSTALL SPECIALTY GLASS AND PRODUCTS G	Layout specialty glass and products G1				
		2	3		
	Assemble specialty glass and products G2				
			3		
	Install custom glazing systems G3				
			3		
SERVICE GLAZING SYSTEMS H	Service commercial window and door systems H1				
			3		
	Service residential window and door systems H2				
		2			

Training Topics and Suggested Time Allocation: Level 1

Glazier – Level 1

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line A	USE SAFE WORK PRACTICES	22%	80%	20%	100%
A1	Control workplace hazards		✓		
A2	Apply OHS regulations and WorkSafeBC standards		✓		
A3	Use Global Harmonized System 2015 (WHMIS) Certification		✓		
A4	Use personal protective equipment		✓	✓	
A5	Practice fire prevention		✓	✓	
A6	Apply Level 1 First Aid practices		✓	✓	
A7	Use fall protection systems		✓	✓	
Line B	ORGANIZE WORK	11%	90%	10%	100%
B1	Interpret drawings and specifications		✓		
B2	Use codes, regulations, and standards		✓		
B3	Apply manufacturer and supplier documentation		✓		
B4	Apply trade math		✓	✓	
B5	Plan sequence of work		✓	✓	
B6	Handle materials		✓	✓	
B7	Communicate with others		✓		
Line C	USE TOOLS AND EQUIPMENT	25%	60%	40%	100%
C1	Use hand tools		✓	✓	
C2	Use portable power tools		✓	✓	
C3	Use stationary power tools		✓	✓	
C4	Use layout and measuring equipment		✓	✓	
C5	Use ladders and scaffolds		✓	✓	
C6	Use rigging and hoisting equipment		✓	✓	
C7	Operate mobile access equipment		✓	✓	
Line D	FABRICATE COMMERCIAL SYSTEMS	15%	30%	70%	100%
D1	Fabricate storefront systems		✓	✓	
D2	Fabricate window systems		✓		
D7	Perform glass cutting and edge treatment		✓	✓	
Line E	INSTALL COMMERCIAL SYSTEMS	25%	25%	75%	100%
E1	Install storefront systems		✓	✓	
E2	Install strip window systems		✓		
E3	Install curtain walls		✓	✓	
E7	Install building envelope membranes		✓	✓	
E9	Use caulking and sealants		✓		

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line F	INSTALL RESIDENTIAL SYSTEMS	2%	100%	0%	100%
F4	Install shower enclosures, mirrors, and back-painted glass		✓		
Total Percentage for Glazier Level 1		100%			

Training Topics and Suggested Time Allocation: Level 2

Glazier – Level 2

		% of Time	% of Time Allocated to:		
			Theory	Practical	Total
Line B	ORGANIZE WORK	10%	80%	20%	100%
B1	Interpret drawings and specifications		✓	✓	
B4	Apply trade math		✓	✓	
Line D	FABRICATE COMMERCIAL SYSTEMS	30%	30%	70%	100%
D1	Fabricate storefront systems		✓	✓	
D2	Fabricate window systems		✓	✓	
D3	Fabricate curtain walls			✓	
D5	Fabricate commercial entrance systems		✓	✓	
D6	Fabricate guardrail, handrail, and balustrade systems		✓		
D7	Perform glass cutting and edge treatment		✓	✓	
Line E	INSTALL COMMERCIAL SYSTEMS		40%	30%	70%
E1	Install storefront systems			✓	
E2	Install strip window systems			✓	
E3	Install curtain walls			✓	
E6	Install guardrail, handrail, and balustrade systems	✓			
E8	Install flashing	✓		✓	
E9	Use caulking and sealants	✓		✓	
Line F	INSTALL RESIDENTIAL SYSTEMS	10%		30%	70%
F1	Layout residential window and door systems		✓	✓	
F2	Glaze residential windows and doors		✓		
F4	Install shower enclosures, mirrors, and back-painted glass		✓	✓	
F6	Install residential windows, doors, frames, and hardware		✓	✓	
Line G	INSTALL SPECIALTY GLASS AND PRODUCTS	5%	100%	0%	100%
G1	Layout specialty glass and products		✓		
Line H	SERVICE GLAZING SYSTEMS	5%	100%	0%	100%
H2	Service residential window and door systems		✓		
Total Percentage for Glazier Level 2		100%			

Training Topics and Suggested Time Allocation: Level 3

Glazier – Level 3

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line B	ORGANIZE WORK	15%	70%	30%	100%
B1	Interpret drawings and specifications		✓	✓	
B2	Use codes, regulations, and standards		✓		
B3	Apply manufacturer and supplier documentation		✓		
B4	Apply trade math			✓	
B5	Plan sequence of work		✓	✓	
B7	Communicate with others		✓		
Line C	USE TOOLS AND EQUIPMENT	10%	50%	50%	100%
C4	Use layout and measuring equipment		✓	✓	
C6	Use rigging and hoisting equipment			✓	
Line D	FABRICATE COMMERCIAL SYSTEMS	15%	30%	70%	100%
D3	Fabricate curtain walls		✓		
D4	Fabricate skylights and sloped glazing systems		✓	✓	
D5	Fabricate commercial entrance systems		✓	✓	
D6	Fabricate guardrail, handrail, and balustrade systems		✓	✓	
D7	Perform glass cutting and edge treatment			✓	
Line E	INSTALL COMMERCIAL SYSTEMS	20%	20%	80%	100%
E3	Install curtain walls		✓	✓	
E4	Install skylights and sloped glazing systems		✓	✓	
E5	Install commercial entrance systems		✓	✓	
E6	Install guardrail, handrail, and balustrade systems			✓	
E7	Install building envelope membranes		✓		
E8	Install flashing		✓	✓	
E9	Use caulking and sealants			✓	
Line F	INSTALL RESIDENTIAL SYSTEMS	15%	40%	60%	100%
F2	Glaze residential windows and doors		✓	✓	
F3	Install residential skylights and solariums		✓	✓	
F4	Install shower enclosures, mirrors, and back-painted glass		✓	✓	
F5	Install guardrail, handrail, and balustrade systems			✓	
Line G	INSTALL SPECIALTY GLASS AND PRODUCTS	15%	70%	30%	100%
G1	Layout specialty glass and products		✓	✓	
G2	Assemble specialty glass and products		✓	✓	
G3	Install custom glazing systems		✓	✓	
Line H	SERVICE GLAZING SYSTEMS	10%	70%	30%	100%

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
H1	Service commercial window and door systems		✓	✓	
Total Percentage for Glazier Level 3		100%			

Section 3

PROGRAM CONTENT

Glazier

Level 1 Glazier

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A1 Control workplace hazards

Objectives

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

- Describe workplace hazards
- Manage workplace hazards
- Describe emergency procedures
- Describe non-emergency injury reporting procedures
- Interpret worksite safety policies

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Describe short term hazards in the glazier trade | <ul style="list-style-type: none"> • Sharp objects <ul style="list-style-type: none"> ○ Glass ○ Metal • Overhead hazards • Electrical • Lockout procedures • Explosive material (dust) • Lifting techniques • Housekeeping • Horseplay • Falls • Respect for other's safety • Constant awareness of surroundings • Safe attitude • Safety line inspections • Management of hazards |
| 2. Describe long term hazards in the glazier trade | <ul style="list-style-type: none"> • Respiratory disease <ul style="list-style-type: none"> ○ Volatile Organic Compounds (VOCs) ○ Silicosis • Asbestos • Repetitive strain injuries • Cleaning products <ul style="list-style-type: none"> ○ Solvents ○ Chemicals • Caulking product toxicity • Back injuries |
| 3. Describe emergency procedures | <ul style="list-style-type: none"> • Emergency shutoffs • Fire control systems |

LEARNING TASKS

4. Describe non-emergency injury reporting procedures
5. Interpret worksite safety policies

CONTENT

- Eye wash facilities
- Emergency exits
- Emergency contact/phone numbers
- Outside meeting place
- Disaster meeting place
- Emergency horn protocol
- First aid facilities
- Reports
- Reports to first aid attendant
- Site orientations
 - Risk and hazard assessment
 - Safe work procedures
 - Toolbox meetings
 - Conditions
 - Meeting requirements
 - Reporting hazards and incidents
 - Investigations
 - Committees
 - Joint Occupational Health & Safety
 - Employee orientation
 - First aid
 - Hearing
 - Records and statistics
 - Lock-out
 - Non-compliance procedures
- Tape identification (red, yellow)
- Minimum standards
- Acts and Regulations

Line (GAC): A USE SAFE WORK PRACTICES
Competency: A2 Apply OHS regulations and WorkSafeBC standards

Objectives

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

- Apply Occupational Health and Safety Regulations applicable to the workplace

LEARNING TASKS

1. Locate the Occupational Health and Safety Regulations

2. Interpret Occupational Health and Safety information that is relevant to the workplace

CONTENT

- Occupational Health and Safety Regulations
- WorkSafeBC
- CSA Standards
- As per documentation

Line (GAC): A USE SAFE WORK PRACTICES
Competency: A3 Use Global Harmonized System 2015 (WHMIS) Certification
Objectives

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

- Describe the purpose of the Global Harmonized System 2015 (GHS 2015) (WHMIS) Regulations
- Interpret material safety data sheets (MSDS)
- Interpret GHS 2015 labels
- Apply GHS 2015 regulations

LEARNING TASKS

1. Describe the key elements and purpose of GHS 2015
2. Describe the responsibilities of suppliers under GHS 2015
3. Describe the responsibilities of employers under GHS 2015
4. Describe the responsibilities of employees under GHS 2015
5. Describe information to be disclosed on a MSDS

CONTENT

- Protection of workers through the provision of information
- 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
- Create workplace labels
 - Product info
 - Safe handling information
 - Reference to MSDS
- Hazardous ingredients
- Preparation information
- Product information
- Physical data
- Fire or explosion
- Reactivity data
- Toxicological properties

LEARNING TASKS

6. Identify symbols found on GHS 2015 labels and describe their meaning

7. Apply GHS 2015 regulations as they apply to hazardous materials used in the shop

CONTENT

- 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 of chemicals

Line (GAC): A USE SAFE WORK PRACTICES

Competency: **A4 Use personal protective equipment**

Objectives

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

- Describe personal protective equipment requirements for glaziers
- Use personal protective equipment

LEARNING TASKS

1. Describe personal protective equipment requirements

CONTENT

- Safety footwear
- Eye and face protection
- Ear protection
- Head protection
- Wrist and arm protection
- Knee protection
- Hand protection
- Respiratory protection
- Fall protection
- Tool tethers
- Inspection
- Maintenance
- Storage

2. Use personal protective equipment

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A5 Practice fire prevention

Objectives

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

- Identify various classes of fires
- Apply preventative fire safety precautions
- Describe fire safety procedures

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe the conditions necessary to support a fire | <ul style="list-style-type: none"> • Air • Fuel • Heat • Chemical chain reaction |
| 2. Describe the classes of fires according to the materials being burned | <ul style="list-style-type: none"> • Class A • Class B • Class C • Class D • Symbols and colours |
| 3. Apply fire safety precautions when working near, handling or storing flammable liquids or gases, combustible materials and electrical apparatus | <ul style="list-style-type: none"> • Fuels <ul style="list-style-type: none"> ○ Diesel ○ Gasoline ○ Propane ○ Natural Gas • Ventilation <ul style="list-style-type: none"> ○ Purging • Lubricants • Oily rags • Combustible metals • Aerosols |
| 4. Describe considerations and steps to be taken in case of fire | <ul style="list-style-type: none"> • Training • Personal method of egress • Contacting fire department immediately • Warning others • Evacuation of others |

LEARNING TASKS

5. Describe the procedure for using a fire extinguisher

CONTENT

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

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A6 Apply Level 1 First Aid practices

Objectives

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

- Apply Level 1 First Aid practices

LEARNING TASKS

1. Apply Level 1 First Aid practices

CONTENT

- CPR
- Bandaging
- Airway
- Breathing
- Circulation

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A7 Use fall protection systems

Objectives

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

- Describe fall protection equipment and systems
- Use fall protection equipment and systems

LEARNING TASKS

1. Describe fall protection equipment

2. Describe fall protection systems

3. Use fall protection equipment and systems

CONTENT

- Fall arrest/restraint/work positioning equipment
 - Harnesses
 - Trauma strap
 - Waist belt limitations
 - Hardware
 - Beamer
 - Lanyard
 - Carabiner
 - Shock-absorbing devices
 - Retractable devices
 - Vertical and horizontal line grab (fibre and wire)
 - Cable/nylon tie-off slings
 - Standards (CSA)
- Inspection and maintenance
- Worksite awareness
- Applicable OHS regulations
- Railings/scaffolds
- Nets
- Hardware
- Anchor points
- Assembly
- Ladder systems
- Vertical and horizontal systems
- Applicable OHS Regulations
- Daily inspection
- Assembly/disassembly
- Fall protection plan
 - Identify work area and risks
 - List and choose equipment
 - Rescue procedures
- Fit test

Achievement Criteria

Performance	The learner will perform a fit test.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Harness • Lanyard • Line grab • Safety lifeline
Criteria	<p>The learner will score 70% or better on a rating sheet that reflects the following criteria:</p> <ul style="list-style-type: none"> • D-ring position (between shoulders) • Snugness of fit • Alignment • Coordination of shock absorber • Coordination of line grab

Line (GAC): **B ORGANIZE WORK**
Competency: **B1 Interpret drawings and specifications**

Objectives

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

- Describe architectural, shop, and fabrication drawings

LEARNING TASKS

1. Describe purpose of drawings

2. Describe components of drawings

CONTENT

- Uses
- Types
 - Architectural, shop, fabrication
- Floor plan
- Cross section
- Elevation
- Details
- Scale
- Schedules
- Symbols

Line (GAC): **B ORGANIZE WORK**
Competency: **B2 Use codes, regulations, and standards**

Objectives

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

- Identify organizations responsible for codes, regulations, and standards
- Describe codes, regulations, standards, and engineering requirements

LEARNING TASKS

1. Describe how codes, regulations, and standards affect the Glazier trade

2. Describe codes, regulations, standards, and engineering requirements

CONTENT

- Material selection
- Construction and installation methods
- Design characteristics

- Door lights
- Skylights and canopies
- Side lights
- Guardrails and balustrade
- Office divisional to floor
- Fire-rated glass
- Smoke baffles

Line (GAC): **B ORGANIZE WORK**
Competency: **B3 Apply manufacturer and supplier documentation**

Objectives

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

- Interpret manufacturer and supplier documentation

LEARNING TASKS

1. Interpret manufacturer and supplier documentation

CONTENT

- Tool and equipment documentation
- System component documentation
- Proprietary product documentation
- Certification agencies
- Installation instructions and requirements
- Operation and maintenance manuals
- Product specifications
- Warranty information

Line (GAC): B ORGANIZE WORK

Competency: B4 Apply trade math

Objectives

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

- Apply mathematical principles to solve problems

LEARNING TASKS

1. Use fractions to solve problems

2. Use decimal fractions to solve problems

3. Solve problems of ratio

4. Use metric and imperial measurement

CONTENT

- Add, subtract, multiply divide
- Express in higher terms
- Simplify fractions
- Add, subtract, multiply divide
- Convert between decimals and fractions
- Decimal notation
- Ratio
 - Equivalent
 - Percentage
- Convert between metric and imperial
 - Feet, inches/metres, millimetres
 - Pounds, kilos, tons

Competency: **B5** **Plan sequence of work**

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

- ## LEARNING TASKS

1. Describe inspection of the worksite

- ## 2. Prepare the worksite

Line (GAC): B ORGANIZE WORK

Competency: B6 Handle materials

Objectives

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

- Handle and store glass and aluminum manually
- Use equipment to move glass, sealed units, and aluminum
- Ship and receive glass products and aluminum
- Handle and store flashings manually
- Communicate with others to lift, transport and install glass and other materials

LEARNING TASKS

1. Handle glass, sealed units, and aluminum manually
2. Use equipment to move glass, sealed units, and aluminum
3. Crate glass
4. Un-crate glass
5. Store glass, aluminum, and flashings on the jobsite
6. Store glass and glass units in a shop

CONTENT

- Lifting techniques
- Carrying glass and sealed units
- Ergonomics
- Hazards associated with lifting glass
- Lifting tools
 - Suction cups
 - Gloves
 - Slings
- Glass dollies
- Glass trucks
- Slings and webs
- Suction cups
- Skeleton crate
- Cardboard
- Squash board
- Metal strapping
- Proper lean
- Wedged safely
- Opening correct side
- Checking for broken glass
- Temporary racks
- Bearing walls
- Envelope racks
- Glass racks
- Glass cases
- Protecting the public

LEARNING TASKS

7. Ship and receive glass products
8. Communicate with others to lift, transport, and install glass and other materials

CONTENT

- Cut off racks
- Securing loose glass on dollies
- Detecting flaws in glass products
- Communication protocols
- Lifting limitations
- Emergency procedures
- Developing a safety backup plan for transporting glass

Achievement Criteria

Performance	The learner will transport glass with a partner by using a plate dolly.
Conditions	The learner will be given: <ul style="list-style-type: none"> • Equipment (dolly, glass, suction cups) • Instructions
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: <ul style="list-style-type: none"> • Safe lifting technique and transportation of glass • Communication • Use of cups

Line (GAC): **B ORGANIZE WORK**
Competency: **B7 Communicate with others**

Objectives

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

- Participate in toolbox meetings
- Communicate with supervisors
- Convey possible hazards

LEARNING TASKS

1. Use basic trade terminology

2. Participate in toolbox meetings

3. Communicate with supervisors

4. Convey possible hazards

CONTENT

- Systems
- Materials
- Tools
- Techniques

- Roles and responsibilities
- Topics
- Safety updates

- Roles and responsibilities
- Site and shop
- Reporting procedure
- Right to refuse
- Corrective actions

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C1 Use hand tools

Objectives

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

- Use hand tools
- Inspect and maintain hand tools

LEARNING TASKS

1. Describe hand tools

CONTENT

- Hammers and mallets
- Saws
- Clamps
- Chisels
- Knives
 - Bent putty knife
- Drills and drill bits
- Punch
- Glass cutting tools
- Caulking gun
- Wrenches
- Snips
- Pliers
- Duck bill pliers
- Rivet gun
- Sanders
- Files
- Scoring tool
- Metal-cutting tools
- Hand-pump suction cups
- Tap and dies
- Vinyl roller

Refer to the tool list at the end of the document for complete listing

2. Inspect and maintain hand tools

- Storage
- Safety
- Maintenance procedures
- Manufacturer specifications

LEARNING TASKS

3. Use hand tools

CONTENT

- Purpose
- Types and sizes
- Parts
- Operation
- Accessories
- Safety
- Adjustments

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C2 Use portable power tools

Objectives

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

- Use portable power tools
- Inspect and maintain portable power tools

LEARNING TASKS

1. Describe portable power tools

CONTENT

- Sanders
- Saws
- Drill gun
- Screw gun
- Caulking gun
- Nibbler
- Shears
- Router
- Grinders

Refer to the tool list at the end of the document for complete listing

2. Use portable power tools

- Purpose
- Types and sizes
- Parts
- Operation
- Accessories
- Safety
- Adjustments

3. Inspect and maintain portable power tools

- Storage
- Safety
- Maintenance procedures
- Manufacturer specifications

Achievement Criteria

Performance	The learner will demonstrate safe operating procedures for power tools.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Power tools • Safety and operation instructions • Materials to work with
Criteria	<p>The learner will score 70% or better on a rating sheet that reflects the following criteria:</p> <ul style="list-style-type: none"> • Proper set-up • Handling equipment • According to safety instructions • Proper lubrications • Cut quality and accuracy

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C3 Use stationary power tools

Objectives

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

- Use stationary power tools
- Inspect and maintain stationary power tools

LEARNING TASKS

1. Describe stationary power tools

CONTENT

- Sanders
- Saws
- Router
- Grinders
- Hand brake
- Polishing machine
- Milling machine
- Press
 - Punch
 - Drill

Refer to the tool list at the end of the document for complete listing

2. Use stationary power tools

- Purpose
- Safety
- Types and sizes
- Parts
- Operation
- Accessories
- Adjustments
- Lubricants

3. Inspect and maintain stationary power tools

- Storage
- Safety
- Maintenance procedures
- Manufacturer specifications

Achievement Criteria

Performance	The learner will demonstrate safe operating procedures for stationary power tools.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Power tools • Guidelines and safety protocols • Materials to work with
Criteria	<p>The learner will score 70% or better on a rating sheet that reflects the following criteria:</p> <ul style="list-style-type: none"> • Proper set-up • Handling equipment • According to safety instructions • Proper lubrications • Cut quality and accuracy

Line (GAC): C USE TOOLS AND EQUIPMENT
Competency: C4 Use layout and measuring equipment

Objectives

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

- Describe layout and measuring equipment
- Use layout and measuring equipment
- Maintain layout and measuring equipment

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe layout and measuring equipment | <ul style="list-style-type: none"> • Levels <ul style="list-style-type: none"> ○ Torpedo ○ Hand ○ Builder's ○ Laser ○ Transit/Theodolite • Measurement and Alignment Tools <ul style="list-style-type: none"> ○ Tape measure ○ Metre stick ○ Plumb bob ○ Chalk/string line ○ Straight edges and squares ○ Protractor ○ Squares ○ T bevel square |
| 2. Use layout and measuring equipment | <ul style="list-style-type: none"> • Purpose • Types and sizes • Parts • Operation • Accessories • Laser safety <ul style="list-style-type: none"> ○ Adjustments |
| 3. Maintain layout and measuring equipment | <ul style="list-style-type: none"> • Storage • Inspection • Maintenance procedures • Manufacturer's specifications |

Achievement Criteria

Performance	The learner will use layout and measuring equipment to determine, communicate and draft accurate flashing, glass, and metal profiles.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Layout and measuring equipment • Instructions • Safety protocols • Materials
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Proper set-up • Handling equipment • Measurement accuracy • Understanding and following instructions • Transfer of accurate measurements and angles

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C5 Use ladders and scaffolds

Objectives

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

- Use ladders and scaffolds

LEARNING TASKS

1. Describe ladders and scaffolds

CONTENT

- Ladders
 - Extension
 - Step
 - Ladder jacks
- Scaffolds
 - Tower
 - Outriggers
 - Baker
 - Frame
 - Sectional
 - Tubular
 - Hung
- Uses
- Parts
- Safety
- Fall arrest equipment
- Hazard recognition
- Government regulations
- Selection
- Operating procedures
- Limitations
- Securing
- Inspection
- Maintenance
- Storage

2. Use ladders and scaffolds

Achievement Criteria

Performance	The learner will erect tower scaffold.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Scaffolding components • Fall protection if required
Criteria	<p>The learner will score 70% or better on a rating sheet that reflects the following criteria:</p> <ul style="list-style-type: none"> • Inspection procedure followed • Ladders aligned • Safety pins installed • Cross brace properly installed • Locked wheels • Layout according to site conditions and public safety (control zone)

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C6 Use rigging and hoisting equipment

Objectives

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

- Describe hoisting, rigging, and lifting principles and equipment
- Tie knots, bends and hitches

LEARNING TASKS

CONTENT

- | | |
|--|---|
| 1. Describe the principles of lifting and hoisting | <ul style="list-style-type: none"> • Mechanical advantage • Balance point |
| 2. Describe hoisting, lifting, and rigging equipment | <ul style="list-style-type: none"> • Lifting and Hoisting <ul style="list-style-type: none"> ○ Power cups ○ Cranes ○ Boom trucks ○ Engine hoist (Cherry Pick) ○ Loaders ○ Turfers ○ Come-alongs ○ Tuggers ○ Chain falls • Accessories |
| 3. Describe lifting and hoisting communication | <ul style="list-style-type: none"> • Purpose of proper communication • Types <ul style="list-style-type: none"> ○ Hand signals ○ Communication with the operator ○ Communication with others |
| 4. Tie knots, bends, and hitches | <ul style="list-style-type: none"> • Types <ul style="list-style-type: none"> ○ Half hitch ○ Clove hitch ○ Figure of eight ○ Bowline ○ Trucker's hitch • Purposes • Limitations |

Achievement Criteria

Performance	<p>The learner will tie the appropriate knot for a given application:</p> <ul style="list-style-type: none"> • Half hitch • Clove hitch • Figure of eight • Bowline • Trucker's hitch
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Rope • Instructions
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Properly tied knots • Appropriate knot for given application

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C7 Operate mobile access equipment

Objectives

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

- Operate mobile access equipment

LEARNING TASKS

1. Describe mobile access equipment

CONTENT

- Aerial work platforms
 - Boom and scissor lifts
 - Swing stage
 - Permanent
 - Portable
 - Engineered
 - Hydromobile work platform
 - Man basket
 - Bosun's chair
 - Uses
 - Parts
 - Safety
 - Fall arrest equipment
 - Hazard recognition
 - Government regulations
 - Manufacturers' specifications
- Some of the above equipment requires certification to operate*

2. Operate mobile access equipment

- Selection
- Operating procedures
- Limitations
- Securing
- Inspection
- Maintenance
- Storage

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D1 Fabricate storefront systems

Objectives

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

- Describe storefront profiles
- Describe fastener and screw types
- Describe doors and pivot systems
- Fabricate basic storefront

LEARNING TASKS

1. Describe storefront profiles
2. Describe fasteners, screws, and plugs
3. Describe doors and pivot systems
4. Fabricate basic storefront

CONTENT

- Single glaze
- Double glaze
- Thermally-broken and non-thermally-broken
- Aluminium finishes
- Fasteners
 - Sheet metal
 - Machine
 - Nuts and bolts
 - Pop rivets
 - Rivnuts
- Composition
 - Stainless
 - Plated
 - Nickel cadmium
 - Aluminum
- Single glazed
- Double glazed
- Glass doors
- Sliders
- Types of pivots
 - Offset, butt, continuous hinge, centre hung
- Shear block or screw spline assembly
- Setting block location
- Glazing and vinyling

Achievement Criteria

Performance	The learner will screw assemble a small frame.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Instructions • Materials • Tools
Criteria	<p>The learner will score 70% or better on a rating sheet that reflects the following criteria:</p> <ul style="list-style-type: none"> • Overall size • Installation of interior vinyl. • Proper joints • Overall aesthetics

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D2 Fabricate window systems

Objectives

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

- Describe layout for fabrication of commercial window systems
- Describe fabrication of commercial window systems

LEARNING TASKS

1. Describe commercial window systems
2. Describe layout for fabrication of commercial window systems
3. Describe fabrication of commercial window systems and vent installations

CONTENT

- Types of window systems
 - Strip
 - Punched opening
- Types of operable windows
 - Casement
 - Awning
 - Hopper
 - Tilt turn
- Components
 - Spigots
 - Screw spline
 - Hardware
 - Glazing
- Confirm rough openings, daylight openings and frame sizes according to site conditions and drawings
- Layout fabrication holes
- Types of sealants
- Types of finish
- Types of fasteners
- Air seals/rainscreen
- Glazing thickness
- Thermal breaks
- Part and component fabrication
 - Proper milling and stops
- Assembly techniques for window systems
- Assembly of components
 - Jambs, headers and sills
 - Sealing joints at head and sill and intermediate horizontals
 - Tapes and gaskets
 - Setting blocks
- Material protection

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D7 Perform glass cutting and edge treatment

Objectives

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

- Describe composition of glass
- Describe the types of glass
- Describe specialty tools and cutting equipment
- Apply basic glass cutting
- Perform basic glass edge treatment procedures

LEARNING TASKS

1. Describe composition of glass
2. Describe the types of glass
3. Describe specialty tools and cutting equipment

CONTENT

- History of glass
- Properties
- Glass ingredients
- Evolution of glass
- Float
- Laminate
- Tempered
- Heat-strengthened
- GPW
- Sealed units
- Mirror
- Glass coatings
- Obscure pattern glass
- Glass cutters
- Pliers
- Cutting tables
- Squares
- Circle cutters
- Hole cutters
- Notching saw
- Belt sander
- Methyl hydrates
- Water jet

- | | |
|--|--|
| 4. Apply basic glass cutting theory | <ul style="list-style-type: none"> • Measuring • Straight edges and squares • Cutters (sharp and dull) • Completing cuts <ul style="list-style-type: none"> ○ Pressure points ○ Running ○ Snapping • Storage and disposal of cut offs |
| 5. Perform basic glass edge treatment procedures | <ul style="list-style-type: none"> • Arrissing • Grinding and polishing • Bevels • Corners |

Achievement Criteria

- | | |
|-------------|--|
| Performance | The learner will cut glass to a specified size. |
| Conditions | The learner will be given: <ul style="list-style-type: none"> • Materials • Tools • Instruction |
| Criteria | The learner will be evaluated on: <ul style="list-style-type: none"> • Correct size (+/- 1/16 in.) • Hand arriss |

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E1 Install storefront systems

Objectives

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

- Install basic storefront

LEARNING TASKS

1. Prepare rough opening
2. Install flashing
3. Install framing
4. Glaze frames
5. Finish frames

CONTENT

- Plumb level square
- Membranes
- L-angle installation
- End dams
- Drips
- High performance
- Sealants
- Fasteners
- Shims
- Fasteners
- Backing plates
- Gaskets
- Setting block
- Glass
- Stops
- Backer rod
- Insulation
- Sealant

Achievement Criteria

Performance	The learner will install and glaze a small frame.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Instructions • Materials • Tools
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Plumb • Level • Setting block procedures • Overall aesthetics • Caulking joints • Exterior vinyl installation

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E2 Install strip window systems

Objectives

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

- Describe commercial strip window system installation

LEARNING TASKS

1. Describe installation of commercial strip window systems

CONTENT

- Weather seal membranes
- Flashing installations
- Deflection channel and internal angles
- Assembly methods
 - Pre-glazed
 - Sight-glazed
- Installation procedures
 - Dividing caulking clearances
 - Expansion joints
 - Installing setting blocks
 - Securing window systems
 - Installation of on-site glazing
 - Modifying windows in final locations
 - Insulating and seal frames
 - Verifying operation of windows
 - Rainscreen system
- Installation of preassembled structures

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E3 Install curtain walls

Objectives

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

- Describe curtain wall installation
- Prepare curtain wall
- Glaze curtain wall
- Finish curtain wall

LEARNING TASKS

1. Describe curtain wall installation

2. Prepare curtain wall

3. Glaze curtain wall

4. Finish curtain wall

CONTENT

- Two and Four sided SSG
- Stick built
- Unitized
- Split mullion
- Fastening systems
- Toggle system
- Tapes
- Gaskets
- Toe beads
- Angles
- Flashing and membranes
- Corner blocking and sealants
- Glass installation
- Setting blocks
- Temporaries (Dutchmen)
- Vertical pressure plate installation
- Horizontal pressure plate installation (clearance tolerances)
- Sealants
- Beauty cap
- Anti-Rotation

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E7 Install building envelope membranes

Objectives

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

- Describe preparation of materials for installation
- Describe procedures for installing building envelope membranes
- Install building envelope membranes

LEARNING TASKS

1. Describe the purpose and applications of membranes
2. Describe preparation of materials for installation
3. Describe compatibilities of membranes and sealants
4. Describe types of substrates
5. Describe rain screen principles

CONTENT

- Water and air seal
 - Permeable / non-permeable
- Types of materials
- Application of materials
- Selection and use of appropriate tools and equipment
- Preparation methods for specific materials
- General preparation of materials
 - Cleaning
 - Measuring
 - Priming
 - Corner sealing and lapping
 - Sizes
- Peel and stick
 - Permeable / non-permeable
- Specifications of compatibility of adjoining membranes and sealants
- Metal
- Concrete
- Wood
- Fibre board
- Airtight seal to the interior
- Rain barrier weeped to the exterior
- Pressure equalization
- Pressure differential

LEARNING TASKS

6. Install building envelope membranes

CONTENT

- Tools and equipment
- Materials
 - Fasteners, sealants and primers
 - Product compatibility
 - Manufacturer recommendations
- Installation sequencing of membranes for watershed
- Laying down of membrane
- Install building envelope membranes according to job specifications

Achievement Criteria

Performance The learner will measure and apply primer and membrane to specifications.

Conditions The learner will be given:

- Instructions
- Materials
- Tools

Criteria The learner will be evaluated on:

- Priming
- Lapping coordination (3 in. minimum)
- Shingling
- Adhesion
- Neatness of finish/aesthetics
- Sealant application

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E9 Use caulking and sealants

Objectives

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

- Describe types of sealants and shims

LEARNING TASKS

1. Describe types of sealants

CONTENT

- Classification
 - High performance
 - Medium performance
 - Low performance
 - Structural
- Types
 - Silicone
 - Oil base
 - Butyl
 - Polysulfide
 - Urethane
 - One part
 - Two part
- Primer
- Tapes
- Caulking
- Gaskets
- Butyl tape
- Pre-shim tape
- Foam tape
- Sponge gaskets
- Dense wedge gaskets
- Shims
- Types
 - Closed-cell polyethylene rod
 - Open-cell polyethylene rod
 - Bond breakers
- Procedures for application
 - Size
 - Parallel joint faces
 - Width-to-depth ratio

2. Describe tapes and shims

3. Describe backup materials

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS
Competency: F4 Install shower enclosures, mirrors, and back-painted glass

Objectives

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

- Describe preparation and installation for mirrors and back-painted glass

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Describe wall preparation for mirrors and back-painted glass | <ul style="list-style-type: none"> • Measuring wall • Measuring out of square • Clearance tolerances • Wall plane • Confirmation of surface preparation |
| 2. Describe installation of mirrors and back-painted glass | <ul style="list-style-type: none"> • Sealants and adhesives compatibility • Safety backing • Vancouver clips/J-molding • Mirror trims • Cut-outs • Edge grips • Standoffs • Butt joint blackout/shadowline • Fasteners • Attachment to wall |

Level 2 Glazier

Competency: B1 Interpret drawings and specifications

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

- ## LEARNING TASKS

1. Identify symbols and abbreviations

- ## 2. Interpret shop and fabrication drawings

3. Describe door and window schedules

4. Use a drawing to prepare a simple material list

Achievement Criteria

Performance	The learner will interpret a table of contents and convey information on a blueprint.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Blueprint(s) (shop or architectural) • Instructions and tasks • Tools
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Gridlines • Quantities • Locations • Details • Sizes and Dimensions • Specifications

Line (GAC): B ORGANIZE WORK

Competency: B4 Apply trade math

Objectives

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

- Solve geometric problems
- Solve problems using trigonometry
- Use math to optimize materials for specific framing

LEARNING TASKS

1. Solve geometric problems

2. Solve problems using trigonometry

3. Use math to optimize materials for specific framing

CONTENT

- Area
- Perimeter
- Volume
- Angles
- Arc
- Radius and diameter
- Formulas for area of
 - Squares and rectangles
 - Triangles
 - Parallelogram
 - Trapezoid
 - Circle
 - Sector
 - Segment
 - Other relevant geometric shapes
 - Simplify fractions
- Pythagorean theorem
- Sine
- Cosine
- Tangent
- Glass
- Metal
- Miscellaneous related materials
 - Tapes
 - Gaskets
 - Sealants

Achievement Criteria

Performance	The learner will determine frame sizes, glass sizes and site dimensions.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Calculator • Instructions and tasks • Framing specifications • Tools
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Glass sizes • Framing sizes • Calculations

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D1 Fabricate storefront systems

Objectives

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

- Fabricate door frame and sidelites
- Prepare frame for closers, butt hinges, and hardware
- Perform routing and lock cut-outs
- Fabricate jigs
- Fabricate headers for concealed overhead closers
- Install panic hardware

LEARNING TASKS

CONTENT

- | | |
|---|--|
| 1. Fabricate door frame and sidelites | <ul style="list-style-type: none"> • Screw spline assembling • Setting block applications • Glazing and vinyling • Presses and jigs • Assembly of storefront frame • Installation of offset pivot |
| 2. Prepare frame for closers, butt hinges, and hardware | <ul style="list-style-type: none"> • Surface mounted closers • Butt hinge cutouts • Layout and installation of cut-outs • Installation of backing plates • Installation of butt hinges • Installation of doors and adjustments |
| 3. Perform routing and lock cut-outs | <ul style="list-style-type: none"> • Router safety and lubrication • Lock layout • Lock cut-outs using routers |
| 4. Describe jigs | <ul style="list-style-type: none"> • Types |
| 5. Fabricate jigs | <ul style="list-style-type: none"> • Screw spline and shear block • Concealed overhead closer • Butt hinge |
| 6. Fabricate headers for concealed overhead closers | <ul style="list-style-type: none"> • Choice of metal • Layout and installation of cut-out • Installation of closer |
| 7. Install panic hardware | <ul style="list-style-type: none"> • Layout and installation of panics • Adjustment of panics and flush bolt |

Achievement Criteria

Performance	The learner will perform door and sidelite fabrication.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools • Instructions and drawings • Materials
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Accuracy of frame and door opening size, lock cut-out • Overall aesthetics (no scratches) • Hardware preparation • Door stop installation

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D2 Fabricate window systems

Objectives

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

- Layout for fabrication of commercial window systems
- Fabricate commercial window systems

LEARNING TASKS

1. Describe commercial window systems
2. Layout for fabrication of commercial window systems
3. Fabricate commercial window systems and vent installations

CONTENT

- Types of window systems
 - Strip
 - Punched opening
- Types of operable windows
 - Casement
 - Awning
 - Hopper
 - Tilt turn
- Components
 - Spigots
 - Screw spline
 - Hardware
 - Glazing
- Confirm rough openings, daylight openings and frame sizes according to site conditions and drawings
- Layout fabrication holes
- Types of sealants
- Types of finish
- Types of fasteners
- Air seals/rainscreen
- Glazing thickness
- Thermal breaks
- Part and component fabrication
 - Proper milling and stops
- Assembly techniques for window systems
- Assembly of components
 - Jambs, headers and sills
 - Sealing joints at head and sill and intermediate horizontals
 - Tapes and gaskets
 - Setting blocks
- Material protection

Achievement Criteria

Performance	The learner will fabricate a strip window assembly.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools • Instructions and drawings • Materials
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Fabricate to industry standards (1/16 in) • Proper joint sealing • Proper taping, vinyling and heel and toe bead procedures • Air seal • Weep holes • Fabricate for rain screen

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D3 Fabricate curtain walls

Objectives

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

- Fabricate curtain walls

LEARNING TASKS

1. Plan fabrication requirements

2. Fabricate curtain walls

CONTENT

- Fabrication sheets
- Manufacturer's specifications related to expansion and contraction
- As built drawings
- Tool selection
- Sequence
- Organize work area
- Material quantity determination and optimization
- Quality control
- Steel and fastening requirements
- Isolation of dissimilar metals
- Cutting and milling
- Labelling material for framing positioning
- Layout and spigot drilling
- Fabrication process
 - Cutting curtain wall parts and components from stock length and prefabricated materials.
 - Spigot application
 - Assembling and sealing components
 - Squaring frames
 - Prepare components for wind load/dead load anchors
 - Notching head and sill nosings for blue skin application
 - Thermal breaks
 - Types of sealants, gaskets and tapes

Achievement Criteria

Performance	The learner will fabricate a curtain wall frame.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools • Instructions and drawings • Materials
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Fabricate to industry standards (1/16 in.) • Proper joint sealing • Proper taping, vinyling procedures • Thermal breaks • Preparation of pressure plate and cover cap

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D5 Fabricate commercial entrance systems

Objectives

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

- Describe the types and applications of different commercial entrance systems
- Describe the parts required for fabricating commercial entrance systems
- Fabricate entrance systems

LEARNING TASKS

1. Describe the different types and applications of commercial entrance systems

2. Describe the parts required for fabricating commercial entrance systems

3. Fabricate entrance systems

CONTENT

- Types of entrance systems
 - Swing
 - Single/double
 - Centre balance
 - Sliding
 - Portals
 - Vestibule
- Auto headers
- Sliding doors
 - Pocket doors
- Parts
 - Types of hardware
 - Types of framing material
 - Flush glaze
- Compatibility and performance for types of specified hardware for aluminum doors
- Creating and using templates to prepare doors for hardware
- Assembly of components
 - Handles
 - Closers
 - Thresholds
 - Flush
 - Bolts
 - Locksets
- Assembly of entrances
 - Fastening entrance system components
- Finger guards
- Kick plate
- Thresholds
- Fabrication and preparation of frames

LEARNING TASKS

CONTENT

- Lock preparation
- Floor mounted pivots
- Power transfer hinges
- Overhead door stops

Line (GAC): **D FABRICATE COMMERCIAL SYSTEMS**
Competency: **D6 Fabricate guardrail, handrail, and balustrade systems**

Objectives

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

- Describe the fabrication of guardrail, handrail and balustrade systems

LEARNING TASKS

1. Describe guardrail, handrail, and balustrade systems

CONTENT

- Channel / Base Shoe
- Stanchions
- Face Mount

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D7 Perform glass cutting and edge treatment

Objectives

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

- Cut different types of glass
- Describe and install sealed units
- Use specialty tools and cutting equipment
- Perform edge treatment procedures

LEARNING TASKS

1. Describe sealed units
2. Cut different types of glass
3. Use specialty tools and cutting equipment

CONTENT

- Low-E coatings
- High-performance
- Spacer bars / Desceccants
- Laminated
- Triple and quad glazed
- Gases
- Breather tubes
- Heat mirror
- Float
- Laminate
- GPW
- Mirror
 - Obscure pattern glass
 - Specialty glasses
- Glass cutters
- Pliers
- Cutting tables
- Squares
- Arrissing sander
- Belt sanders
- Methylhydrates
- Hole saw
- Notching saw
- Diamond saw
- Tube drills
- Spear points
- Routers
- Circle cutter

LEARNING TASKS

4. Perform edge treatments

CONTENT

- Arrissing
- Grinding
- Polishing

Achievement Criteria

Performance The learner will cut glass to specifications.

Conditions The learner will be given:

- Instructions
- Material
- Tools and PPE

Criteria The learner will be evaluated on:

- Accuracy to 1/32 in.
- Proper edge treatment

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E1 Install storefront systems

Objectives

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

- Install door and sidelite framing
- Install door and glazing
- Perform door adjustment
- Finish frame

LEARNING TASKS

1. Install door and sidelite framing

2. Install glazing to sidelite

3. Perform door adjustment

4. Finish frames

CONTENT

- Flashing
- Glaze door (letter slot)
- Hardware installation
- Plumbing, levelling and squaring
- Load door
- Gaskets
- Setting blocks
- Glass
- Stops
- Door clearance adjustment
- Closure adjustment
- Lock and key adjustment
- Backer rod
- Insulation
- Sealant

Achievement Criteria

Performance	The learner will perform door and sidelite installation.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools and PPE • Materials • Instructions and drawings
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Plumb • Level • Square • Lock installation and function • Overall aesthetics (no scratches) • Hardware adjustment and installation

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E2 Install strip window systems

Objectives

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

- Layout commercial window systems for installation
- Install commercial window systems

LEARNING TASKS

1. Layout commercial window systems for installation
2. Install commercial window systems

CONTENT

- Confirm location of roof and wall structural members
- Confirm location of benchmarks, gridlines and datum points
- Layout of anchoring systems
- Transferring lines from floor to ceiling and roof
- Confirm opening sizes on site
- Weather seal membranes
- Flashing installations
- Deflection channel and internal angles
- Assembly methods
 - Pre-glazed
 - Sight-glazed
- Installation procedures
 - Dividing caulking clearances
 - Expansion joints
 - Installing setting blocks
 - Securing window systems
 - Installing on-site glazing
 - Modifying windows in final locations
 - Insulating and seal frames
 - Verifying operation of windows
- Installation of preassembled structures

Achievement Criteria

Performance	The learner will describe, mill, assemble and glaze a window frame.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools and PPE • Materials • Instructions and drawings
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Install, plumb, level, square to (1/16 in.) • Stop installation • Air seal • Taping, vinyling and heel and toe bead procedures

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E3 Install curtain walls

Objectives

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

- Install curtain walls
- Glaze curtain walls

LEARNING TASKS

1. Install curtain walls

2. Glaze curtain walls

CONTENT

- Shop and architectural drawings
- Layout
- Installation of anchors at proper locations
- Expansion joints
- Installation process
 - Starter track and welded anchors according to layouts
 - Level and plumb and align frames
 - Corner blocks for stick built systems
 - Blue skin applications
 - Air and vapour barriers
 - Metal back pans, glazing adapters, insulation corner blocks and glazing gaskets
 - Bulb vinyl for ventilation escape
 - Pressure plate equalizing adaptors
 - Secondary sealing of corner blocks at vertical pressure plate
- Operable windows
- Glazing process
 - Setting blocks
 - Heel bead corners
 - Install glass
 - Temporary Dutchman
 - Secondary flashings
 - Vertical pressure plate
 - Horizontal pressure plate
 - Horizontal pressure plate after applying vertical caps
- Frames, glass, caps and sealants
- SSG requirements

Achievement Criteria

Performance The learner will install and glaze a curtain wall frame.

Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools and PPE • Instructions and drawings • Materials
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Install, plumb, level, square to (1/16 in.) • Joint sealing • L Angle installation • Corner block installation • Membrane installation • Taping, vinyling procedures • Toe bead • Install and seal pressure plate • Install cover cap • Glass installation • Setting block installation

Line (GAC): **E INSTALL COMMERCIAL SYSTEMS**
Competency: **E6 Install guardrail, handrail, and balustrade systems**

Objectives

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

- Describe layout and installation of guardrail, handrail, and balustrade systems

LEARNING TASKS

1. Describe layout and installation of guardrail, handrail, and balustrade systems

CONTENT

- Channel / Base Shoe
- Stanchions
- Face Mount
- Confirm finished floor elevations, sizes according to site conditions and drawings
- Installing glass support systems
- Verify size and shape of glass
- Setting and alignment of glass
- Apply final finishes

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E8 Install flashing

Objectives

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

- Describe types of flashing
- Describe shear and break flashing
- Describe the purpose of flashing
- Describe installation considerations
- Install flashing

LEARNING TASKS

1. Describe types of flashing material
2. Select types of flashing
3. Describe purpose of flashing
4. Describe installation considerations

CONTENT

- Types
 - Aluminum
 - Galvanized steel
 - Bituminous
 - Painted steel
- Thicknesses
- Types
 - Head
 - Sill and parapet
 - Corner
 - Column
 - Splice
 - Counter
- Prevention of water entry
- Protection for membrane
- Continuity of framing
- Finishing
- Overlap requirements
- Seam requirements
- Expansion and contraction allowances
- Sealant location
- Slope and drainage requirements
- Plumbing and levelling
- Heel beading
- Bedding bead
- Fastener selection

LEARNING TASKS

5. Install flashing

CONTENT

- Tool selection
 - Snips
 - Rivet gun
 - Combination square
 - Duck bill pliers
 - Power shears
- Procedures
 - Measurement
 - Layout
 - Shear and break
 - Dry fit
 - Fastening
 - Sealing
- Install flashing according to job specifications

Achievement Criteria

Performance The learner will form and install flashing.

Conditions The learner will be given:

- Instructions and drawings
- Material
- Tools and PPE

Criteria The learner will be evaluated on:

- Accuracy
- Aesthetics
- Functionality
- Positive slope
- Angles
- End dams
- End caps
- Splice joints

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E9 Use caulking and sealants

Objectives

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

- Describe mixing procedures
- Describe sealing methods
- Apply caulking and sealants

LEARNING TASKS

1. Select sealants
2. Describe mixing procedures
3. Describe sealing methods
4. Apply sealant

CONTENT

- Factors to consider
 - Movement potential
 - Adhesion
 - Weathering
 - Compatibility with substrate
 - Structural
- Three-part caulking
- Base
- Hardener
- Colour pack
- Follow plate
- Dry
- Wet
- Wet/dry
- Dry/dry
- Surface preparation
 - Priming and cleaning
- Substrate considerations
 - Wood
 - Concrete
 - Metal
 - Glass
- Structural silicone joints
- Joint design/dimensions
 - Joint preparation
- Personal protection equipment
 - Gloves
 - Respirator
 - Eye protection
- Tools
- Loading the bulk gun
 - Applying
- Cleaning

Achievement Criteria

Performance	The learner will caulk a vertical caulking bead and a silicone butt joint.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools and PPE • Material • Instructions and drawings
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Joint configuration and preparation • Backer rod or bond breaker installation • Tooling • Masking off • Caulking application • Aesthetics and clean-up

Line (GAC):	F	INSTALL RESIDENTIAL SYSTEMS
Competency:	F1	Layout residential window and door systems

Objectives

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

- Layout window and door systems

LEARNING TASKS

1. Describe types of door and window systems

CONTENT

- Vinyl / PVC
- Wood / Aluminum Clad
- Aluminum
- Composite
- Steel framed doors
- Frame Types
 - Equal leg
 - Nail on flange
 - Rebate / Brickmold
- Determine rough opening
- Inside heel dimension
- Wall thickness
- Liner depth
- Determine door handing
- Determine operable window type
 - Slider
 - Awning
 - Hopper
 - Casement
 - Tilt and Turn
 - Fixed

- ## 2. Layout window and door systems

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F2 Glaze residential windows and doors

Objectives

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

- Describe replacing broken glass
- Describe upgrading existing windows

LEARNING TASKS

1. Describe the different types of residential windows and doors
2. Describe measurement of residential windows
3. Describe replacing broken glass
4. Describe upgrading of existing windows

CONTENT

- Nail-on flange
- Equal leg
- Rebate
 - Tilt and turn
- Aluminum, PVC, wood, and fibreglass
- Doors
 - French, sliding, and double
 - Mouldings and trim
- Inside heel dimension
- Exterior rebate
 - 3/4" and 2"
- Shimming and clearance tolerances
- Hinging, sliding and fixed abbreviations
- Removal of broken glass
- Measuring of replacement glass
- Glass thicknesses
- Types of residential stops
- Removing window systems
- Installation of new window systems
- Installation of trims and mouldings
- Sealants and vapour barrier considerations
- Caulkings and flashings

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS

Competency: F4 Install shower enclosures, mirrors, and back-painted glass

Objectives

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

- Measure for mirrors and back-painted glass
- Install mirrors and back-painted glass

LEARNING TASKS

CONTENT

- | | |
|--|---|
| 1. Prepare wall for mirrors and back-painted glass | <ul style="list-style-type: none"> • Measuring wall • Measuring out of square • Clearance tolerances • Wall plane • Confirmation of surface preparation |
| 2. Describe installation of mirrors and back-painted glass | <ul style="list-style-type: none"> • Sealants and adhesives • Vancouver clips • Mirror trims • Cut-outs • Edge grips • Standoffs |
| 3. Install mirror and back-painted glass | <ul style="list-style-type: none"> • Adhesive and sealant compatibility • Safety backing • Butt joint blackout/shadowline • Fasteners • Attachment to wall |

Achievement Criteria

Performance The learner will create a drawing and cut and install a mirror.

Conditions The learner will be given:

- Tools and PPE
- Material
- Instructions and drawings

Criteria The learner will be evaluated on:

- Layout
- Size
- Cut out
- Edgework
- Position of clips or anchors
- Drawing

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS
Competency: F6 Install residential windows, doors, frames, and hardware

Objectives

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

- Layout residential windows, doors, frames and hardware for installation
- Install residential windows, doors, frames and hardware

LEARNING TASKS

1. Layout residential windows, doors, frames, and hardware for installation
2. Install residential windows, doors, frames, and hardware

CONTENT

- Confirm opening sizes
- Fastening requirements
- Windows / Doors
 - Primary Membrane
 - Install window
 - Shingle secondary membrane
 - Flashing
 - Insulate interior cavity
 - Interior liners and casings
 - Caulking

Line (GAC): G INSTALL SPECIALTY GLASS AND PRODUCTS

Competency: G1 Layout specialty glass and products

Objectives

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

- Describe applications of specialty glass and products
- Describe specialty product materials

LEARNING TASKS

1. Describe applications of specialty products

2. Describe specialty product materials

3. Describe applications of specialty glass and products

CONTENT

- Pass-through windows
- Spider glass walls
- Sun shades
- Demountable partition
- Smoke baffle
- Display cases
- Glass floors
- Bullet-resistant glass
- Types
 - Plastic
 - Wood
 - Vinyl
 - Aluminum
 - Stainless steel
 - Lead
- Characteristics
- Properties
- Applications
- Multi-laminate
- Pattern
- Mirrors
- Fireproof
- Heat-treated (fire-resistant)
- High performance coatings
- Reflective
- Low E (low emissivity)
- Insulated units

Line (GAC): **H SERVICE GLAZING SYSTEMS**
Competency: **H2 Service residential window and door systems**

Objectives

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

- Describe servicing broken and failed glass
- Describe servicing doors and hardware
- Describe servicing damaged framing components

LEARNING TASKS

1. Describe servicing broken and failed glass

2. Describe servicing doors and vents

3. Describe replacing hinges

4. Describe servicing or replacing locks

CONTENT

- Type, colour, or coating of glass
- Safety concerns
- Measure replacement glass
- Protection of surrounding areas
- Removal and disposal
- Installation and clean up
- Problem identification
- Manufacturer
- Accessibility considerations
- Replacement parts
- Adjustment and verification of function with the customer
- Slides, guides, and wheels
- Adjustment of operable hardware
- Part identification
- Lubrication
- Clearances and adjustments
- Shimming
- Fastening door hinges to frame
- Door and window blocking
- Type and manufacturer
- Components
- Confirmation of problem
- Removal/replacement
- Lubrication and clearances
- Adjustment and verification of function with the customer

LEARNING TASKS

5. Describe replacing damaged components

CONTENT

- Confirmation of damage and the extent of the repair necessary with the customer
- Identification of part manufacturer and colour
- Duplicate flashing profiles and colour
- Tools, jigs, metal, and fasteners
- Removal, repair, flash, and caulk
- Fastening to existing substrate
- Glass installation and clean up
- Verification of repair with the customer

Level 3 Glazier

Line (GAC): **B ORGANIZE WORK**
Competency: **B1 Interpret drawings and specifications**

Objectives

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

- Interpret architectural drawings and specifications
- Use door and window schedules
- Use a drawing to prepare a complex material list

LEARNING TASKS

1. Interpret architectural drawings and specifications to confirm shop and fabrication drawings
2. Use door and window schedules
3. Use a drawing to prepare a complex material list

CONTENT

- Glazing specifications
- Sizes and dimensions
- Metal type and finish
- Handing
- Hardware
- Glass type and use
- Quantities (caulking, vinyls, metal)
- Overall dimensions
- Optimizing
- Glass sizes

Achievement Criteria

Performance	The learner will use architectural drawings to create quantity lists, shop drawings, and solve installation problems.
Conditions	The learner will be given: <ul style="list-style-type: none"> • Instructions and drawings • Tools
Criteria	The learner will be evaluated on: <ul style="list-style-type: none"> • Accuracy of quantity lists • Material requirements • Find locations in relation to grids and benchmarks • Interpret details • Confirm information

Line (GAC): **B ORGANIZE WORK**
Competency: **B2 Use codes, regulations, and standards**

Objectives

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

- Identify organizations responsible for codes, regulations, and standards
- Apply codes, regulations, standards, and engineering requirements

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Identify organizations responsible for codes, regulations, and standards | <ul style="list-style-type: none"> • National Fire Protection Association (NFPA) • National Building Code and British Columbia Building Code (NBC and BCBC) • Municipal Bylaws • Canadian Standards Association (CSA) • Underwriters Laboratories of Canada (ULC) |
| 2. Describe how codes, regulations, and standards affect the Glazier trade | <ul style="list-style-type: none"> • Material selection • Construction and installation methods • Design characteristics |
| 3. Interpret and apply codes, regulations, standards, and engineering requirements | <ul style="list-style-type: none"> • Door lights • Skylights and canopies • Side lights • Guardrails and balustrade • Office divisional to floor • Fire-rated glass • Smoke baffles |

Objectives

- Apply manufacturer and supplier documentation

CONTENT

1. Interpret manufacturer and supplier documentation
 - Tool and equipment documentation
 - System component documentation
 - Proprietary product documentation
 - Certification agencies
 - Installation instructions and requirements
 - Operation and maintenance manuals
 - Product specifications
 - Warranty information
2. Apply manufacturer and supplier documentation for installation purposes
 - Hardware
 - Windows
 - Doors
 - Skylights
 - Curtain walls
 - Point fixed
 - Guard rails, hand rails, and balustrade
 - Specialty glazing
 - Operable vents
 - Automotive

Line (GAC): B ORGANIZE WORK

Competency: B4 Apply trade math

Objectives

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

- Calculate material quantities
- Use math to optimize materials for entire project

LEARNING TASKS

1. Calculate material quantities
2. Use math to optimize materials for entire project

CONTENT

- Material list
- Glass
- Metal
- Miscellaneous related materials
 - Tapes
 - Gaskets
 - Sealants

Line (GAC): **B ORGANIZE WORK**
Competency: **B5 Plan sequence of work**

Objectives

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

- Assess specific job requirements
- Prepare tool and material list
- Determine building envelope specifications
- Copy a fabrication list
- Determine installation priorities

LEARNING TASKS

1. Assess specific job requirements

2. Prepare tool and material list

3. Determine building envelope specifications

4. Coordinate with the fabricating department

5. Determine installation priorities

CONTENT

- Blueprints detail analysis
- Safety requirements
- Primers and membranes
- Caulking and cleaners
- Fastener specifications
- Flashing specifications
- Ladders and elevated platforms
- Job-specific tools
- Personal tools
- Drawing details
- Coordination with general contractor
 - Coordinate with building envelop specialist
- Copy a fabrication list
 - Acquire fabrication drawings and cutting lists
 - Identify available pre-fabricated materials
 - Jigs and fabricating screws
- Coordination with general contractor
- Review installation details
- Review shop drawing
- Coordinate access of job site
- Confirm rough openings and frame sizes

Line (GAC): **B ORGANIZE WORK**
Competency: **B7 Communicate with others**

Objectives

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

- Lead toolbox meeting
- Coordinate work with other trades
- Participate in site-specific JOHS meeting
- Communicate with engineers and architects
- Communicate with clients
- Describe mentorship

LEARNING TASKS

1. Use advanced trade terminology
2. Lead toolbox meetings
3. Participate in site-specific JOHS meeting
4. Communicate with engineers and architects
5. Communicate with clients
6. Describe mentorship

CONTENT

- Systems
- Materials
- Tools
- Techniques
- Roles and responsibilities
- Topics
- Safety updates
- Roles and responsibilities
- Roles and responsibilities
- Understanding audience
- Generational differences
- Applying discretion
- Specifications
- Understanding audience
- Generational differences
- Applying discretion
- Company representation
- Roles and responsibilities

Line (GAC): **C USE TOOLS AND EQUIPMENT**
Competency: **C4 Use layout and measuring equipment**

Objectives

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

- Perform on site measuring off gridlines and benchmarks
- Layout of radius frame
- Transpose rough openings (ROs), frame sizes, and flashing to drawings

LEARNING TASKS

1. Describe advanced layout tools
2. Perform on site measuring off gridlines and benchmarks
3. Layout of radius frame
4. Transpose RO's, frame sizes, and flashing to drawings

CONTENT

- Total station and data collectors
- 3D scanners
- Interpretation of architectural drawings
 - Frame locations
- Laser and level equipment
- Interpretation of shop drawings
- Application of geometry and trigonometry
- Mathematical proficiency
- Clearance tolerances

Achievement Criteria

Performance	The learner will perform: <ul style="list-style-type: none"> • Differential levelling • Layout of angles • Setting up of instrumentation
Conditions	The learner will be given: <ul style="list-style-type: none"> • Instructions and drawings • Tools and PPE • Materials
Criteria	The learner will be evaluated on the accuracy of: <ul style="list-style-type: none"> • Measurement • Layout • Trigonometry

Line (GAC): C USE TOOLS AND EQUIPMENT

Competency: C6 Use rigging and hoisting equipment

Objectives

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

- Use rigging, hoisting, and lifting equipment

LEARNING TASKS

1. Use rigging, hoisting, and lifting equipment

CONTENT

- Equipment
 - Power cups
 - Engine hoist (Cherry Pick)
 - Turfers
 - Come-alongs
 - Chain falls
- Accessories
- Safety
- Certification requirements
- Estimation of weights
- Equipment capacities
- Equipment selection
- Lifting location
- Operating procedures
- Securing of loads
- Equipment inspection
- Equipment maintenance
- Equipment storage
- Removal from service

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D3 Fabricate curtain walls

Objectives

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

- Describe curtain wall types and components
- Describe curtain wall fabrication
- Describe anchor systems

LEARNING TASKS

1. Describe curtain wall
2. Describe curtain wall fabrication
3. Describe anchor systems
4. Describe rain screen

CONTENT

- Curtain wall components
 - Pressure plate
 - SSG
 - Vertical and horizontal mullion
 - Slip brackets
 - Static and non-static anchors
 - Beauty caps
 - Corner mullions
 - Two part screw spline curtain wall
- Taping and vinyling pressure plate and curtain wall
- Drilling or punching vent and drain holes
- Installing pressure plates
- Back pans
- Thermal requirements
- Aluminum angles
- Slip brackets
- Static anchors
 - Deadload
- Dynamic anchors
 - Windload
- Embeds
- Watershed
- Pressure equalized chamber
- Air seal

Line (GAC): **D FABRICATE COMMERCIAL SYSTEMS**
Competency: **D4 Fabricate skylights and sloped glazing systems**

Objectives

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

- Describe the purpose, function and components of complex skylights
- Fabricate complex skylights

LEARNING TASKS

1. Describe the purpose, function, and components of complex skylights

CONTENT

- Types of skylights
 - Ridge
 - Hip
 - Pyramid
 - Barrel vault
 - T Bar
 - Pressure cap
- Components
 - Rafters
 - Purlins
 - Spigots
 - Splice plates
 - Pressure plates
 - Gutters
 - Sleeve anchors
- Weather seal materials
 - Tapes
 - Sealants
 - Flashings
 - Rubber gaskets
- Types of anchors
- Types of flashings
 - Primary, secondary
- Types of membranes
 - EPDM rubber, peel-and-stick
- Glazing, safety and performance
- Assembly
 - Notching, cutting, and assembling components
- Steel-aluminum separation requirements
- Determining the degree of required slope

2. Fabricate complex skylights

Achievement Criteria

Performance	The learner will measure and fabricate skylights and flashings.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools • Material • Instructions and drawings
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Appearance • Rafter notching • Rafter size • Flashing size

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D5 Fabricate commercial entrance systems

Objectives

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

- Describe the types and applications of different commercial entrance systems
- Describe the parts required for fabricating commercial entrance systems
- Fabricate entrance systems

LEARNING TASKS

1. Describe the types and applications of different commercial entrance systems

CONTENT

- Types of entrance systems
 - Swing
 - Bifold
 - Revolving
 - Sliding
 - Portals
 - Vestibule
 - Total Vision System
- Types of automatic operators
 - Mag locks
 - Handicap panels
 - Card readers
 - Key pad operators
 - Automatic mats
 - Auto sensors
- Auto headers
- Sliding doors
 - Pocket doors
 - Bypass doors
- Parts
 - Types of hardware
 - Types of framing material
 - Flush glaze
 - Curtain wall with door adaptor
- Compatibility and performance for types of specified hardware for aluminum doors
- Creating and using templates to prepare doors for hardware
- Assembly of components
 - Handles

LEARNING TASKS

CONTENT

3. Fabricate entrance systems

- Closers
- Thresholds
- Flush
- Bolts
- Locksets
- Electric strikes
- Panic hardware
- Assembly of entrances
 - Fastening entrance system components
- Running feed wires and pass holes
- Finger guards
- Kick plate
- Thresholds
- Astragals and coordinators
- Fabrication and preparation of frames
- Concealed overhead closers
- Floor closers
- Lock preparation
- Panic hardware
- Floor mounted pivots
- Walking beam pivot
- Power gear hinges
- Power transfer hinges
- Overhead door stops
- Custom hardware
- Single and multi-track slider hardware

Achievement Criteria

- | | |
|-------------|--|
| Performance | The learner will build jigs and will ensure that the door closer panic and butts work. |
| Conditions | The learner will be given: <ul style="list-style-type: none"> • Tools • Material • Instructions (and divided into groups) |
| Criteria | The learner will be evaluated on: <ul style="list-style-type: none"> • Accuracy of fit to 1/16 in. |

Line (GAC): **D FABRICATE COMMERCIAL SYSTEMS**
Competency: **D6 Fabricate guardrail, handrail, and balustrade systems**

Objectives

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

- Layout for fabrication of guardrail, hand rail and balustrade systems
- Fabricate guardrail, handrail and balustrade systems

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe guardrail, handrail, and balustrade systems | <ul style="list-style-type: none"> • Channel / Base Shoe • Stanchions • Face Mount |
| 2. Layout for fabrication of guardrail, handrail, and balustrade systems | <ul style="list-style-type: none"> • Confirm finished floor elevations and sizes according to site conditions and drawings • Layout for fabrication • Material Optimization • Templates if required • Interpretation of drawings • Minimum depth into U-channel • Height and Spacing (refer to BCBC code) |
| 3. Fabricate guardrail, handrail, and balustrade systems | <ul style="list-style-type: none"> • Channel / Base Shoe • Stanchions • Face Mount |

Achievement Criteria

- | | |
|-------------|---|
| Performance | The learner will assemble a guardrail or handrail system. |
| Conditions | The learner will be given: <ul style="list-style-type: none"> • Tools • Material • Instructions |
| Criteria | The learner will be evaluated on: <ul style="list-style-type: none"> • Accuracy of fit to 1/16 in. • Plumb, level and alignment |

Line (GAC): D FABRICATE COMMERCIAL SYSTEMS

Competency: D7 Perform glass cutting and edge treatment

Objectives

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

- Cut different shapes of glass
- Use specialty tools and cutting equipment

LEARNING TASKS

1. Cut different shapes of glass

CONTENT

- Mail slot
- Speak hole
- Holes – 2 in., 4 in.
- Arcs
- Templates
- Plug outlets
- Notches
- Island (for large plug outlets)
- Circles
- Polishing wheels
- Scratch removal systems
- Scratch wheels
- Sandblasting

2. Use specialty tools and cutting equipment

Achievement Criteria

Performance	The learner will fabricate cut outs to specifications.
-------------	--

Conditions The learner will be given:

- Instructions
- Material
- Tools

Criteria	The learner will be evaluated on:
----------	-----------------------------------

- Accuracy
- Trueness to 1/32 in.
- Proper edge treatment
- Use of PPE (particulate mask and safety glasses)
- Safety precautions

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E3 Install curtain walls

Objectives

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

- Describe installation and glazing of curtain walls
- Analyze and troubleshoot problems with envelope performance integrity

LEARNING TASKS

1. Describe installation of curtain walls

CONTENT

- Shop and architectural drawings
- Layout
- Installation of anchors at proper locations
- Expansion joints
- Installation process
 - Starter track and welded anchors according to layouts
 - Level and plumb and align frames
 - Corner blocks for stick built systems
 - Blue skin applications
 - Air and vapour barriers
 - Metal back pans, glazing adapters, insulation corner blocks and glazing gaskets
 - Bulb vinyl for ventilation escape
 - Pressure plate equalizing adaptors
 - Secondary sealing of corner blocks at vertical pressure plate
- Operable windows

CONTENT

2. Describe glazing curtain walls

- Glazing process
 - Setting blocks
 - Heel bead corners
 - Install glass
 - Temporary Dutchman
 - Secondary flashings
 - Vertical pressure plate
 - Horizontal pressure plate
 - Horizontal pressure plate after applying vertical caps
- Frames, glass, caps and sealants
- SSG requirements
- Perimeter seal
- Inner joint seal
- Corner blocking
- Associated glazing components
- Weep holes
 - Orientation
 - Blockage

3. Analyze and troubleshoot problems with envelope performance integrity

Achievement Criteria

Performance	The learner will analyze and troubleshoot problems with envelope performance integrity.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools and PPE • Materials • Instructions and drawings
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Successful analysis of problem

Line (GAC): **E** **INSTALL COMMERCIAL SYSTEMS**
Competency: **E4** **Install skylights and sloped glazing systems**

Objectives

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

- Install complex skylights
- Install complex sloped glazing systems

LEARNING TASKS

1. Install sloped glazing and skylight systems

CONTENT

- Preparing skylights and glazing systems for flashings and roof membrane tie-ins
- Types of sealant applications
- Placement of purlins
- Location and placement of anchors for skylights
- Securing anchors
- Placement and assembly of condensation gutters and frame members
- Squaring skylights
- Confirming measurements for skylights
- Modifying skylights in final location
- Securing anchors using fasteners
- Installing insulation between primary and secondary flashing
- Installing on-sight glazing, pressure plates and caps

2. Install complex sloped glazing and skylight systems

- Pyramid
- Ridge
- Barrel vault
- Atrium

Achievement Criteria

Performance	The learner will install and glaze skylights and flashings.
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> • Tools and PPE • Materials • Instructions and drawings
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> • Square and alignment • Weatherproofing • Membrane • Pressure plate cap • Purlin cover • Fasteners • Flashing • Glass considerations • Appearance

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E5 Install commercial entrance systems

Objectives

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

- Install entrance systems

LEARNING TASKS

1. Install entrance systems

CONTENT

- Sliders and track
 - Stacking doors
 - Bi-fold
 - Bi-pass
- Swing doors
- Revolving doors
- Total vision system
- Automatic doors
- Sub-trade preparation confirmation
- Layout and clearances
- Installation and adjustments

2. Install recessed floor closer

Achievement Criteria

Performance The learner will install a door frame complete with closer, panic hardware and butt hinges.

Conditions The learner will be given:

- Tools
- Material
- Instructions

Criteria The learner will be evaluated on:

- Accuracy of fit to industry standards (1/16 in.)
- Plumb
- Level
- Square
- Hardware functions

Line (GAC): **E** **INSTALL COMMERCIAL SYSTEMS**
Competency: **E6** **Install guardrail, handrail, and balustrade systems**

Objectives

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

- Layout for installation of guardrail, handrail, and balustrade systems
- Install guardrail, handrail, and balustrade systems

LEARNING TASKS

CONTENT

- | | |
|---|--|
| 1. Layout for installation of guardrail, handrail, and balustrade systems | <ul style="list-style-type: none"> • Channel / Base Shoe • Stanchions • Face Mount |
| 2. Install guardrail, handrail, and balustrade systems | <ul style="list-style-type: none"> • Confirm finished floor elevations, sizes according to site conditions and drawings • Installing Glass Support Systems • Verify size and shape of glass • Setting and alignment of glass • Apply final finishes |

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E7 Install building envelope membranes

Objectives

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

- Describe purpose and types of building envelope membranes

LEARNING TASKS

1. Describe the purpose of membranes
2. Describe different types of membranes

CONTENT

- Water and air seal
- Types of materials
 - Foil back
 - Permeable/non-permeable
- Application of materials
- Preparation methods for specific materials
- General preparation of materials
 - Cleaning
 - Measuring
 - Priming
 - Corner sealing and lapping
 - Sizes

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E8 Install flashing

Objectives

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

- Install flashing

LEARNING TASKS

1. Describe types of flashing material
2. Select types of flashing
3. Describe purpose of flashing
4. Describe installation considerations

CONTENT

- Types
 - Aluminum
 - Galvanized steel
 - Bituminous
 - Painted steel
- Thicknesses
- Types
 - Head
 - Sill and parapet
 - Corner
 - Column
 - Splice
 - Counter
- Prevention of water entry
- Protection for membrane
- Continuity of framing
- Finishing
- Overlap requirements
- Seam requirements
 - Standing seam
 - Splice
 - Overlap
- Expansion and contraction allowances
- Sealant location
- Slope and drainage requirements
- Plumbing and levelling
- Heel beading
- Bedding bead
- Fastener selection

LEARNING TASKS

5. Install flashing

CONTENT

- Tool selection
 - Snips
 - Rivet gun
 - Combination square
 - Bevel square
 - Protractor
 - Duck bill pliers
 - Power shears
 - Caulking gun
- Procedures
 - Measurement
 - Layout
 - Shear and break
 - Dry fit
 - Sealing
 - Fastening
- Install flashing according to job specifications

Achievement Criteria

Performance	The learner will build a flashing mock-up.
Conditions	The learner will be given: <ul style="list-style-type: none"> • Tools • Materials • Instructions • Drawing
Criteria	The learner will be evaluated on: <ul style="list-style-type: none"> • Accuracy of fit to within 1/16 in. tolerance • Aesthetics • Shingling / lapping accuracy of fit • Sealant placement

Line (GAC): E INSTALL COMMERCIAL SYSTEMS

Competency: E9 Use caulking and sealants

Objectives

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

- Apply structural silicone glazing (SSG)

LEARNING TASKS

1. Prepare surface
2. Apply silicone

CONTENT

- Clean and prepare surface
- Priming
- Protection of adjacent surfaces
- Taping
- Freehand
- Tooling
- Backer rod
- Bond breaker
- Finish bead
- Structural bead

Line (GAC): **F** **INSTALL RESIDENTIAL SYSTEMS**
Competency: **F2** **Glaze residential windows and doors**

Objectives

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

- Install a residential nail-on flange

LEARNING TASKS

1. Install a residential nail-on flange

CONTENT

- Nail-on flange
- Equal leg
- Rebate
 - Tilt and turn
- Aluminum, PVC, wood, and fibreglass
- Doors
 - French, sliding, and double
 - Mouldings and trim

Achievement Criteria

Performance The learner will install a residential nail-on flange window.

Conditions The learner will be given:

- Tools
- Material
- Instructions

Criteria The learner will be evaluated on:

- Accuracy of fit to industry standards (1/16")
- Plumb
- Level
- Square
- Proper shimming
- Proper membrane and building-paper overlap

Line (GAC): **F** **INSTALL RESIDENTIAL SYSTEMS**
Competency: **F3** **Install residential skylights and solariums**

Objectives

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

- Measure for solariums
- Install solariums

LEARNING TASKS

1. Measure for solariums

2. Describe installation of solariums

3. Install solarium

CONTENT

- Review opening
- Clearance tolerances
- Residential codes

- Sealants and adhesives
- U-channels

- Measuring
- Caulking
- Flashing
- Fasteners
- Anchoring
- Glazing
- Finishing

Line (GAC): F INSTALL RESIDENTIAL SYSTEMS
Competency: F4 Install shower enclosures, mirrors, and back-painted glass

Objectives

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

- Measure for shower enclosures
- Install shower enclosures

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Measure for shower enclosures | <ul style="list-style-type: none"> • Layout and measurement • Clearance tolerances |
| 2. Describe installation of shower enclosures | <ul style="list-style-type: none"> • Sealants and adhesives • Hinges and hardware • U-channels • Cut-outs |
| 3. Install shower enclosures | <ul style="list-style-type: none"> • Measuring • Fasteners • Attachment to wall • Drilling substrate • Masking and caulking • Door adjustment • Mildew/lime resistance coating • Cleaning |

Achievement Criteria

Performance The learner will install a shower door and sidelite.

Conditions The learner will be given:

- Tools
- Material
- Instructions

Criteria The learner will be evaluated on:

- Accuracy of fit to industry standards (1/16")
- Plumb
- Level
- Square
- Proper shimming

Line (GAC): **F** **INSTALL RESIDENTIAL SYSTEMS**
Competency: **F5** **Install guardrail, handrail, and balustrade systems**

Objectives

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

- Layout guardrail, handrail, and balustrade systems for installation
- Install guardrail, handrail, and balustrade systems

LEARNING TASKS

1. Layout guardrail, handrail, and balustrade systems for installation
2. Install guardrail, handrail, and balustrade systems

CONTENT

- Channel / Base Shoe
- Stanchions
- Face Mount
- Confirm finished floor elevations, sizes according to site conditions and drawings
- Installing Glass Support Systems
- Verify size and shape of glass
- Setting and alignment of glass
- Apply final finishes

Line (GAC): G INSTALL SPECIALTY GLASS AND PRODUCTS

Competency: G1 Layout specialty glass and products

Objectives

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

- Describe specialty product materials
- Describe applications of specialty glass and products
- Layout specialty glass and products

LEARNING TASKS

1. Describe specialty product materials

2. Describe applications of specialty glass and products

CONTENT

- Types
 - Plastic
 - Wood
 - Vinyl
 - Aluminum
 - Stainless steel
 - Lead
- Characteristics
- Properties
- Applications
- Curved
- Multi-coloured
- Multi-laminate
- Pattern
- Sandblast
- Fireproof
- Low iron
- Heat-treated (fire-resistant)
- High performance coatings
- Filming
- Reflective
- X-ray
- Low E (low emissivity)

LEARNING TASKS

3. Describe applications of specialty products

4. Layout specialty glass and products

CONTENT

- Pass-through windows
- Spider glass walls
 - Cable stayed systems
- Sun shades
 - Cable stayed systems
- Demountable partition
- Smoke baffle
- Display cases
- Glass floors
- Bullet-resistant glass
- Templates
- Procedures
- Benchmarks and gridlines
- Measurements
- Anchoring systems
- Hardware and patch fittings
- Sealants
- Silicone butt joints
- Total vision installations
- Spider glazing
- Office dividers
- Smoke baffles
- Tools and equipment
- Safety

Line (GAC): G INSTALL SPECIALTY GLASS AND PRODUCTS

Competency: G2 Assemble specialty glass and products

Objectives

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

- Select materials required for assembly
- Assemble specialty glass and products
- Describe service procedures

LEARNING TASKS

1. Select materials required for assembly

2. Assemble glass and specialty products

3. Describe service procedures

CONTENT

- Hardware
 - Patch fittings
 - Closers
 - Pivots
 - Gussets
- Fasteners
 - Screws
 - Clips
 - Spigots
 - Anchors
- Mouldings
 - Base shoes
 - U-channels
- Gaskets
 - Vinyl
 - Rubber
 - Weather-stripping
- Sealants, adhesives, quick-set cement
- Tools
- Manufacturer specifications
- Assembly procedures
 - Cut and measure materials
 - Level and square materials
 - Fasten materials
 - Torque patch fittings and cables to accurate tensions
- Specialized tools and equipment
- Custom installation and service requirements

Line (GAC): G INSTALL SPECIALTY GLASS AND PRODUCTS

Competency: G3 Install custom glazing systems

Objectives

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

- Install Spider glazing, smoke baffles, canopies, sunshades, auto headers, automotive and commercial machinery glass

LEARNING TASKS

CONTENT

- | | |
|--|---|
| 1. Describe Spider glazing installation process | <ul style="list-style-type: none"> • Physical properties • Components • Layout and measurement procedures • Structural steel relative to brackets |
| 2. Install Spider glazing | <ul style="list-style-type: none"> • Layout brackets • Glass measurement • Tools for installation • Glass installation • Structural silicon joints |
| 3. Install smoke baffles | <ul style="list-style-type: none"> • Describe the purpose • Apply fastening hardware • Measuring and templating • Installing and siliconing |
| 4. Install canopies | <ul style="list-style-type: none"> • Measuring and templating • Fasteners and structural tape • Hoisting and placement • Glass and steel separation |
| 5. Install sunshades | <ul style="list-style-type: none"> • Description and purpose of application • Fabrication of sunshade arms • Alignment of installation • Installation and fastening |

Line (GAC): **H SERVICE GLAZING SYSTEMS**
Competency: **H1 Service commercial window and door systems**

Objectives

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

- Service broken and failed glass
- Service doors and hardware
- Service damaged framing components

LEARNING TASKS

1. Service broken and failed glass

2. Service doors and vents

3. Replace hinges and pivots

4. Service or replace locks

CONTENT

- Type, colour, or coating of glass
- Safety factors
- Measure replacement glass
- Safety access (public)
- Removal and disposal
- Installation and clean up
- Problem identification
- Manufacturer
- Accessibility considerations
- Replacement parts
- Public access control
- Adjustment and verification of function with the customer
- Adjust operable hardware
- Slides, guides, wheels
- Part identification
- Bushing replacement
- Lubrication
- Clearances and adjustments
- Shimming and reinforcing back plates (custom backing plates)
- Fastening door hinges to building structure
- Door and window blocking
- Type and manufacturer
- Manufacturer component and installation sheet
- components
- Confirmation of problem
- Removal and adjustments

LEARNING TASKS

CONTENT

5. Service closers

- Lubrication and clearances
- Door adjustments
- Adjustment and verification of function with the customer
- Identification of problem with customer
- Re-tapping, drilling and mounting
- Adjustment of door and closure, verification of function with the customer

6. Service or replace damaged framing components

- Confirmation of damage and the extent of the repair necessary with the customer
- Identification part manufacturer and colour
- Duplicate flashing profiles and colour
- Tools, jigs, metal, and fasteners
- Public access control
- Glass removal and storage
- Removal, repair, flash, and caulk
- Fastening to existing (spigots and fasteners)
- Glass installation and clean up
- Verification of repair with the customer
- Recording repair time

Section 4

ASSESSMENT GUIDELINES

Assessment Guidelines – Level 1

Level 1 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		GLAZIER LEVEL 1	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	USE SAFE WORK PRACTICES	25%	10%
B	ORGANIZE WORK	20%	15%
C	USE TOOLS AND EQUIPMENT	20%	15%
D	FABRICATE COMMERCIAL SYSTEMS	18%	30%
E	INSTALL COMMERCIAL SYSTEMS	17%	30%
F	INSTALL RESIDENTIAL SYSTEMS	0%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		70%	30%
Final in-school mark Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Glazier Standardized Level exam		IN-SCHOOL %	

In-school Mark Combined theory and practical subject competency multiplied by	80%
Standard Level Exam Mark The exam score is multiplied by	20%
Final Level Mark	FINAL%

Assessment Guidelines – Level 2

Level 2 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		GLAZIER LEVEL 2	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	ORGANIZE WORK	15%	20%
D	FABRICATE COMMERCIAL SYSTEMS	30%	35%
E	INSTALL COMMERCIAL SYSTEMS	30%	35%
F	INSTALL RESIDENTIAL SYSTEMS	21%	10%
G	INSTALL SPECIALTY GLASS AND PRODUCTS	2%	0%
H	SERVICE GLAZING SYSTEMS	2%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school mark Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Glazier Standardized Level exam		IN-SCHOOL %	

In-school Mark Combined theory and practical subject competency multiplied by	80%
Standard Level Exam Mark The exam score is multiplied by	20%
Final Level Mark	FINAL%

Assessment Guidelines – Level 3

Level 3 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		GLAZIER LEVEL 3	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	ORGANIZE WORK	10%	15%
C	USE TOOLS AND EQUIPMENT	10%	15%
D	FABRICATE COMMERCIAL SYSTEMS	22%	28%
E	INSTALL COMMERCIAL SYSTEMS	20%	28%
F	INSTALL RESIDENTIAL SYSTEMS	10%	14%
G	INSTALL SPECIALTY GLASS AND PRODUCTS	20%	0%
H	SERVICE GLAZING SYSTEMS	8%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school mark Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Interprovincial Red Seal exam		IN-SCHOOL %	

All apprentices who complete Level 3 of the Glazier program with a FINAL level percentage score of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.

SkilledTradesBC will enter the apprentices' Glazier Interprovincial Red Seal examination percentage score into SkilledTradesBC Portal.

A minimum percentage score of 70% on the examination is required for a pass.

Section 5

TRAINING PROVIDER STANDARDS

Facility Requirements

Classroom Areas

- Comfortable seating and tables suitable for learning
- Compliance with the local and national fire code and occupational safety requirements
- Overhead and multimedia projectors with a projection screen
- 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
- Classroom space with internet access
- Library with reference material and installation manuals for student and instructor use

Shop Areas

- 10000 square foot mock-up/storage area which includes:
 - 20 feet high workshop
 - Classroom: 25 sq.ft. per student, based on 16 students
 - Tool crib
 - Lockers
- Adequate lighting and lighting control
- Ventilation as per WorkSafeBC standards
- Refuse and recycling bins for used shop materials
- First aid facilities as per WorkSafeBC regulations
- Hand and eye wash stations as per WorkSafeBC regulations
- Fire prevention equipment as per WorkSafeBC regulations

Student Facilities

- Adequate lunch room as per WorkSafeBC requirements
- Adequate washroom facilities as per WorkSafeBC requirements
- Personal Storage lockers

Instructor's Office Space

- Desk and filing space
- Computer

Tools and Equipment

Hand Tools

- Allen keys
- angle finder
- bulk caulking gun
- caulking gun
- C-clamp
- centre punch
- chalk line
- chisel – cold
- chisel – wood
- combination square
- core tool
- countersinks (# 8, 10, 12)
- dead-blow hammer
- drill bits – high speed steel
- fibre stick
- files – bastard
- files – half moon
- files – round
- glass cup
- glass cutter
- glass pliers
- glass wedge
- hand cutters
- glazing bar
- hack-out knife
- hacksaw
- hammer – claw
- levels
- locking pliers
- locking pliers – duck-billed
- nail set
- nut driver set (imperial and metric)
- ofal knife
- open end wrenches (imperial and metric)
- paint brush
- pens, pencils, markers
- pouch/apron
- protractor (degree finder)
- pry bars
- putty knife – bent, straight
- ratchet set
- rivet tool
- mallet (plastic, rubber)
- running glass pliers
- scoring tool
- screwdrivers – flat
- screwdrivers – Philips
- screwdrivers – Robertson
- side cutters
- standard pliers
- string line
- taps and dies
- tin snips – straight, left, right
- tool box
- utility knife
- vinyl glazing roller
- wrench – adjustable

Portable Power Tools

- belt sander
- chop saw
- circular saw
- cordless drill
- electric drill
- electric nibbler (shears)
- glass drilling machine and drill bits
- grinders
- hammer drill
- hole drill
- tube drill
- jig saw
- notch saw
- portable glass notching saw
- portable mitre saw
- reciprocating saw
- router
- screw gun
- wet sander

Stationary Power Tools

- cutting table
- production cutter
- band saw
- bench grinder
- drill press
- flashing brake
- flashing shear
- glass cutting table
- radial arm saw
- table saw
- upright belt sanders

Measuring and Layout Equipment

- builder's level
- calculator
- laser distance measurer
- laser level
- measuring tape
- plumb bob
- sliding T bevel
- squares – combination
- squares – steel

Specialty Tools

- calipers
- glass clamp
- offset drill
- offset hook tool
- plate running pliers
- point driver
- Circle cutter
- Riv-nut tool
- Step drill

Scaffolding and Access Equipment

- Boom lift (rental)
- ladder jacks
- ladders (extension and step)
- scaffolding (baker, frame, sectional, tubular)
- Swing Scissor lift (rental)
- stage (rental)

Rigging, Hoisting and Lifting Equipment

- block and tackle
- gator dolly
- glass dolly
- ropes (fibre and synthetic)
- winches

Personal Protective Equipment

- ear protection
- fall arrest equipment
- gloves
- hard hat
- respirator (particulate mask)
- rubber gloves
- safety footwear
- safety glasses
- safety vest

Reference Materials

Required Reference Materials

- None

Recommended Resources

- BC Campus Open Education website – online resources for common core skills found in many trades:
 - <https://open.bccampus.ca/2015/11/04/new-open-textbooks-common-core-trades/>
 - Recommend reviewing *D-1 Solve Trades Mathematical Problems*

Suggested Texts

- None

Instructor Requirements

Occupation Qualification

The instructor must possess:

- A BC Certificate of Qualification with a Red Seal Endorsement, or Certificate of Qualification from another Canadian jurisdiction complete with Red Seal Endorsement only.
- A minimum of 5 years of experience working in the industry as a journeyperson.

Instructional Experience and Education

It is preferred that the instructor also possesses one of the following:

- An Instructor's Diploma or equivalent, or a Bachelor's Degree in Education

Appendices

Appendix A

Summary of Achievement Criteria

Achievement Criteria are included for competencies that require a practical assessment. 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 measurable and that they reflect the skills spelled out in the competency. 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 evaluation criteria.

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.

The following tables summarize the practical assessments for each level. **For details, please refer to the Achievement Criteria following the competency in the Program Content section.**

GLAZIER – LEVEL 1 SUMMARY OF ACHIEVEMENT CRITERIA	
SUBJECT COMPETENCY	ACHIEVEMENT CRITERIA TASK
A7 Use fall protection systems	The learner will perform a fit test.
B6 Handle materials	The learner will transport glass with a partner by using a plate dolly.
C2 Use portable power tools	The learner will demonstrate safe operating procedures for power tools.
C3 Use stationary power tools	The learner will demonstrate safe operating procedures for stationary power tools.
C4 Use layout and measuring equipment	The learner will use layout and measuring equipment to determine, communicate and draft accurate flashing, glass, and metal profiles.
C5 Use ladders and scaffolds	The learner will erect tower scaffold.
C6 Use rigging and hoisting equipment	The learner will tie the appropriate knot for a given application: <ul style="list-style-type: none"> • Half hitch • Clove hitch • Figure of eight • Bowline • Trucker's hitch
D1 Fabricate storefront systems	The learner will screw assemble a small frame.
D7 Perform glass cutting and edge treatment	The learner will cut glass to a specified size.
E1 Install storefront systems	The learner will install and glaze a small frame.
E7 Install building envelope membranes	The learner will measure and apply primer and membrane to specifications.

GLAZIER – LEVEL 2 SUMMARY OF ACHIEVEMENT CRITERIA	
SUBJECT COMPETENCY	ACHIEVEMENT CRITERIA TASK
B1 Interpret drawings and specifications	The learner will interpret a table of contents and convey information on a blueprint.
B4 Apply trade math	The learner will determine frame sizes, glass sizes and site dimensions.
D1 Fabricate storefront systems	The learner will perform door and sidelite fabrication.
D2 Fabricate window systems	The learner will fabricate a strip window assembly.
D3 Fabricate curtain walls	The learner will fabricate a curtain wall frame.
D7 Perform glass cutting and edge treatment	The learner will cut glass to specifications.
E1 Install storefront systems	The learner will perform door and sidelite installation.
E2 Install strip window systems	The learner will describe, mill, assemble and glaze a window frame.
E3 Install curtain walls	The learner will install and glaze a curtain wall frame.
E8 Install flashing	The learner will form and install flashing.
E9 Use caulking and sealants	The learner will caulk a vertical caulking bead and a silicone butt joint.
F4 Install shower enclosures, mirrors, and back-painted glass	The learner will create a drawing and cut and install a mirror.

GLAZIER – LEVEL 3 SUMMARY OF ACHIEVEMENT CRITERIA	
SUBJECT COMPETENCY	ACHIEVEMENT CRITERIA TASK
B1 Interpret drawings and specifications	The learner will use architectural drawings to create quantity lists, shop drawings, and solve installation problems.
C4 Use layout and measuring equipment	The learner will perform: <ul style="list-style-type: none"> Differential levelling Layout of angles Setting up of instrumentation
D4 Fabricate skylights and sloped glazing systems	The learner will measure and fabricate skylights and flashings.
D5 Fabricate commercial entrance systems	The learner will build jigs and will ensure that the door closer panic and butts work.
D6 Fabricate guardrail, handrail, and balustrade systems	The learner will assemble a guardrail or handrail system.
D7 Perform glass cutting and edge treatment	The learner will fabricate cut outs to specifications.
E3 Install curtain walls	The learner will analyze and troubleshoot problems with envelope performance integrity.
E4 Install skylights and sloped glazing systems	The learner will install and glaze skylights and flashings.
E5 Install commercial entrance systems	The learner will install a door frame complete with closer, panic hardware and butt hinges.
E8 Install flashing	The learner will build a flashing mock-up.
F2 Glaze residential windows and doors	The learner will install a residential nail-on flange window.
F4 Install shower enclosures, mirrors, and back-painted glass	The learner will install a shower door and sidelite.

Appendix B Previous Contributors

Industry Subject Matter Experts retained to assist in the development of the Program Outline (2017):

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SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry and training provider representatives appointed to identify the training requirements of the Glazier occupation.