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Mid Stage Tasks

Final Stage Tasks

ESSENTIAL SKILLS WALL CHART

Document Use, Oral Communication

Thinking Skills: Decision Making, Critical Thinking

You will find the Essential Skills Wall Chart on the wall in the group room/classroom.

TASK STEPS

YOU WILL NEED:

- ✓ the Essential Skills Wall Chart
- ✓ a non-permanent marker

<u>During the Orientation:</u>

- Work as a group
- Scan the Wall Chart
- Discuss the nine Essential Skills
  - Information about Essential Skills can be found in your Student Notes
  - Use the Table of Contents to help you find the Essential Skills section
- Identify one Essential Skill you demonstrated in the Orientation
- Explain to the group why you selected this skill

<u>At the End of Each Class:</u>

- Work as a group
- Scan the Wall Chart
- Identify the most important Essential Skill you demonstrated or developed in class today
- Explain to the group why you selected this skill

Essential Skills provide the foundation that makes it possible for people to learn all other skills. These are the skills that will help you find and keep a job and manage change at work.

ESSENTIAL SKILLS CHECKLIST

Reading Text, Document Use, Writing

Thinking Skills: Decision Making, Critical Thinking

As mentioned in your Student Notes, you will have time at the end of each class to identify the Essential Skills you used during the class. You will be asked to work individually to complete your own checklist.

We recommend keeping your checklist at the front or back of your Student Notes so that it will be easy to find.

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil
- ✓ a copy of your individual Essential Skills Checklist

- Work independently
- Review your own Essential Skills Checklist
- Assess all of the Essential Skills you demonstrated in class today
- Complete the checklist

Essential Skills provide the foundation that makes it possible for people to learn all other skills. These are the skills that will help you find and keep a job and manage change at work.

Reading Text – Read sentences or paragraphs. Scan for information, skim for overall meaning and read a full text to understand, learn, critique or evaluate

Read Student Notes ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Find information using the Table of Contents and/or scan your notes for information and answers to questions ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Read and follow the step-by-step instructions in a task Task #: _____ Task #: _____ Task #: _____ Task #: _____ Task #: _____ Task #: _____ Task #: _____ Task #: _____ Task #: _____ Task #: _____ Task #: _____ Task #: _____	Read material from other books, manuals and websites - identify those resources below.
Other, please list:	

Document Use – Read signs, labels or lists, interpret information on graphs or charts and enter information on forms

Complete an attendance/sign-in sheet ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Read bulleted lists in your Student Notes and in the tasks ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Read and understand a document Material Safety Data Sheets (MSDS): ☐ _____ ☐ _____ Other Documents: ☐ _____ ☐ _____	Read and understand labels on product containers ☐ Product: _____ ☐ Product: _____ ☐ Product: _____ ☐ Product: _____
Read and understand a chart ☐ Avoiding Injuries Summary ☐ Safety Checklist ☐ Adhesives Chart Other_____	Complete a chart Essential Skills Wall Chart ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ This Essential Skills Checklist: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Other Charts: ☐ _____ ☐ _____
Read and follow steps in the Activities section of your notes ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Other, please list:

Writing – Write text and fill in forms. Organize, record or document, inform or persuade and request information	
Make notes in your Student Notes ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Record notes to track your research ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Record notes when you are completing a task ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Record notes in a group discussion ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Other, please list:	
Numeracy – Use numbers and think in quantitative terms. Numerical estimation and numerical calculations including money math, scheduling or budgeting and accounting, measurement and calculation and data analysis.	
Arrive on time and finish tasks on time ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Move between SI (Metric) and Imperial measurements or Fahrenheit and Celsius ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Use a ruler or tape measure ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Learn about the temperature of solder and soldering irons ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Know the width of foil you need for the thickness of your glass ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Use pliers at a 90° angle ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Track time in minutes and/or hours ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Use a calculator ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Number the pieces of your pattern ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Other, please list:

Oral Communication – Use speech to give and exchange thoughts and information. Greet people, reassure, or persuade, seek or obtain information, resolve conflicts, facilitate or lead a group.

Talk with others as you worked ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Present on behalf of your group ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Ask questions of the instructor and/or discuss your progress ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Work with a partner on a task ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Give or receive feedback (help, advice, ideas, opinions) ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Participate in group brainstorming activities and/or discussions ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Report an accident, spill, injury or problem with equipment ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Listen to and follow directions ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Other, please list:	

Thinking Skills – A process of evaluating ideas or information to reach a rational decision. Problem solving, decision making, critical thinking, job task planning and organizing, significant use of memory, finding information (each Thinking Skill is outlined below)

Problem Solving (Thinking Skills) – A problem requires a solution

Solve not having enough glass in the colour you need ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Solve problems with pieces of glass not breaking properly ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Solve issues with pieces cut upside down ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Solve problems with the foil being crooked, bubbled or uneven ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Solve problems with solder beads not the right size, shape or texture ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Other, please list:

Decision Making (Thinking Skills) – Make a choice among options

Select/ wear appropriate clothing for stained glass ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Decide on steps for completing a task ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Make a group decision ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Decide which project to work on ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Decide on the tools you will use on your projects ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Decide on the techniques you will use for a project ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Decide on colours and pattern for your stained glass ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Decide on whether or not use patina on your finished piece ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Other, please list:	

Critical Thinking (Thinking Skills) – Evaluate ideas or information using a rational, logical, thought process and refer to objective criteria to reach a rational judgment about value or to identify strength and weakness (judge, assess, evaluate, consider, review)

Assess your surroundings for safety and cleanliness before starting and ending your work ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Evaluate tools before using them ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Assess your pattern before you begin: do you like it, will it work, and do you have the skills and tools to do it? ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Assess your progress and skills development ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Assess your work and identify problems and strengths ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Evaluate your piece and assess your progress and skill development ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Assess the work of others ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Assess your techniques and make necessary adjustments ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Other, please list:	

Job Task Planning and Organizing (Thinking Skills) - Plan and organize your own job tasks.	
Organize activities in your day, within the structure of the course ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Identify an overall plan for completing a project ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Have all tools, equipment and materials ready before you start ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Schedule your work so you finish the project on time ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Identify your next steps, after this course has ended ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Other, please list:
Significant Use of Memory (Thinking Skills) - Over and above things you need to remember on a day-to-day basis	
Remember solutions to common stained glass problems ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Remember the Essential Skills and Technical Skills you demonstrated in class ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Other, please list:	
Finding Information (Thinking Skills) – Use a variety of sources for information	
Find additional stained glass information and resources ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Search for information required to complete the tasks ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Find information to share with the others in the group ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Other, please list:

Working with Others – Work independently, jointly with a partner, as a member of a team or as a supervisor or leader.

Work with others to solve problems ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Work with others to generate a list through brainstorming ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Work independently on your project ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Work with one other person on a task or project ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Work with others in small and large groups to complete tasks ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Take a leadership role ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Other, please list:	

Continuous Learning – Ongoing process of gaining new skills and knowledge through others, on the job or through formal training

Research and/or sign up for another course or workshop ☐ ☐ ☐ ☐ ☐	Other, please list:

Computer Use – Use the internet, word processing software, email or create spreadsheets	
Open a web browser ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Enter a URL into the address bar on your computer ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Use a search engine to find stained glass information ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Follow links to stained glass websites ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Watch online videos about stained glass ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Send an email to a friend, another student or the instructor about the class ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Print information or a file ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	Other please list:

ESSENTIAL SKILLS PROFILE REVIEW

Reading Text, Document Use, Oral Communication

Thinking Skills: Decision Making, Critical Thinking

As mentioned in your Student Notes there are nine Essential Skills needed for success in almost every job.

Essential Skills Include:

- Reading
- Document Use
- Numeracy
- Writing
- Oral Communication
- Working with Others
- Thinking Skills
    - Problem Solving, Decision Making, Critical Thinking, Job Task Planning and Organizing, Significant Use of Memory, Finding Information
- Continuous Learning
- Computer Skills

Note: We are not assuming that you will want to be a Glazier or that this course will prepare you to work as one.

If you are interested in a career that involves glass work, go to the Essential Skills site and search profiles using the word "glass". This won't list all related jobs but it is a good place to start.

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

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil or highlighter

STEP ONE:

- Work independently
- Scan the Glaziers Occupational profile on the following pages
- Decide which three of the nine Essential Skills you would consider to be the most important for someone in this field
- Highlight or circle your choices

STEP TWO:

- Discuss the profile as a group
  - How could reading Essential Skills profiles help you make a career decision or help you with your job search?
- Discuss your three Essential Skills choices

The following information has been gathered from the Essential Skills Profile for Glaziers found at the Human Resources and Skills Development Canada website: http://srv108.services.gc.ca/english/profiles/215.shtml. This site has the full, detailed profile of Glaziers as well as many more occupational profiles.

GLAZIERS

INTRODUCTION

Glaziers cut, fit, install and replace glass and frames for glass in residential, commercial and industrial buildings, on exterior walls of buildings and other structures, furniture and other products. They are employed by construction glass installation contractors, retail service and repair shops and glass fabrication shops.

Reading Text

- read job and purchase orders that include a brief description of labour and parts required, shipping information and costs
- read notes, memos and letters from suppliers that include information on rates, charges and materials
- read labels on products to confirm the appropriateness of the product to the situation and for correct application instructions
- read bulletins and brochures from suppliers describing new products, parts and prices
- read safety procedures that are site and task specific. For example, they read procedures for high risk installations such as a 300 pound light (single pane of glass) lifted to an upper floor.
- read occupational health and safety manuals. For example, they check for compliance to regulations for use of swingstages, scaffolding or outriggers.
- read MSDS (Material Safety Data Sheet) for general information such as short and long term effects of working with a hazardous material and specific information such as personal protective equipment

- read numerous technical manuals that give instructions for installing different kinds of windows and hardware or building frames using a variety of materials. Instructions are usually integrated with assembly drawings.
- may read a trade journal to learn about new products such as using window film on wired glass
- may read engineers' reports to determine the best method of making a repair. For example, they read to understand the history and problems related to leaks in a curtain wall (an exterior, non-bearing wall), in order to make recommendations for repair.

Document Use

- read price lists and tables in parts manuals and catalogues
- read labels/stickers on windows giving directions for installation
- use levels, tape measures, protractors and mitring gauges
- refer to lists and tables containing information on various types and sizes of materials such as gaskets or glazing tapes
- read installation or delivery schedules on a construction site to coordinate and sequence tasks
- read and complete various forms such as: daily time sheets, shipping documents, purchase orders, invoices, job sheets, city permits
- refer to a table to determine the correct counterweights for setting up a swing stage or to verify load capacity
- check shipping documents to determine that the correct items and quantity are delivered to the site. Details that are checked may include size, colour, angles, coating and type. A list of back order items may be required.
- refer to safety regulations, especially during technical training, regarding lock out procedure, personal protective equipment, swingstages and other topics. Information must be integrated from several sources and different document types including tables, diagrams and drawings.

- refer to a wide array of complex assembly drawings integrating text, drawings and actual components
- refer to detail drawings to understand how elements are to be constructed by reading angles, interpreting symbols, cross referencing to other documents and information written on the drawings. This information may include constraints on order of completion and requirements such as type of sealant.
- use blueprints starting with the most general views leading through shop drawings, route sheets, specifications and finally to detailed drawings. Navigating through the layers and integrating, glaziers identify placement and details of installation by interpreting symbols, abbreviations, and referencing to other documents.

Writing

- write notes to themselves regarding work orders and customer requests that include details about measurements or scheduling information
- write internal notes to request supplies and materials
- complete a variety of forms such as shipping orders, time sheets, job sheets, purchase orders and invoices
- may write a one page quote or estimate for a customer that includes costs of labour to remove existing materials and install the new product, as well as costs of all materials
- may write a monthly summary of activities for a supervisor
- may write memos or letters to customers or suppliers and manufacturers relaying or requesting information on prices, equipment, parts or procedures
- may write an incident report for the company or the Worker's Compensation Board describing an accident that occurred on the job

Numeracy

Money Math

- accept payments from customers in the form of cash, cheque or credit card and make change if necessary
- prepare customer invoices, calculating labour at an hourly rate, materials by the linear metre or square foot and taxes

Scheduling, Budgeting & Accounting Math

- may meet quotas for installation set in the estimation of a job. For example, one unit replaced per day or 12 units installed per day
- determines the amount of materials needed, for example, number of tubes of sealant based on standard coverage, for various phases of a job
- compare differing costs for materials and job procedures. For example, they calculate the most cost efficient frame fabrication by comparing products available, and calculating the least wasteful cuttings and labour costs.

Measurement and Calculation Math

- calculate the total weight of materials when shipping work to customers
- set the required angles for cutting on the mitre saw gauge
- use tape measure, either SI (system international) or Imperial, to make measurements to construct and fit frames
- set up center lines and then measure to ensure that units are properly placed and centered in openings
- calculate radius, circumference and angles in order to construct architectural features such as curved curtain walls. Glaziers use a transit to lay out points of a segment for curved or unusual shapes that may include splitting angles and finding centre points

- may calculate the measurements of architectural features where no measurements are provided. For example, using geometry in conjunction with trigonometry to calculate distances and angles in relation to established elevations and gridlines to lay out and place window and door systems.

Numerical Estimation

- estimate the size of a rough opening
- estimate safe work loads for equipment such as swing stages by adding the weight of workers, tools and materials
- prepare written estimates for new installations, service calls and shop work. Glaziers estimate quantities and calculate approximate costs for materials, taking into account characteristics such as thickness, size, colour and type of edge finish of glass or mirrors. Estimates also include labour costs based on an estimation of the time needed to complete a job.

Oral Communication

- ask shipping/receiving staff or unit line workers to get help unloading supplies or for information on when products will be ready
- talk with order desk staff to receive printed customer orders
- talk with a partner or helper to relay messages, give directions or coordinate tasks
- communicate with other members of the work team such as the draftsperson or the estimator to determine what needs to be done and what materials are required and to solve routine problems
- may tell a supervisor about amount of work done, hours of work, or material and equipment purchases
- may talk with customers in a friendly, professional and diplomatic manner to determine what they need and to give advice on service and repair options

- participate in site safety meetings
- may explain drawings to production workers
- may reassure a customer when an installation does not go as planned and the customer's living space may be exposed to the elements
- negotiate with foremen, contractors, building managers, clients, suppliers and other tradespeople regarding work schedules and materials and equipment. These exchanges can be complicated by conflicting priorities and a complexity of detail that will need to be considered.
- instruct others, such as an apprentice or a work crew, explaining and demonstrating procedures

Thinking Skills

Problem Solving

- may find that a pivot needed for a frame doesn't fit. They recut the frame.
- may break glass that is being installed. They arrange for the glass to be replaced at extra cost to the company.
- may order incorrect material for a job. They attempt to use that material in another job by making size accommodations. They may need to re-schedule tasks and arrange for delivery of proper material.
- may need to deal with customer complaints such as a job site not being cleaned properly or a product not meeting customer expectations. They must take responsibility for the problem, apologize where needed, and use persuasion and negotiating skills to make the necessary corrections in as cost effective a way as possible.

- may hoist or deliver units, especially heavy or awkward shapes, to the area of installation only to find out that it can't be moved into place or doesn't fit the intended opening. Double checking of measurements of the load compared to the size of the installation opening and delivery path may result in adjustments to the load or opening before hoisting. In some cases, computer software can be used offsite to simulate practical problems and different solutions can be tried effortlessly.
- may encounter problems with other trades when priorities conflict. Unit installation on the third floor of a building will make stone work beneath unsafe. Workers from different trades coordinate work tasks. Glaziers find alternate tasks or negotiate trade offs to prevent escalation of disputes that may involve supervisors.
- may discover that measurements or elements have been omitted from drawings or are incorrectly placed. They constantly translate two dimensional blueprint specifications into three dimensions and relate new construction with existing structures. By visualizing the parts, glaziers can identify and correct errors early in the process

Decision Making

- decide what equipment to use on a job, such as whether to use a ladder or a scaffold, based on the size and elevation of a project
- decide whether to do a job independently or arrange for assistance
- decide on the sequence and timing of many tasks such as whether to construct a frame before or after the doors have arrived
- decide a method to determine the correct side in order to install a sealed unit containing two lights. "Low E" coating is used to deflect the sun and must be placed on the correct side. An error in installation could result in the unit failing. Glaziers have several methods of determining the correct side, for example, using a flame to distinguish the light reflecting a discoloured flame.

- make numerous safety decisions such as whether to proceed with a job on a windy day, or whether to put up barricades or allow public access to a work area or whether equipment is safe to operate
- decide which is the most cost efficient and safe method to move heavy or awkward loads. They consider accessibility, load capacity, labour and time involved.

Critical Thinking information was not collected for this profile.

Job Task Planning and Organizing

Glaziers:

- Glaziers' work schedules are planned in response to customers' needs. Although they organize and decide on the sequence of tasks, glaziers' priorities are generally decided in consultation with supervisors and others working on the contract or project. Planning and ordering of tasks are key skills for efficiency. Glaziers' work must be coordinated with the work of many others including contractors, other building trades, draftspersons, estimators, foremen, suppliers and delivery personnel. Weather is also an important factor and glaziers adjust their schedules in response to wind, precipitation and cold.

Significant Use of Memory

Glaziers:

- remember many common product numbers
- remember the names, phone numbers and locations of frequently used suppliers and customers
- remember details of specifications for a particular job during the time they are on that job

Finding Information

- refer to suppliers' lists to find parts and materials required
- consult glass and framing parts and installation manuals for information on procedures and prices

- may phone a supplier or manufacturer to find out about a product such as a new sealant
- consult with a manager or others working in the industry with regard to hard to locate parts or for advice about alternative materials
- may access a reference library containing texts on layout, hoisting and rigging and other related topics

Working with Others

Glaziers may work independently or with partners or apprentices depending on the type of work they are performing. For example, frame fabricators often work alone while constructing frames, while installers will usually work with a partner or apprentice while installing windows. Glaziers must coordinate their work with many other co-workers, trades and suppliers. They see themselves as members of a team who work together to provide a quality service or product. Some glaziers supervise the work of apprentices and other journeypersons on larger jobs.

Computer Use

- on some job sites, blueprints are accessed online which involves navigating a number of screens to find the right detail drawing. CAM programs may be used in fabrication shops.

Continuous Learning

Glaziers frequently learn about new products and materials such as a new line of metal for framing or a new high performance window. They find out about these products by referring to brochures or manuals from suppliers and by using them on the job. Occasionally, their employer may send them for training by the manufacturer in how to use or install a new product. Glaziers also attend courses and orientations on safety procedures and the operation of equipment such as a swing stage or scissor lift. Union training plans also offer upgrading on topics such as layouts, rigging and welding.

OTHER INFORMATION

Physical Aspects

The glazier's job has significant physical demands including long periods of standing, bending, climbing and lifting. Glaziers need to have good physical coordination, balance, flexibility and strength in order to climb ladders, carry heavy materials and use a variety of hand and power tools. Good eyesight and sense of touch are also required to read measuring tapes and feel for imperfections in metal and glass. Glaziers must be able to tolerate heights and extreme weather conditions

Attitudes

The glaziers interviewed felt that glaziers should be conscientious, patient and able to take pride in their work and finished products. They should be friendly, easy to get along with and customer service oriented.

Future Trends Affecting Essential Skills

As more expensive, high performance products become available, glaziers will need to be even more accurate in their work in the future, particularly in regard to Numeracy, which will continue to be a critical skill for the trade. Document use will increase in importance as glaziers are expected to interpret more technical material. Some members of the trade will be required to learn and use computer applications for estimating, pricing or ordering materials and there will be a growing requirement for glaziers to access blueprints online. There is also a trend towards greater awareness of safety and security issues and the future will likely include increased requirements for safety certification and security authorizations. This will augment the need for Continuous Learning.

GIVING AND RECEIVING FEEDBACK

Document Use, Writing, Oral Communication

TASK STEPS

YOU WILL NEED:

- ✓ flipchart paper or a blank sheet of paper
- ✓ a marker

STEP ONE:

- Work as a group
- Discuss the difference between feedback and criticism

Brainstorming: a method of creating a list of ideas as a group. Each member of the group has a chance to share their ideas. While brainstorming, try not to be critical of the ideas presented by the others in your group.

STEP TWO:

- Appoint a recorder for the group
  - The recorder will:
    - divide a piece of paper in half (flipchart paper or sheet of paper)
    - write "Giving" on one side of the page
    - write "Receiving" on the other side of the page
    - record the group discussions

- Brainstorm the things that you think are important to remember when giving feedback
- Brainstorm the things that you think are important to remember when receiving feedback
- Post the list you have created so you can use it throughout this course

USING THE INTERNET

Reading Text, Document Use, Computer Use

Thinking Skills: Decision Making, Finding Information

There may be times in this course when you want or need to use the internet to search for information about stained glass. This task will introduce you to the basics of using a browser and a search engine to find information. However, before you complete the task, take a few minutes to read the following definitions.

Desktop: The screen you will see when you turn on your computer. You will see icons for the software programs you have on your computer. Double clicking on the icons will open the software program.

Desktop Icon: An image or graphic that provides a link to software, often called a Shortcut.

Web Browser: Software used to access information on the World Wide Web. Most people are familiar with the browser called Windows Internet Explorer; however Mozilla Firefox, Apple Safari, Google Chrome and Opera are examples of other web browsers you can use.

Log on: Connecting to the internet using a web browser.

Address Bar: This is the area at the top of your screen where you enter a URL or website address.

URL: URL stands for Uniform Resource Locator. This is the address that tells your computer where to find the file on the internet. It usually starts with http://www.

Web Search Engine: A tool designed to help you search for information on the World Wide Web. When you enter the information you are searching for (e.g. a word, a term or a phrase) and click search, a list of related websites will display on your screen. From there you can visit any website that looks like it will provide you with the information you need.

Bookmarks: When you are visiting a website that you want to return to at a later date you can bookmark the site. This allows you to store the URL on your computer. When you open the web browser in the future and click on "Bookmarks", you will see all of your bookmarked sites. If you click on the site name you will return to the website without having to complete another search or remember the URL.

Note: If you look at the menu at the top of the Firefox web browser you will see the word "Bookmarks" and in Internet Explorer you will see the word "Favorites".

TASK STEPS

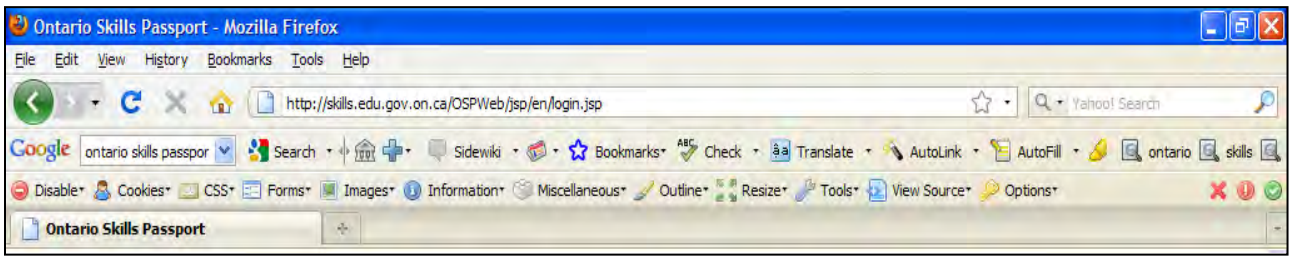
YOU WILL NEED:

- ✓ a computer
- ✓ access to a web browser
- ✓ a search engine

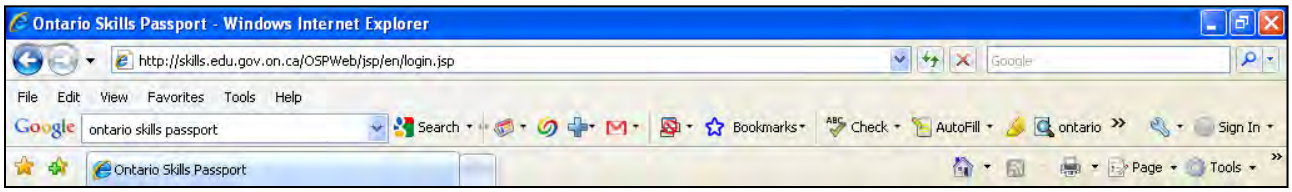
STEP ONE:

- Work independently to complete this task
    - You will need access to the classroom computer
    - You may also want to work on this task at home
- Log onto the internet using a web browser
- Locate the Address Bar at the top of the page of your web browser
- Enter the following URL into the Address Bar: http://skills.edu.gov.on.ca/OSPWeb/jsp/en/login.jsp

Using Mozilla Firefox as your web browser your page will look similar to the image below:



Using Windows Internet Explorer as your browser your page will look similar to the image below:



Note: Once you have logged on, stay logged on until you have completed all of the steps in this task.

STEP TWO:

- Enter the address of any search engine into the Address Bar at the top of your screen
    - Common search engines include:
        - www.google.com
        - www.yahoo.com
        - www.bing.com

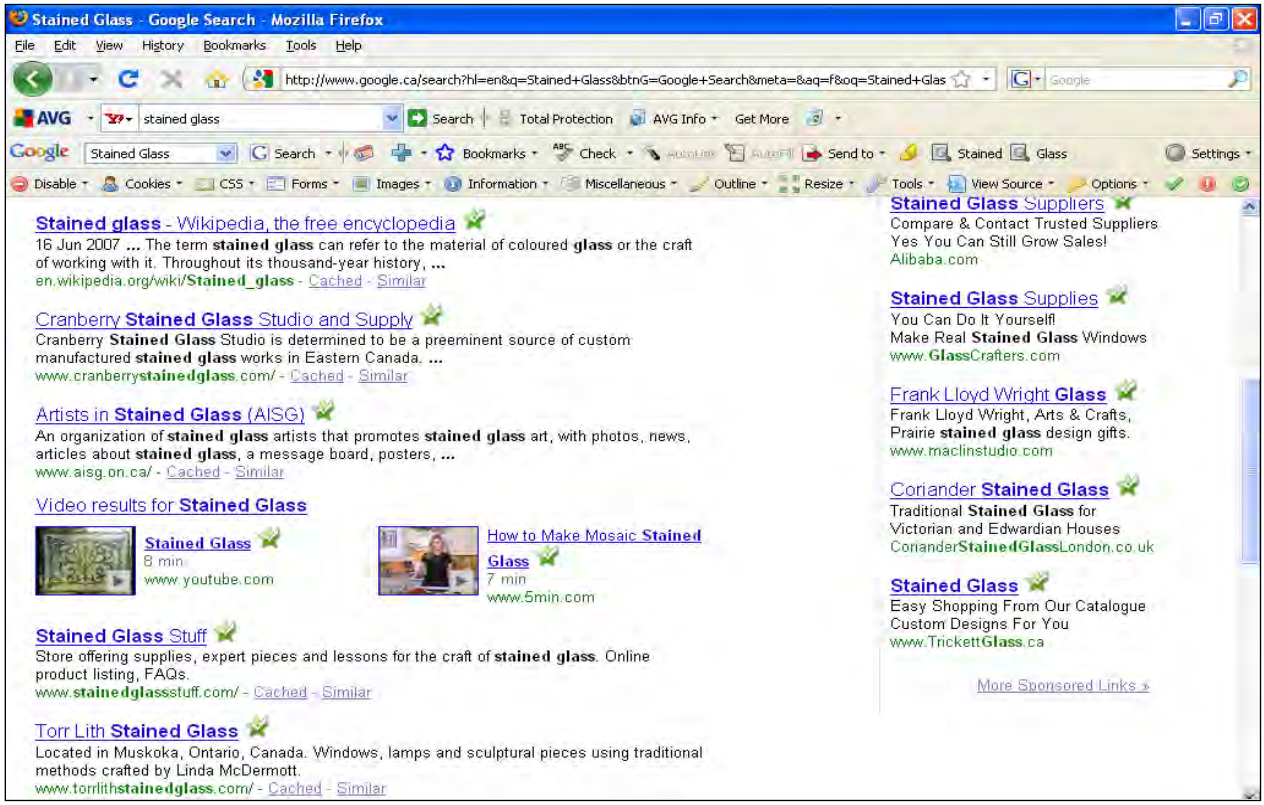
In the image below http://www.google.ca can be seen in the address bar. This has opened the Google Search Engine Page:

STEP THREE:

- Enter/type the words "Stained Glass" into the search area as shown in the image above
- Click "Search"
    - In the example above you would click "Google Search"
    - You can also select "pages from Canada"
- Click on one of the websites listed (blue letters with a blue underline)
    - Visit a few sites before moving on to the next step

Note: Your screen will look similar to the one below.

Example of a page listing websites you can choose to visit:



STEP FOUR:

- Find one site you would like to bookmark
- Look at the menu at the top of your screen and find the:
  - "Bookmark" menu if you are using Firefox
  - "Favorites" menu if you are using Internet Explorer
- Click the word "Bookmark" or "Favorites"
  - This will open a drop down menu
- Click:
  - "Bookmark this page" if you are using Firefox
  - "Add to favorites" if you are using Internet Explorer

STEP FIVE:

- Look at the list of bookmarked sites on your computer
- Select one existing bookmarked site you would like to visit
- Click to open that site

Note: If you have an electronic file (e.g. a Word Document or PDF) that contains a link to a website, you can access the site easily by completing the following steps:

- Open the file
- Find a website address
    - The link will be blue and underlined
- Place your cursor over the link
- Hold the control - CTRL - key on your keyboard
- Use your cursor to click on the blue underlined URL
    - This will take you directly to the site

SCANNING

Reading Text, Document Use, Writing

Thinking Skills: Decision Making, Critical Thinking

The Essential Skill called Reading Text covers many different types of reading. Reading Text includes reading word for word in order to learn, scanning to find information or skimming to get the gist of the information being presented.

In this course you will be asked to read the Student Notes. This requires that you read the text in detail in order to learn about stained glass art. You will also be required to read the Essential Skills tasks presented in the course.

Some of the tasks in this course will ask you to scan for information. Scanning means that your eyes will run over the text looking for specific information rather than reading every word. It involves quickly locating keywords and finding specific information. If you are looking for information to help you complete the task or to help you make a decision, you are most likely scanning.

Note: There have been many studies done to track the eye movement of people looking at websites. It has been found that most people scan rather than read web pages.

The following article is the type of article you might scan if you were interested in learning more about stained glass.

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil/highlighter

STEP ONE:

- Work independently
- Complete the five questions below by scanning the "Stained Glass Tips from Another Stained Glass Making Expert" article on the pages following this task
    - Try to complete this exercise by scanning the text only
    - Record your answers in the space available under each question or use a pen/pencil/highlighter to mark your answers directly in the article

QUESTIONS

1. What tool do you use to create a score?

2. What tool do you use for nipping the edges of the glass?

3. What are the two traditional techniques for joining glass?

4. What do you apply to the copper to make the solder stick?

5. What do you use to change the colour of solder?

http://www.createstainedglass.com/stained-glass-tips.html

Stained Glass Tips from Another Stained Glass Making Expert

A new friend of ours offered up some great stained glass tips. She is another true stained glass expert and loved the site.

We are super excited to share this article with you. Parts of this glass making article you've heard from us, but it's always good to reiterate various points.

Plus, you can learn new stained glass tips that perhaps we haven't mentioned.

Note: All pictures here are hers and we are proud to present them to you to view!

My advice and biggest of the stained glass tips to all of the beginning stained glass artists out there is: start with the basics.

Glass is cut using a stained glass cutter tool, which consists of a tiny wheel, usually made of carbide, with a small well of oil for lubrication.

The glass cutter is rolled along the glass surface, creating a score. The glass then breaks along this score line when pressure is applied to either side. There are several types of cutters, and I recommend trying a few to find the most comfortable one for you.

There are also several other tools that will help in the cutting and shaping process. For an easier way to break the glass along a score, I suggest using running stained glass pliers.

These pliers come to a slight point on the top, so that equal pressure is applied and centered over the score line, creating a clean break.

Another type of pliers known as grozing pliers work by "nipping" the edges of the glass to create the shape necessary for the design.

One of the most useful stained glass tools I have is a glass grinder. Stained glass grinders are simply a plastic box filled with water with has a grid top, and a carbide grinding wheel.

The wheel is very similar to that of a rotary dremel tool. This tool allows you to "sand" off any unwanted parts of your piece in a smooth and safe manner.

Once you've got all of the pieces, it is then time to join them together. There are two traditional techniques used to join pieces of glass together: copper foil & lead came. Usually, beginners start out learning the copper foil method first.

The foil itself is similar to tape: copper on one side, adhesive on the other. Apply the foil along all edges of the glass that will later be joined (all "Tiffany" style lamps are made this way).

The use of lead came is a little bit different. Generally speaking, all church windows and other large projects are built with lead came because of its strength and durability.

Came usually comes in lengths of 6 feet, and has a profile that is in the shape of the capital letter "I" or a sideways capital letter "H".

This shape allows the glass to slide into either side, while having a center that allows strength, and stops the pieces from hitting each other.

Lead came is flexible, will form around almost any shape, and is cut with a lead knife that is similar to a sharpened putty knife.

Once all of the pieces are foiled, or leaded, and arranged where they need to be, brush on a chemical called flux (for foil flux all of the exposed copper, for lead flux only the joints).

Flux creates a chemical reaction between the copper and the solder, allowing the solder to bond with the copper. After applying flux, the pieces are ready to be soldered together.

The types of stained glass solder I recommend are 60/40 (60% tin, 40% lead) or, if you would rather, lead free (keep in mind that lead free solder will not work with lead came, only copper foil).

There are many types of soldering irons available. Big stained glass tips: I recommend the Inland or Weller brand soldering gun with a trigger. This allows the user to turn the heat of the gun on and off with the use of the trigger, unlike traditional irons that continue to heat up as long as they are plugged in.

Discover more great stained glass tips

Once you have made your choice of solder and iron, start soldering! The trick is, for foil, try and create a uniform "pool" of solder. The end result will be a "hump", or the shape of an upside-down "U".

Huge stained glass tips: For lead, neatness counts. When soldering lead joints, try to make the points equal- creating a sort of addition sign. Be careful of burning through the lead.

This happens when the soldering iron gets too hot, so be sure to unplug it every once in a while (Tip: For maximum soldering, your soldering tip should be cleaned frequently. This can be done by using a wire brush, and also by dipping the tip in the flux). When the piece is structurally complete, be sure to clean the flux off with Windex.

In the case of lead, the next step is to "cement" the pieces. This is a process of waterproofing, and strengthening the individual pieces of glass.

For this, take glazing putty and push it under the edges of the lead, and then remove the excess (Tip: Mix the putty with black cement dye to create a gray putty that blends in better with the color of the lead. Also, sharpened chopsticks make a great tool when removing the excess putty).

For special effects, change the color of the solder or lead by using a product called patina. This will change the color to either black (the most common) or copper. Patina is a liquid that must be applied evenly over all lead and soldered areas. Q-tips are a good application tool.

For the final cleanup, there are many different techniques that I have found effective. In my experience, the best cleaner is whiting, which is a powder- like substance that is made up of calcium carbonate.

It is easiest to sprinkle the whiting all over the piece, and use a soft bristled scrub brush to scrub away the grease. An older, but still effective technique uses sawdust and burlap. If those don't appeal to you, there is always my old standby, Windex. Glass shows everything, so be prepared to clean it a few times!

The past few paragraphs provide stained glass tips and a crash course in the extreme basics of stained glass art. There are, of course, countless things to learn and discuss in regards to stained glass.

For now, remember: get the proper stained glass supplies - always wear safety glasses, no open-toed shoes (ouch!), work in a well ventilated, well-lit area, and most of all, HAVE FUN!!

We hope you got something out of these stained glass tips. I know we did as we can learn from each other. Feel free to share your stained glass tips anytime!

Sarah is the owner of Element Custom Glass, a small company that specializes in creating pieces that are both beautiful and unique. I would love to share any stained glass tips that you may be interested in. Please feel free to check out our website at Element Custom Glass or you can contact me directly by phone at (718) 938-7676.

ONTARIO SKILLS PASSPORT

Document Use, Oral Communication, Computer Use

Thinking Skills: Decision Making, Finding Information

TASK STEPS

YOU WILL NEED:

- ✓ pen/pencil
- ✓ computer and internet

STEP ONE:

- Log onto the internet using a web browser
- Locate the Address Bar in your web browser
- Enter the following URL into the Address Bar:
  - http://skills.edu.gov.on.ca/OSPWeb/jsp/en/introduction.jsp
- Spend 10 minutes exploring this site

STEP TWO:

- Remain logged onto the internet
- Enter the following URL into the Address Bar: http://www.jobbank.gc.ca/
- Find a job posting that identifies the Essential Skills necessary for the position

STEP THREE:

- Work as a group
- Discuss what you found in your search
  - How could you use the information in these sites?
  - How will your knowledge of Essential Skills help you with your job search?

CONTEST

Reading Text, Document Use, Writing

Thinking Skills: Finding Information

This contest is designed to run the length of the course. A draw will be made during the final class.

During the course we ask that you watch for examples of stained glass in your community. For example you may see stained glass windows, doors and/or home decor.

Record what you find on a ballot – one ballot for each thing you find.

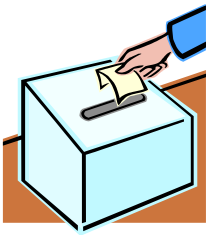
Enter as many times as you want. The more times you enter the better your chances are of winning.

TASK STEPS

YOU WILL NEED:

- ✓ a pen or pencil
- ✓ a ballot

- Ask your instructor for a ballot
- Fill out a ballot
    - Include your name, what you saw and the location
- Drop your completed ballot into the ballot box



MATERIAL SAFETY DATA SHEETS

Reading Text, Document Use, Oral Communication, Writing

Thinking Skills: Finding Information

Material Safety Data Sheets - are documents written for people who use hazardous material. They contain information about the physical or chemical hazard associated with using the material. The MSDS outline the safe handling, storage and disposal as well as steps for dealing with emergencies, fires, spills or overexposure.

Any material covered by the Workplace Hazardous Material Information System (WHMIS) must have a MSDS. This means that if you are working with a hazardous substance, you must have access to the MSDS in your workplace and you should be trained to work with the material safely.

TASK STEPS

YOU WILL NEED:

- ✓ pen/pencil or highlighter
- ✓ a Material Safety Data Sheet (MSDS) for "Metal Effects Black Patina Aging Solution"

STEP ONE:

- Find a partner
- Scan the Material Safety Data Sheet (MSDS) for "Metal Effects Black Patina Aging Solution"
- Work with your partner to find the answers to the questions on the following page
    - Record your answers in the space available under each question or use a pen/pencil/highlighter to mark your answers directly on the MSDS

Note: If your eyes are running over the text looking for specific information you are actually using a reading technique called scanning. Scanning involves glancing over the text quickly to locate keywords and find specific information.

Questions:

1. What First Aid Measures would you take if you got patina on your skin?

2. What methods would you use to clean up spilled patina?

3. What general hygiene practices are recommended with this product?

STEP TWO:

- Work as a group
- Discuss MSDS and your experience using them at work
- Discuss your answers to the questions in this task
- Discuss your experience scanning for information

MATERIAL SAFETY DATA SHEET

SECTION 1 – GENERAL INFORMATION

Manufacturer:
Modern Masters, Inc.
9380 San Fernando Road,
Sun Valley, California 91352
818-683-0201

HMIS Rating

HEALTH	2
FLAMMABILITY	0
REACTIVITY	1

Emergency Telephone: 800-942-3166

Preparation Date: January 18, 2002
Revision Date: May 5, 2009

Product Name: **Metal Effects Black Patina Aging Solution**

Product Code: **PA903**

SECTION 2 – HAZARDOUS INGREDIENTS

Hazardous Component	CAS #	OSHA PEL	ACGIH TLV
Blue Copper	7758-99-8	1 mg/m3 (as copper) (dusts and mists)	0.1 mg/m3 (as copper) (fumes)
Selenium Compound	7783-00-8	0.2 mg/m3	N/A

SECTION 3 – HAZARD IDENTIFICATION

Emergency Overview: This material is a reactive patinating solution. It is a stable, non-flammable, translucent blue flowable liquid with a flash point above 200°F.

Primary Routes of Exposure:
Inhalation Skin contact Eye contact Ingestion

Potential Acute Health Effects:
Inhalation: May cause respiratory tract irritation **Eye:** May cause eye irritation
Skin: Prolonged or repeated skin contact may cause irritation
Ingestion: Not hazardous under intended use conditions

Potential Chronic Health Effects: None known

MATERIAL SAFETY DATA SHEET

SECTION 4 – FIRST AID MEASURES

Eye contact: Flush eyes with clean water for 15 minutes. Seek medical attention.

Skin contact: Thoroughly wash with soap and warm water.

Inhalation: If irritation occurs, remove to fresh air and seek medical attention if cough or other symptoms develop.

Ingestion: If ingested, induce vomiting. Seek medical attention.

Note to Physician: Treat symptomatically. Wilson's Disease, a disease associated with the inability to remove copper from the blood, is a medical condition aggravated by exposure to Blue Copper.

SECTION 5 – FIRE FIGHTING MEASURES

Flash Point (method): N/D (est. >200°F)

Extinguishing Media: Use water spray, foam, or carbon dioxide when fighting fires involving this material.

Protection of Firefighters: As in any fire, wear NIOSH approved self-contained breathing apparatus pressure-demand and full protective gear.

Fire and Explosion Hazards: Material will not burn.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Personal Precautions: Slippery: can cause slips and falls if walked on.

Clean Up Methods: Contain spill with sand or other diking material. Soak up small spills with absorbent material. Dispose of in accordance with federal, state, and local regulations.

(See also Section 8 for information on Exposure Controls and Personal Protective Equipment.)

MATERIAL SAFETY DATA SHEET

SECTION 7 – HANDLING AND STORAGE

Handling: Avoid prolonged or repeated contact with skin. Avoid contact with eyes. Wash hands thoroughly with soap and warm water after use.

Storage: **Do not freeze.** Keep container tightly closed when not in use. Do not reuse containers and properly dispose of empty containers.

KEEP OUT OF REACH OF CHILDREN!

SECTION 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: If necessary, use general room dilution ventilation, process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Personal Protective Equipment (PPE):

Eye Protection: Eye contact should be avoided. Where eye contact is likely, wear chemical splash goggles and/or full-face shield.

Skin Protection: Skin contact should be avoided. Wear rubber or latex gloves when using this product.

Respiratory Protection: None needed under normally anticipated use conditions. If vapor levels exceed allowable limits, wear a NIOSH approved air-purifying respirator with an organic vapor cartridge.

General Hygiene Practices: Avoid eye and skin contact. Avoid breathing vapors. Wash hands with soap and warm water before eating, drinking, or using the toilet.

MATERIAL SAFETY DATA SHEET

SECTION 9 – PHYSICAL DATA

Appearance:	Translucent blue flowable liquid	**Odor:**	Mild odor
Physical State:	Liquid	**pH:**	4 to 10
Boiling Point:	Above 200°F	**Melting Point:**	<32°F
Vapor Pressure:	N/D	**Vapor Density:**	N/D
Odor Threshold:	N/D	**Viscosity:**	<100 cps
Solubility in Water:	Dilutable in water	**Specific Gravity** (water = 1)**:**	1.0-1.2

VOC: This material contains no (zero) Volatile Organic Compounds.

SECTION 10 – STABILITY AND REACTIVITY

Stability: Stable, non-reactive

Incompatibility: strong acids and strong bases; oxidizers

Hazardous Polymerization: Will not occur

Hazardous Decomposition Products: None known

SECTION 11 – TOXICOLOGICAL INFORMATION

Carcinogenicity: This material is not considered a carcinogen by IARC or NTP and is not regulated as a carcinogen by OSHA.

Wilson's Disease, a disease associated with the inability to remove copper from the blood, is a medical condition aggravated by exposure to Blue Copper.

(See also Section 15 for related information.)

MATERIAL SAFETY DATA SHEET

SECTION 12 – ECOLOGICAL INFORMATION

Chemical Effects: Blue Copper is toxic to fish and marine organisms. Do not contaminate water destined for streams, rivers, ponds, or lakes.

Chemical Fate: No data available.

SECTION 13 – DISPOSAL CONSIDERATIONS

Recommended Waste Disposal Method: This material is not considered hazardous waste under Federal Hazardous Waste Regulations (40CFR 261). However, state and local requirements for waste disposal may be more restrictive or otherwise differ from federal regulations. Chemical additions, processing, or otherwise altering this material may render the waste management information presented in this MSDS incomplete, inaccurate, or otherwise inappropriate. Consult all applicable federal, state, and local regulations regarding the proper disposal of this material.

SECTION 14 – TRANSPORTATION INFORMATION

Regulated by the DOT: Not regulated

DOT Proper Shipping Name: Paint

SECTION 15 – REGULATORY INFORMATION

CERCLA:
The Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) requires notification to the National Response Center for releases of quantities of Hazardous Substances equal to or greater than the reportable quantities (RQs) in 40 CFR 302.4 (for CERCLA 102).

Components present in this product at a level which could require reporting under the statute are:

Chemical Name	CAS #	Maximum Concentration (Wt. %)
none	N/A	N/A

MATERIAL SAFETY DATA SHEET

SARA Title III, section 311/312:
The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311, and 312).

Components present in this product at a level which could require reporting under the statute are:

Chemical Name	CAS #	Maximum Concentration (Wt. %)
none	N/A	N/A

SARA Title III, section 313:
The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires submission of annual reports of release of toxic chemicals that appear in 40 CFR 372 (for SARA 313).

Components present in this product at a level which could require reporting under the statute are:

Chemical Name	CAS #	Maximum Concentration (Wt. %)
Blue Copper	7758-99-8	4%
Selenium Compound	7783-00-8	<1%

TSCA:
The components of this mixture are listed in the Toxic Substance Control Act Inventory of Chemical Substances.

This product does not contain any chemicals that would require export notification under Section 12(b) of the TSCA regulation.

MATERIAL SAFETY DATA SHEET

SECTION 16 – OTHER INFORMATION

Legend:
N/A: Not Applicable
N/D: Not Determined
N/E: Not Established
N/R: Not Required
STEL: Short Term Exposure Limit
C: Ceiling Value
cps: Centipoise
mg/m^3: milligrams per cubic meter
PPM: Parts Per Million
PPB: Parts Per Billion
PEL: Permissible Exposure Limit
TLV: Time Weighted Average
mppcf: million particles per cubic foot of air
ACGIH: American Conference of Governmental Industrial Hygienists
CPSC: Consumer Product Safety Commission
DOT: US Department of Transportation
FHSA: Federal Hazardous Substance Act
OSHA: Occupational Safety and Health Administration (US Dept. of Labor)
RCRA: Resource Conservation and Recovery Act
SARA: Superfund Amendment and Reauthorization Act
TSCA: Toxic Substance Control Act

HMIS Key
4 = Severe Hazard
3 = Serious Hazard
2 = Moderate Hazard
1 = Slight Hazard
0 = Minimal Hazard

Prepared by: Modern Masters Regulatory Compliance Manager, Technical Management Dept.
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Disclaimer: Modern Masters, Inc. believes, to the best of its knowledge, information, and belief, the information contained herein to be accurate and reliable as of the date of this material safety data sheet. However, because the conditions of handling, use, and storage of these materials are beyond our control, we assume no responsibility or liability for personal injury or property damage incurred by the use of these materials and make no warranty, expressed or implied, regarding the accuracy or reliability of the data or results obtained from their use. All materials may present unknown hazards and should be used with caution. The information and recommendations in this material safety data sheet are offered for the users' consideration and examination. It is the responsibility of the user to determine the final suitability of this information and data to comply with all applicable international, federal, state, and local laws and regulations.

SAFETY CHECKLIST

Reading Text, Document Use, Oral Communication,

Thinking Skills: Finding Information

When you start a new job you may be asked to read information such as Material Safety Data Sheets, Policies and Procedures, and safety information. Some employers will have you complete a checklist to ensure you have received all the information you need to work safely.

Please complete the following safety checklist. This checklist has been designed for this course. If you are unable to check a box on this page, please refer back to the safety section of your Student Notes or ask your instructor.

Check if you have:

- ☐ found appropriate clothing to wear to class, such as long pants
- ☐ read the example Material Safety Data Sheet
- ☐ read any MSDS for products you will be using in class
- ☐ learned about common injuries related to Stained Glass and how to avoid them

Check if you know:

- ☐ when to report accidents
- ☐ when to report equipment damage
- ☐ how to use stained glass equipment and tools safely
- ☐ how to lift glass sheets properly

Check if you can:

- ☐ locate the First Aid Kit
- ☐ locate the Fire Extinguisher
- ☐ identify the various tools and equipment used in stained glass
- ☐ identify general safety rules for working with glass
- ☐ maintain a clean, safe work area

WEB SEARCH

Reading Text, Document Use, Computer Use

Thinking Skills: Decision Making, Finding Information

If you have access to the internet and would like more information about Material Safety Data Sheets, stained glass safety or workplace safety in general, you can use a search engine to find more information on these topics.

TASK STEPS

YOU WILL NEED:

- ✓ access to a computer with internet

- Log onto the internet using a web browser
- Open a search engine
- Enter any of the following:
  - Material Safety Data Sheets (MSDS)
  - Safety and Stained Glass
  - Workplace Health and Safety
  - Workplace Safety and Insurance Board

WORKPLACE HEALTH AND SAFETY

Reading Text, Document Use, Computer Use

Thinking Skills: Finding Information

The Workplace Safety and Insurance Board (WSIB) have designed a website to provide workplace health and safety information to workers between the ages of 16 and 24. We have included this site in this task because the information is useful regardless of your age.

TASK STEPS

YOU WILL NEED:

- ✓ access to a computer with internet

- Log onto the internet using a web browser
- Locate the Address Bar in your web browser
- Enter the following URL into the Address Bar: www.hs101.ca
- Enter the site and select Launch High Speed or Launch Low Speed
- Complete the Modules - Safety Matters, Safety Roles, Work Hazards and Staying Safe

Note: These modules could take up to an hour to complete. If you run out of time in class, you may want to bookmark this site so that you can return to it at a later date. You may also want to work on this task at home.

PROGRESS EVALUATION

Document Use, Oral Communication, Computer Use

Thinking Skills: Decision Making, Critical Thinking, Finding Information

TASK STEPS

STEP ONE:

- Evaluate the progress you are making on your stained glass project
- Discuss your progress with your instructor
    - Work with your instructor to identify the steps you will need to take to complete your project on time
    - Set goals for the completion of your project
- Continue working on your project keeping your timelines in mind

STEP TWO:

- Work on any of the following if you have time or need a break from your project
    - Read the Student Notes that have been assigned
    - Research future projects
    - Search for and watch online stained glass videos
    - Complete or revisit any of the assigned tasks
    - Use stained glass computer software if available

PRESENT YOUR WORK - DAILY

Reading Text, Document Use, Oral Communication

Thinking Skills: Decision Making, Critical Thinking

As mentioned in your Student Notes, you will have the opportunity to present your work at the end of each day. After you present an evaluation of your own stained glass project you will receive feedback from the others in your class. You will also have a chance to provide feedback to the other group members after they present their work.

TASK STEPS

STEP ONE:

- Present your stained glass piece
- Think about the following questions as you present your work:
    - How do you feel about your work to date?
    - What do you like the most about your stained glass so far?
    - What has been the most important thing you've learned?
    - If you were doing it over again, what would you do the same and what would you do differently?
    - How would it be different if you had made other choices?
    - What are your plans for the next class?
        - Your next steps
- Ask the others in the group for feedback on your work

STEP TWO:

- Listen to the other members of the class as they present their work
- Offer them both positive and constructive feedback

STAINED GLASS VIDEOS

Reading Text, Document Use, Writing, Computer Use , Oral Communication

Thinking Skills: Decision Making, Finding Information

In this task you will be asked to watch stained glass video demonstrations online. You can work on your own or with one or two other members of your class. You may also want to watch these videos on your home computer.

TASK STEPS

YOU WILL NEED:

- ✓ a computer with access to the internet
- ✓ speakers/headset
- ✓ a pen/pencil
- ✓ paper

These videos may show stained glass artists using techniques that differ from the ones you learned in class. Please ask your instructor if you have any questions.

Some videos will actually show people making mistakes. Please discuss these with your instructor.

STEP ONE:

- Log onto the internet using a web browser
- Locate the Address Bar
- Enter the following URL into the Address Bar:
  - www.youtube.com
- Enter the words "Stained Glass" in the search area of the YouTube site
- Scan the list of video options
- Find, select and watch at least three videos

- Take notes of the information or record questions that come up as you watch the videos
    - Talk with your instructor if you have any questions
    - Recommend videos and share information with the others in your class

Sites come and go. If you find an address that is no longer valid please let your instructor know.

Note: Step Two of this task can be use in addition to Step One or as an alternative. Also, it is challenging to enter long URL's. For this step you can ask your instructor if they have these sites bookmarked. You can also ask for an electronic copy of this task so you can click on the URL.

STEP TWO:

- Enter at least three of the following URL's into the Address Bar and watch the videos

Pattern Selection:

http://www.expertvillage.com/video/86084_glass-suncatcher-pick-patter.htm

Cutting Stained Glass:

http://www.youtube.com/watch?v=Y1bRi8ygZWE&feature=related

Using a Grinder:

http://www.youtube.com/watch?v=z1xK_yCPI4M&feature=related

Foiling:

http://www.youtube.com/watch?v=cRz_VAhQv1g

Soldering:

http://www.youtube.com/watch?v=I_NU2ruzyc4

http://www.youtube.com/watch?v=FUb0zNNDx-4&feature=related

http://www.youtube.com/watch?v=7Fsn72icq5E&feature=related

http://www.youtube.com/watch?v=E7NBCNY1Tck

http://www.youtube.com/watch?v=24u1nrXfhco&feature=related

Framing

http://www.monkeysee.com/play/5797-framing-your-stained-glass-piece

STAINED GLASS DEFINITIONS

Reading Text, Document Use, Computer Use, Writing, Oral Communication

Thinking Skills: Decision Making, Finding Information

When you start a new job it's possible that you will come across words or techniques that are unfamiliar. It is important to ask questions and ask for clarification at work. However, it is also important to know how to search for information and find answers to your questions using the internet.

TASK STEPS

YOU WILL NEED:

- ✓ a computer
- ✓ access to the internet
- ✓ a pen/pencil
- ✓ paper or printer

STEP ONE:

- Work independently
- Log onto the internet using a web browser
- Select and open a search engine
- Search "Stained Glass Definitions"
- Visit the websites that display until you find one to use to complete this task

STEP TWO:

- Scan the words and definitions
- Pick a word you don't already know
- Print the page or write out the word and the definition
- Talk with your instructor to arrange a time to present your word and definition to the group

STEP THREE: In Class Presentation:

- Present your word, with the definition to the other members of your class
- Write the word for the group
    - Use a whiteboard or flipchart
    - As an alternative, you can share a printed version of the word and definition
- Read the definition to the group

ESSENTIAL SKILLS IN STAINED GLASS – A QUIZ

Document Use, Oral Communication, Numeracy

Thinking Skills: Problem Solving, Decision Making, Critical Thinking, Finding Information

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

- Find a partner
- Scan the quiz on the next three pages
- Work with your partner to complete the questions
    - Refer to your Student Notes for information that will help you answer the questions
    - You will have 10 minutes to complete the exercise
- Discuss your answers with the rest of the group
    - Your instructor will have the correct answers

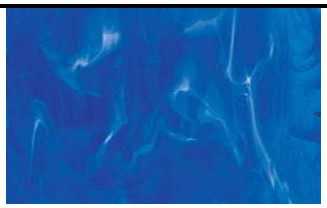
Note:

- When you find a partner and work together to complete this exercise, you are using the Essential Skills called Working with Others and Oral Communication.
- When you scan your notes looking for information that will help you answer these questions, you are using your skills in Reading Text as well as Thinking Skills (Finding Information).
- Finally, when you are discussing your responses with the group you are using your Oral Communication skills.

QUIZ:

Problem Solving

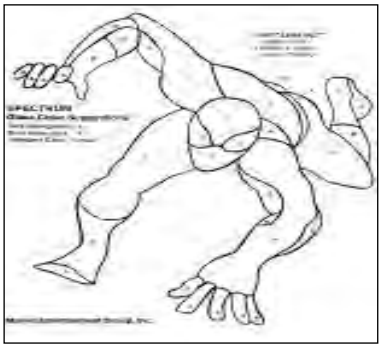
You have cut out two pieces of blue glass. You are using the glass to represent water in the image on your panel. You find that the water "flows" right to left on one piece but the water "flows" up and down on the other piece.

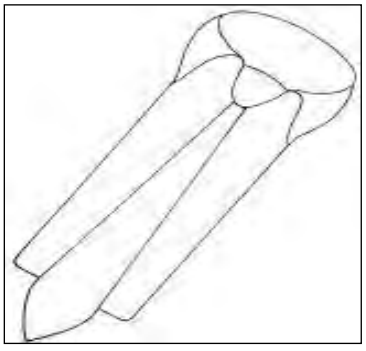
Water flows right/left:	Water flows up/down:
	
How did this happen?	How would you fix the problem?

Decision Making

You have enjoyed learning about stained glass and decide to take on another project. After searching the internet for free patterns, you have found two that you are considering.

- Circle the pattern you think would be ideal for your second project and explain why?





Critical Thinking

Before you begin soldering, what four things do you need to evaluate to determine whether it's okay to proceed?

1.	2.
3.	4.

Numeracy

You have found a piece of glass someone has thrown away. It is the perfect yellow for the pattern you are working on, and it's free.

- The piece you need is - 8.9 centimetres (3 ½ inches) at the base, the two sides need to be 28.9 centimetres (11 inches) in length and the tip must be 2.54 centimetres (1 inch) across
- The piece of glass you want to use is rectangular - 33 centimetres (13 inches) in length and 8.9 centimetres (3 ½ inches) wide
- Can you use this piece? ☐ Yes ☐ No

Job Task Planning and Organizing

You have been asked to build a sun-catcher for your neighbour. They have provided you with a pattern. Please look at the following steps and number them in the order you would complete them. (Number each step from 1 to 10)

	Solder the pieces		Apply patina
	Apply flux		Add a hook
	Select the glass		Grind the pieces of glass
	Foil the pieces of glass		Trim the foil
	Cut the glass		Apply polish

Critical Thinking

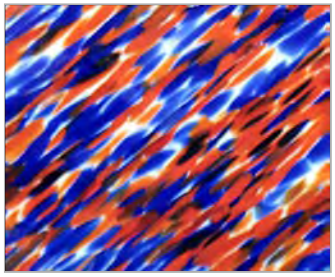
Name two reasons that would indicate the soldering iron is too hot.

•	•

Critical Thinking

Evaluate these two pieces of glass.

- Think of an example where you might use these two pieces of glass together.



COLOUR AND EMOTION

Reading Text, Document Use, Oral Communication

Thinking Skills: Decision Making

In this task you will be asked to match a colour with an emotion or feeling. While there are some standard answers, there is no right or wrong answer. What is important is that you recognize that your colour choices will impact your art.

TASK STEPS

YOU WILL NEED:

- ✓ a pencil/pen
- ✓ an eraser

STEP ONE:

- Work independently
- Scan the page titled "Match the Colours with Emotions"
- Draw a line between each colour and the emotion you think that it best represents
  - Use each colour at least once
  - Some colours can be used more than once

STEP TWO

- Discuss your selections with the group

MATCH THE COLOURS WITH EMOTIONS

Use a pencil to draw a line between the colour that bests represents the emotion/feeling.

Colour	Emotion/Feeling
Red	Calm, peaceful and serene
Yellow	Creative
Green	Happy and cheerful
Blue	Full (not hungry)
Purple	Passion, excitement, love
Orange	Natural feeling
Gray	Hungry
Beige	Gloomy
Black	Anger
	Light and carefree
	Stability
	Fresh start, new beginnings
	Sadness

COLOUR IDENTIFICATION

Document Use, Oral Communication

Thinking Skills: Finding Information

TASK STEPS

YOU WILL NEED:

- ✓ a pencil/pen

STEP ONE:

- Work independently
- Scan the images on the "Colour Identification" chart
- List the three Primary Colours
- List the three Secondary Colours
    - Refer to your Student Notes to find information that will help you with this task

STEP TWO:

- Discuss your results with the entire group

COLOUR IDENTIFICATION CHART

Primary Colours		Secondary Colours	
			
			
			

COLOUR WEBSITES

Reading Text, Document Use, Computer Use, Oral Communication

Thinking Skills: Finding Information

TASK STEPS

YOU WILL NEED:

- ✓ a computer with internet access

- Work individually or in small groups
- Log onto the internet using a web browser
- Locate the Address Bar
- Enter one of the following URL's into the Address Bar:

  http://www.colorschemer.com/index.php

  http://www.colorschemedesigner.com

- Spend some time moving around the site
  - o These sites can help you with your stained glass project
  - o It can also be used to help you decorate or shop for clothes

Note: You don't need to purchase anything to use this site. Ask your instructor for an electronic copy of this task so you can click on the URL. Your instructor may also have this site bookmarked.

RESPONDING TO COLOUR

Reading Text, Document Use, Writing, Oral Communication

Thinking Skills: Critical Thinking, Finding Information

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

STEP ONE:

- Work independently
- Find and review the information about colour in your Student Notes
- Look at the pictures of the paintings on the next two pages:
  - The first "Poppies" by Claude Monet
  - The second "Starry Night Over the Rhone" by Vincent van Gogh
- Answer the questions listed beside the pictures

STEP TWO:

- Work with the group
- Discuss your answers

Claude Monet – "Poppies"

1. When you look at this painting:

   What do you think?

   What do you feel?

2. How do the colours affect you?

Vincent van Gogh – "Starry Night Over the Rhone:"

1. When you look at this painting:

   What do you think?

   What do you feel?

2. How do the colours affect you?

3. How was your reaction different to this painting than the first painting?

SENDING A MESSAGE WITH COLOUR

Reading Text, Document Use, Oral Communication, Writing

Thinking Skills: Decision Making, Critical Thinking

There are some standard answers to this task, however, there are really no right or wrong answers. What is important is that you recognize how your colour choices and your response to colour will impact your art.

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

STEP ONE:

- Work independently
- Scan the chart "**Sending a Message with Colour**"
  - Think about the messages on the left side of the chart
  - What colours would you use to send each of these messages
- Select one or more colour(s) for each of the messages. For example love is often represented with the colour red

Love	***Red***

STEP TWO:

- Work with the group
- Present one of your colour choices
  - Explain why you picked the colour(s) you did
- Listen to the others as they present their choices
- Discuss as a group

SENDING A MESSAGE WITH COLOUR:

The Message you want to Convey	The Best Colour Choices
Growing, changing	
Movement	
Romance	
Cold - temperature (e.g. mitts)	
Adventure (e.g. kayak)	
Stability (e.g. earth)	
Mystery	
Danger	
Celebration	
Regal	
Power	
Relaxed (e.g. canoe)	
Fun	

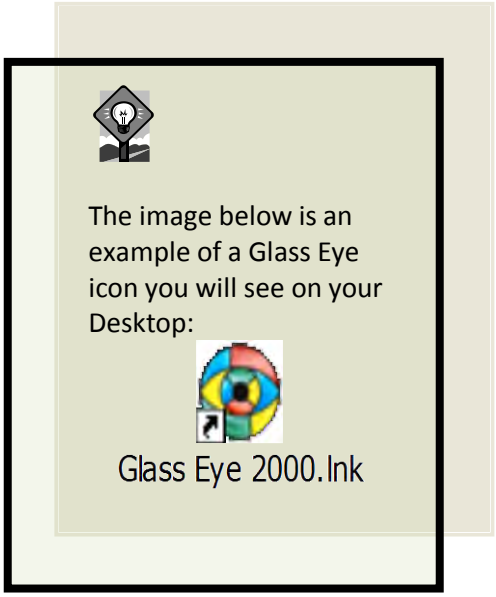
GLASS EYE SOFTWARE

Reading Text, Document Use, Oral Communication, Computer Use

Thinking Skills: Decision Making, Finding Information

In addition to using the internet to help you with your stained glass projects, you can also use stained glass software programs. These are CAD programs (Computer Aided Design), created specifically for use with stained glass. The software can be used by both beginners and professionals.

This task will introduce the software program Glass Eye, produced by the Dragonfly Software Company. http://www.dfly.com/



Glass Eye software can be used to:

- Scan, resize and print existing patterns
- Scan a picture/photo and turn it into a pattern
- Print large patterns – patterns that don't fit on one page
- Design patterns
- Make changes to existing patterns – changing the size and shape of the pieces
- Number the pattern pieces
- Select the colours, flow and texture of the glass
    - On the screen you can change the glass colours, shades and textures quickly and easily. This allows you to see how your finished product will look
- Calculate the amount and cost of the material you will need

TASK STEPS

YOU WILL NEED:

- ✓ a computer with Glass Eye software installed

STEP ONE:

- Observe a demonstration of the Glass Eye software presented by your instructor
- Ask to see any of the functions you are interested in

STEP TWO:

- Work on your own or with a partner
- Locate the Glass Eye software icon on the Desktop (on the classroom computer)
- Locate and watch one of the video demonstrations included in the Glass Eye software
- Scan the list of links to stained glass websites available from within the software
- Decide which link you want to visit and click on the link

STEP THREE:

- Download a free 30 day trial version of the Glass Eye software on your home computer
    - Log onto the internet using a web browser and locate the Address Bar in your browser
    - Enter this URL: www.dfly.com
    - Locate and select the image shown below, follow the instructions

ROUNDING DECIMALS

Reading Text, Document Use, Numeracy

If you are asked to round to two decimal places:

- Find the number in the second decimal place (moving right from the decimal point)

  Example:
  0.1**2**3
  2 is in the second decimal place

- Look at the number in the third decimal place

  Example:
  0.12**3**
  3 is in the third decimal place

- If the number in the third decimal place is less than 5 you don't need to do any rounding, you just need to remove this third number

  Example: 0.12**3** becomes 0.12

- If the number in the third decimal place is equal to or greater than 5 you need to "round up" the number in the second decimal place. This means removing the number in the third decimal place and adding 1 to the number in the second decimal place

  Example: 0.12**5** becomes 0.13

- If there is a fourth decimal place that is equal to or greater than 5 you need to add 1 to the number in the third decimal place. If this makes the number in the third decimal place equal to or greater than five, you need to add 1to the number in the second decimal place

  Example: 0.124**7** becomes 0.12**5** which becomes 0.13

Example of rounding to two decimal places:

Step-by-step rounding of a number to two decimal places		
44.9358**4**	44.935**8**	Start with the last number. 4 is less than 5 so you don't need to round up the number on the left you just need to remove the number 4
44.935**8**	44.93**6**	8 is greater than 5 so 1 is added to the number on the left (5 becomes 6) and the 8 is removed
44.93**6**	44.9**4**	6 is greater than 5 so 1 is added to the number on the left (3 becomes 4) and the 6 is removed
You have now rounded the number to two decimal places **44.94**		

Step-by-step rounding of a number to two decimal places		
56.9348**4**	56.934**8**	4 is less than 5 so no number is added to the number on the left
56.934**8**	56.93**5**	8 is more than 5 so the number rounds up 1 and is added to the number on the left
56.93**5**	56.9**4**	5 is equal to 5 so the number rounds up 1 and is added to the number on the left
You have now rounded the number to two decimal places 56.94		

Step-by-step rounding of a number to two decimal places		
22.9348**4**	22.934**8**	4 is less than 5 so no number is added to the number on the left
22.934**8**	22.93**5**	8 is more than 5 so the number rounds up 1 and is added to the number on the left
22.93**5**	22.9**4**	5 is equal to 5 so the number rounds up 1 and is added to the number on the left
You have now rounded the number to two decimal places 44.94		

Note: Rounding decimal places will affect your answers to the math tasks in this course.

TASK STEPS

YOU WILL NEED:

- ✓ a pen or pencil

- Round the following numbers to two decimal places:

Number	Rounded to two decimal places
4.732	
22.567	
1.878	
0.1478	

IMPERIAL TO METRIC

Reading Text, Document Use, Numeracy, Computer Use

Imperial System

The Imperial System of measurement (e.g. feet, ounces) was developed in the United Kingdom and was used extensively until the 1960's.

Système International d'Unités (International System of Units)

Over 200 years ago the French developed an alternative measurement system called the SI or Système International d'Unités (International System of Units). This system is commonly known as the Metric System.

The SI system of measurement uses an internationally agreed upon set of units and has replaced the Imperial System in most countries. Today the United States is the only industrialized country that continues to use the Imperial System as their main system of measurement. The British converted in the 1960's followed by Canada in the 1970's.

The Imperial System continues to survive around the world, in large part due to the United States' extensive import/export business.

Fahrenheit and Celsius

The United States also uses Fahrenheit to measure temperature. Fahrenheit was developed in the early 1700's by physicist Daniel Fahrenheit. In most countries this system has also been replaced by the Celsius scale.

	Fahrenheit	Celsius
Boiling point of water	212°	100°
Freezing point of water	32°	0°
Absolute zero	–459.67°	–273.15°
The same when the temperature is:	-40°	-40°

Conversions

The SI uses units of 10; therefore many people find it easier to use than the Imperial System. The challenge for most people is converting between the Imperial System and SI.

Mosaic artists may need to convert between inches/feet and millimetres/centimetres.

Products, tools, books and patterns that come from the United States will use the Imperial system of measurement.

If you have access to a computer it is easy to find conversion tools that will do the math for you. For example, if you enter the Imperial System measurement 5 inches, the program does the conversion to SI for you providing the number 12.7 centimetres.

Example conversion site:

http://www.worldwidemetric.com/metcal.htm

Example conversion tables:

http://vulcan.wr.usgs.gov/Miscellaneous/ConversionTables/conversion_table.html

Many workplaces have conversion charts posted and some workers keep small conversion charts in their toolboxes.

If you don't have access to a computer it will be helpful to know how to do some basic conversions on your own. The following task will help you develop the skills to do these conversions with and without technology.

This chart can be used as a guide for this task or you can keep it for future reference.

Symbol:			
mm = millimetre cm = centimetre m = metre km = kilometre			
SI to Imperial: some common conversions			
1 millimetre	.039 inches		
1 centimetre	10 millimetres	.39 inches	
1 metre	100 centimetres	39.37 inches	1.09 yards
1 kilometre	1000 metres	1093 yards	.62 miles
Imperial to SI: some common conversions			
1 inch	25.4 millimetres	2.54 centimetres	.0254 metres
1 foot	12 inches	.30 metres	30.48 cm
1 yard	3 feet	.91 metres	91 cm
1 mile	1760 yards	1.61 kilometres	

TASK STEPS

YOU WILL NEED:

- ✓ a pen or pencil
- ✓ calculator (optional)
- ✓ computer

STEP ONE:

- Select a partner
- Review the "**Example Calculation**" on the following page

- Complete the "**Conversion Problems: (Imperial / SI)**"
- **Round your answers to one decimal place**

Example Calculation:

Problem:

You have a piece of glass 5 feet long.

How many metres is that?

Formula:

Feet x 0.30 = metres

- This formula can be found in the "**Formulas for Converting Between SI and Imperial"** chart - when you know feet and need to find metres

Calculation:

5 feet x 0.30 = 1.5 metres

The piece of glass is 1.5 metres long

Conversion Problems: (Imperial / SI)

1. You want your substrate to be 30.5 x 38 centimetres.
   How many inches is that?

2. How many centimetres is a 4 inch piece of glass?

3. When you are making a cut you need to place your cutter 0.06 inches from the edge of the glass. How many millimetres is that?

4. Calculate the number of centimetres in a piece of glass that measures 6 feet 3 inches.

Formulas for Converting Between SI and Imperial:

When You Know	Multiply by:	To Find
Inches	25.4	Millimetres
Inches	2.54	Centimetres
Feet	30.48	Centimetres
Feet	0.30	Metres
Centimetres	0.39	Inches
Millimetres	0.039	Inches
Centimetres	0.03	Feet
Metres	3.3	Feet

STEP TWO:

- Work as a group
- Log onto the internet using a web browser
- Enter the following URL into the address bar

  http://www.worldwidemetric.com/metcal.htm

STEP THREE

- Using this online conversion tool, complete the same 4 "**Conversion Problems: (Imperial / SI)**"
- Record your answers beside your first set of answers
  - Did you notice any differences in your answers?
  - What would cause those differences?
  - Discuss your results as a group

TASK STEPS

YOU WILL NEED:

- ✓ a pen or pencil
- ✓ calculator (optional)
- ✓ computer

STEP ONE:

- Work with your partner
- Complete the "**Find the Missing Measurement**" chart on the following page
    - Use the measurements in the chart to calculate the missing measurements
- Use the "**Imperial and Metric Reference Chart**" at the end of this task or the formulas in the "**Formulas for Converting Between SI and Imperial**" chart on the previous page
- Record your answers in the largest Imperial number
    - For example, if the answer is 16/16 record the answer as 1

Note: The first line of the chart has been done as an example – when you know 8/16 inch. The calculations are shown in the following two examples "**Find the Missing Measurement – Centimetres**" and "**Find the Missing Measurement - Millimetres**"

Example: Find the Missing Measurement - Centimetres:

Problem:

Convert this fraction **(8/16")** to a decimal

Formula:

Divide the numerator by the denominator

Numerator is the top number 8

Denominator is the bottom number 16

Calculate:

Divide 8 by 16 = 0.5 inch

Problem:

Find centimetres for **0.5** inch

Use the "**Formulas for Converting Between SI and Imperial**" chart

Formula:

inches x 2.54 = centimetres

Calculate:

0.5 inches x 2.54 = 1.27 centimetres

1.27 centimetres is the missing measurement

Example: Find the Missing Measurement - Millimetres:

Problem

Convert this fraction (8/16“) to a decimal

Formula:

Divide the numerator by the denominator

Calculate:

Divide 8 by 16 = 0.5 inch

Problem

Find millimetres for 0.5 inch

Use the “**Formulas for Converting Between SI and Imperial**” chart

Formula:

inches x 25.4 = millimetres

Calculate:

0.5 inches x 25.4 = 12.7 millimetres **12.7 millimetres** is the missing measurement

Note: Round your answers to three decimal places.

Find the Missing Measurement:

Inches (Imperial)	Centimetres (Metric/SI)	Millimetres (Metric/SI)
8/16 inches	***1.27 cm***	***12.7 mm***
	0.635 cm	
	2.540 cm	
2/4 inches		
		19.050 mm
1/16 inches		
1 ½ inch		
		3500 mm

Imperial and SI (Metric) Reference Chart:

Imperial		Metric	
Inches	***Decimal***	***Centimetres***	***Millimetres***
1/16"	0.062	0.157	1.575
2/16 = 1/8"	0.125	0.318	3.175
3/16"	0.187	0.475	4.750
4/16 = 1/4"	0.250	0.635	6.350
5/16"	0.312	0.792	7.925
6/16 = 3/8"	0.375	0.953	9.525
7/16"	0.437	1.110	11.100
8/16 = 1/2"	0.500	1.270	12.700
9/16"	0.562	1.427	14.275
10/16 = 5/8"	0.625	1.588	15.875
11/16"	0.687	1.745	17.450
12/16 = 3/4"	0.750	1.905	19.050
13/16"	0.812	2.062	20.625
14/16 = 7/8"	0.875	2.223	22.225
15/16"	0.937	2.380	23.800
16/16 = 1"	1.000	2.540	25.400

READING A RULER

Reading Text, Document Use, Oral Communication, Numeracy

A ruler is a straight edged tool used to measure distances. It is also used as an aid for drawing straight lines. A tape measure is a flexible form of a ruler. In this stained glass course you will need to use a ruler and/or tape measure. You may need to measure, read and recognize measurements including length, width and depth.

If you are writing down a measurement, record the whole number first. This number represents the number of inches. Leave a space then record the fraction of an inch. For example, 1 ½".

Imperial or English Rulers

Imperial rulers are divided into inches. Each inch on the ruler is subdivided further by a series of long and short lines. The longer the line, the larger the unit of measurement.

For example:

- Each foot is divided into 12 inches
    - Each inch is marked with a whole number e.g. 1 to 12
- The longest line subdividing one inch is the ½ inch mark
- The ¼ inch mark is a shorter line. It divides the inch into 4 quarters
- The inch can also be divided into 1/8's
- In some cases the ruler will have lines dividing the inch into 1/16's

You will have noticed that Imperial measurements divide inches into fractions (¼ and ½). This can make it a difficult system to learn.

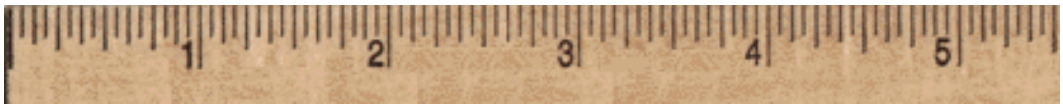
½ inch x 2 = 1 inch

¼ inch x 4 = 1 inch

1/8 inch x 8 = 1 inch

1/16 inch x 16 = 1 inch

The smallest line on this example ruler is 1/16 of an inch. If you look between the 1 and 2 inch markers you should be able to count 16 smaller lines.



When you see measurements written you will notice that the numbers are followed by an apostrophe. This is the symbol for feet. The quote symbol is used to represent inches.

For example:

- **6'** is that same as 6 feet
- **7”** is the same as seven inches
- **6’7”** is six feet, seven inches

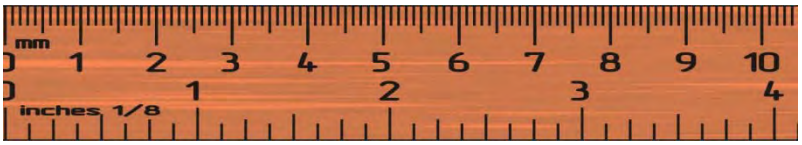
If you are using a tape measure you may notice that at the 24” mark the number has a black background. At the 16” mark the number has a red background. This is done to help construction workers quickly measure the space needed for wall studs or joists. Studs need to be 16” apart if it is a load bearing wall; otherwise they can be 24” apart. This is good to know if you want to hang your finished piece on a wall. Not only will it help you find wall studs it will also help you decide where to place the hooks on your piece.

SI Measurement (SI - International System of Units) – Commonly referred to as Metric

Most people find metric rulers easier to use because they contain only centimetres and millimetres. A centimetre is divided into 10 millimetres. The larger, numbered lines represent centimetres and the smaller lines represent millimetres. If you look between the 1 and 2 centimetre numbers you should be able to count 10 lines or 10 millimetres.

Decimals are also in units of 10; therefore, 7 millimetres can be written as 0.7 centimetres.

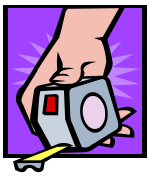
Most rulers and tape measures will display both Metric and Imperial measurements, however it may be best to have two dedicated tape measures, one for Metric and one for Imperial.



Tips for Measuring

- If you need to make precise measurements avoid tape measures with hooks. Hooks on the end of a tape measure will bend which can make your measurement inaccurate
- Whenever possible, start your measurement at 1 rather than 0, especially if you are using a ruler. If the end of the ruler is worn down, your measurements won't be accurate
- If you are working with small detailed measurements make sure you can see the lines on the ruler/tape measure
    - If you can't see the lines clearly, ask someone to help you
- Check the ruler or tape measure against another ruler or tape measure
    - They are not always printed accurately

TASK STEPS



YOU WILL NEED:

- ✓ a pen or pencil
- ✓ tape measure and/or a ruler (you will need to be able to read both Imperial and SI/Metric measurements)

STEP ONE:

- Work as a group
- Brainstorm a list of jobs where you would need to use a ruler or tape measure
    - When do you use a ruler or tape measure at home?
    - When will you use a ruler/tape measure in stained glass art?
    - Do you prefer the Imperial or Metric/SI system?

STEP TWO:

- Select a partner
- Find tape measures or rulers
- Pick three things to measure
- Record your measurements using both Imperial and Metric measurements
    - For example, you could measure the edge of your substrate, the edge of a desk or a window ledge

Item Measured	Imperial (feet or inches)	Metric (centimetres or millimetres)

TASK STEPS

YOU WILL NEED:

- ✓ a pen or pencil
- ✓ tape measure and/or a ruler
- ✓ Imperial and Metric Reference Chart

In most cases when you are measuring you will want to use the largest unit of measurement, for example **16/16 inch = 1 inch**.

STEP ONE:

- Work with your partner
- Complete the "**Largest Imperial Unit**" column in the following chart
  - The "**Imperial and Metric Reference Chart**" on the following page can help you complete this task
  - Use a ruler to find the answer or confirm that your answer is correct

Note: the first one is done for you

Largest Imperial Unit:

Imperial Measurement	Largest Imperial Unit
4/16 inch	**1/4**
8/16 inch	
2/4 inch	
12/16 inch	
14 inches	

Imperial and Metric Reference Chart:

Imperial		Metric	
Inches	***Decimal***	***Centimetres***	***Millimetres***
1/16"	0.062	0.157	1.575
2/16 = 1/8"	0.125	0.318	3.175
3/16"	0.187	0.475	4.750
4/16 = 1/4"	0.250	0.635	6.350
5/16"	0.312	0.792	7.925
6/16 = 3/8"	0.375	0.953	9.525
7/16"	0.437	1.110	11.100
8/16 = 1/2"	0.500	1.270	12.700
9/16"	0.562	1.427	14.275
10/16 = 5/8"	0.625	1.588	15.875
11/16"	0.687	1.745	17.450
12/16 = 3/4"	0.750	1.905	19.050
13/16"	0.812	2.062	20.625
14/16 = 7/8"	0.875	2.223	22.225
15/16"	0.937	2.380	23.800
16/16 = 1"	1.000	2.540	25.400

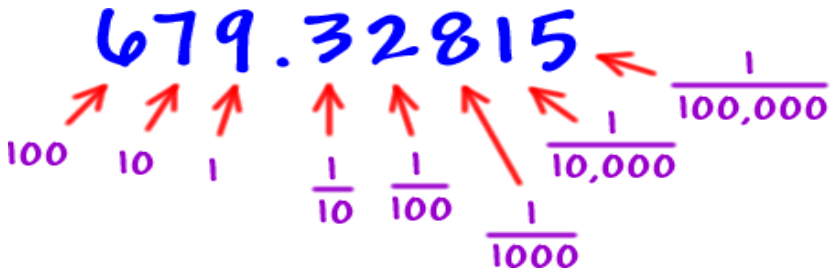
ORDERING DECIMALS

Reading Text, Document Use, Numeracy, Oral Communication

A decimal is a dot in a number that looks like a period.

A decimal point separates whole numbers from numbers that are only a part of a whole number (less than 1). Therefore, decimals allow you to write numbers that fall between two whole numbers. For example the number 3.6 is larger than 3, but smaller than 4.

Numbers to the left of the decimal increase in size as you move to the left. The numbers on the right of the decimal point decrease in size as you move to the right.



http://www.coolmath.com/decimals/01-decimals-place-value.html

In the image above you will notice that decimals show another way of writing a fraction. You will also notice decimals are based on the unit 10. The word "Decimal" is actually Latin for “A Tenth Part”.

Which Decimal Is Larger?

It can be difficult to determine which number is larger when you are comparing decimals. For example which is the largest number in the list below?

4.500, 4.050, 4.60, 4.01

It helps to have an equal number of numbers after each decimal point. For example, it should be easier to tell which number below is the largest now that there are two numbers after each decimal point.

4.50, 4.05, 4.60, 4.01

Note: Adding and removing zeros at the end of a number that follows a decimal does not change the value of the number. For example 4.5 and 4.50 are equal.

Look at the numbers below. Which number is larger?

5.50, 5.05, 5.205

Adding zeros makes it easier to see that

5.500 is larger than **5.205**

5.205 is larger than **5.050**

Table for Ordering Decimals:

Using a table also makes it easier to order numbers from largest to smallest. The following table orders the following list of numbers:

0.419, 0.88, 0.450, 6.4, 2.570

Whole#	Decimal	Tenths	Hundredths	Thousandths
6	.	4	0	0
2	.	5	7	0
0	.	8	8	0
0	.	4	5	0
0	.	4	1	9

Explanation:

The whole number **6** is larger than the whole number **2** so **6.4** is larger than **2.570**

2 is the only other whole number so it comes second

Starting in the tenths column, **8** is larger than **4** so **0.88** is next

There are two number **4's** in the tenths column so the number in the hundredths column must be used. **5** is larger than **1**, therefore **0.450** is larger than **0.419**

Greater Than/Less Than Chart

The following chart identifies whether the number on the left is "Larger Than", "Smaller Than" or "Equal to" the number on the right

Example: Greater Than /Less Than /Equal to:

	Greater than > **Less than <** **Equal to =**	
0.406	Less than <	0.709
13.468	Less than <	13.58
0.987	Equal to =	0.9870
0.678	Greater than >	0.43
0.087	Greater than >	0.07
0.24	Equal to =	0.2400

TASK STEPS

YOU WILL NEED:

- ✓ a pen or pencil

STEP ONE:

- Find a partner
- Work together to complete the table below
- Enter the following list of sizes from the largest to smallest
    - It will help if you cross out the numbers as you place them in the chart

0.71

1.7

0.500

0.76

1.5

0.369

Whole #	Decimal Point	Tenths	Hundredths	Thousandths
	.			
	.			
	.			
	.			
	.			
	.			

STEP THREE:

- Work with your partner
- Complete the following chart
    - Identify whether the number on the left is "Larger Than", "Smaller Than" or "Equal to" the number on the right

	Greater than > Less than < Equal to =	
3.5		3.50
6.5		6.67
0.88		0.445
0.867		0.944
0.766		0.7660
1.339		1.39

STEP FOUR:

- Work as a group
- Discuss your answers for all the steps in this task
- Discuss examples of when you would use decimals in stained glass art?

PRINTING A FILE

Reading Text, Document Use, Oral Communication, Computer Use

Thinking Skills: Finding Information

You may need to print a file as part of this course. You may also need to print information at home or on the job.

If you have used computer software, you have probably already noticed that there is usually more than one way to do the same thing. The people who design software realize that everyone learns differently so they try to provide options for the end users. This task will outline several ways to print a file.

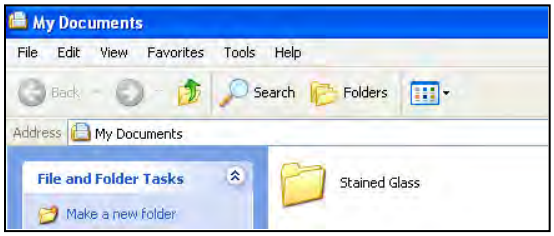
TASK STEPS

YOU WILL NEED:

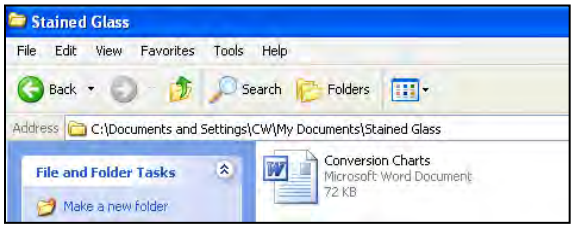
- ✓ a computer
- ✓ printer
- ✓ a word processing program (for example, Microsoft Word, WordPerfect or Open Office)

STEP ONE:

- Work as a group, along with your instructor
- Search the Desktop for an icon called "My Documents"
- Double click the "My Documents" icon
    - This will open a screen that looks like the one in the image below:



- Scan the screen to locate the Folder called "Stained Glass"
- Double click to open it
- Scan the Folder to find the File called "Conversion Charts"



- Double click the File. This File will open and become an active document

STEP TWO:

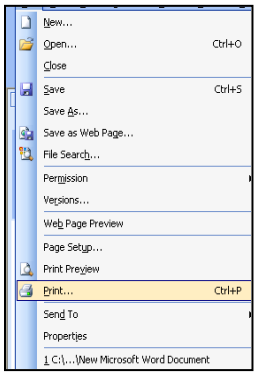
- Find the print icon on the menu at the top of your screen 
- Click on this icon to print the document

STEP THREE:

You can also print this document by opening the "File" menu available in the top left hand corner of your screen

- Click on the word "File" in the menu at the top of your screen
    - This will open a drop down menu of options

- Scroll down until the word Print is highlighted and click
    - You will notice Ctrl+P beside the word Print (CTRL is short for Control). Ctrl + P is another option for printing. Hold the Control key and strike the letter P



With this print menu open you can make changes to the way your document prints. Spend some time as a group reviewing your print options.

- For example, you can:
    - print all (the whole document) or you can print the current page only
    - print a range of pages. For example, if your document is 10 pages long, you may only want to print pages 1 to 3
    - select a printer
    - print multiple copies of the document
- Click OK to print the document or click cancel to close this window

STEP FOUR:

With this document still open:

- Find the word "Help" on the menu bar at the top of your screen
    - The "Help" menu allows you to search for answers to your questions
    - Use the "Help" feature in any Microsoft program

- Click on the word "Help" to open a drop down menu
- Click "Microsoft Office Word Help"
    - This will open another menu, this time on the side of your screen
- Enter the word "Printing" in the area of the menu that begins with "Search for"
- Click the green arrow or hit enter
- Use your mouse to select and open one of the topics listed
    - Topics are identified with a blue question mark and blue lettering
- Read the information that displays
- Click the red X to close this information box
- Click the small black X to close the "Search Results" menu
    - You will be back at your main document

STEP FIVE:

- Close the entire document by clicking the red X in the top right hand corner of your screen
- Point your cursor to the "**Conversion Charts**" document without clicking
- Right click your mouse
    - Another menu will open
    - Using this method you can print the document without opening it
- Click Print to print a copy of the "Conversion Charts" document

STEP SIX:

- Read the summary below
- Ask your instructor if you have any questions

SUMMARY

This task shows the many different ways you can print a file.

In stained glass art there will be more than one way to achieve the same result when creating a stained glass piece. If you watch an online stained glass video, read something about stained glass in a book or read a stained glass "how to" website you will likely find ways of doing things differently than the way you learned in this course.

As mentioned in your Student Notes you are building a foundation by taking this course. The first step in learning any new skill is to learn the basic rules. However, once you have a solid foundation you can start to experiment.

Printable Metric Conversion Chart and Table

Length

1 centimeter (cm)	=	10 millimeters (mm)
1 inch	=	2.54 centimeters (cm)
1 foot	=	0.3048 meters (m)
1 foot	=	12 inches
1 yard	=	3 feet
1 meter (m)	=	100 centimeters (cm)
1 meter (m)	≅	3.280839895 feet
1 furlong	=	660 feet
1 kilometer (km)	=	1000 meters (m)
1 kilometer (km)	≅	0.62137119 miles
1 mile	=	5280 ft
1 mile	=	1.609344 kilometers (km)
1 nautical mile	=	1.852 kilometers meters (km)

Weight

1 milligram (mg)	=	0.001 grams (g)
1 gram (g)	=	0.001 kilograms (kg)
1 gram (g)	≅	0.035273962 ounces
1 ounce	=	28.34952312 grams (g)
1 ounce	=	0.0625 pounds
1 pound (lb)	=	16 ounces
1 pound (lb)	=	0.45359237 kilograms (kg)
1 kilogram (kg)	=	1000 grams
1 kilogram (kg)	≅	35.273962 ounces
1 kilogram (kg)	≅	2.20462262 pounds (lb)
1 stone	=	14 pounds
1 short ton	=	2000 pounds
1 metric ton	=	1000 kilograms (kg)

Area

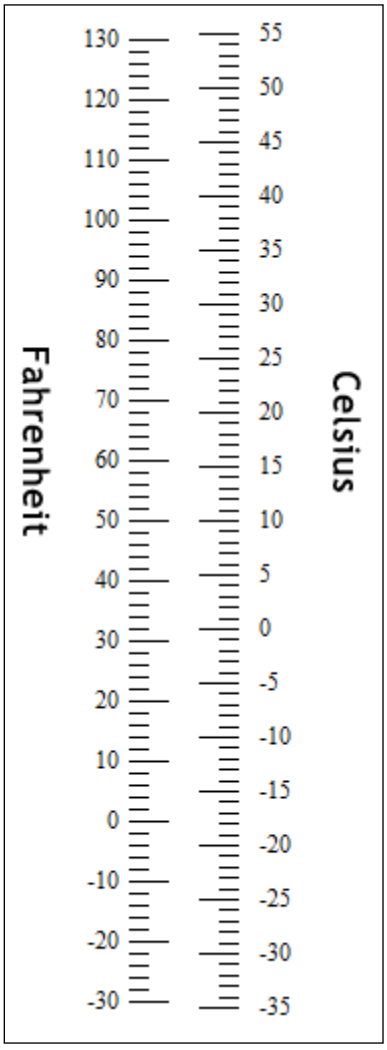
1 square foot	=	144 square inches
1 square foot	=	929.0304 square centimeters
1 square yard	=	9 square feet
1 square meter	≅	10.7639104 square feet
1 acre	=	43,560 square feet
1 hectare	=	10,000 square meters
1 hectare	≅	2.4710538 acres
1 square kilometer	=	100 hectares
1 square mile	≅	2.58998811 square kilometers
1 square mile	=	640 acres

Speed

1 mile per hour (mph)	≅	1.46666667 feet per second (fps)
1 mile per hour (mph)	=	1.609344 kilometers per hour
1 knot	≅	1.150779448 miles per hour
1 foot per second	≅	0.68181818 miles per hour (mph)
1 kilometer per hour	≅	0.62137119 miles per hour (mph)

Volume

1 US tablespoon	=	3 US teaspoons
1 US fluid ounce	≅	29.57353 milliliters (ml)
1 US cup	=	16 US tablespoons
1 US cup	=	8 US fluid ounces
1 US pint	=	2 US cups
1 US pint	=	16 US fluid ounces
1 liter (l)	≅	33.8140227 US fluid ounces
1 liter (l)	=	1000 milliliters (ml)
1 US quart	=	2 US pints
1 US gallon	=	4 US quarts
1 US gallon	=	3.78541178 liters


Fahrenheit
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
Celsius
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35

DISCUSSION – WORKING IN A TEAM

Reading Text, Document Use, Oral Communication

Thinking Skills: Critical Thinking

It is likely that you will be working as a member of a team in the workplace. You may also be asked to work with others on the tasks in this course. Therefore, it is important to think about and learn from your past experiences. Take some time now to talk to the others in your group about your past experience as a member of a team.

TASK STEPS

- Tell the group about a time you participated as a member of a team
    - What was the team?
    - What role did you play?
    - What did you like about teamwork?
    - What was your least favorite thing about the team experience?
- Discuss whether you have been working independently, with a partner/helper or as a member of a team in this class
    - One of the Essential Skills is called "Working with Others" which describes employees working with others to carry out their tasks
- Tell the group about the things that are important to you when you are working with others. For example:
    - "It is important to me that we listen to each other."

GLASS IDENTIFICATION

Document Use, Oral Communication

Thinking Skills: Critical Thinking, Finding Information

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

STEP ONE:

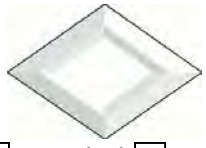
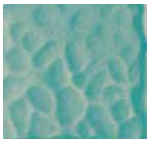
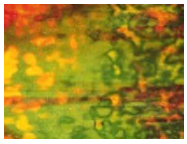
- Find a partner to work with
- Scan the images on the "**Glass Identification Chart**" on the following pages
  - There are 20 images of glass, divided into 10 sets
  - Compare the glass in each set
  - Match the type of glass with the correct glass image
- Work together to identify each type of glass in the chart
  - If you need more information to be able to identify the type of glass in the chart you can scan the definitions at the end of this task
  - You will have 10 minutes to complete the exercise

STEP TWO

- Discuss your answers with the rest of the group

GLASS IDENTIFICATION CHART

 1a. ☐ Antique ☐ Opalescent	 1b. ☐ Antique ☐ Opalescent
 2a. ☐ Cathedral ☐ Baroque	 2b. ☐ Cathedral ☐ Baroque
 3a. ☐ Cathedral ☐ Water Glass	 3b. ☐ Cathedral ☐ Water Glass
 4a. ☐ Rough Rolled ☐ Reamy	 4b. ☐ Rough Rolled ☐ Reamy
 5a. ☐ Glue Chip ☐ Wispy	 5b. ☐ Glue Chip ☐ Wispy

 6a. ☐ Beveled ☐ Nuggets	 6b. ☐ Beveled ☐ Nuggets
 7a. ☐ Rondel ☐ Muffle	 7b. ☐ Rondel ☐ Muffle
 8a. ☐ Opalescent ☐ Mottle	 8b. ☐ Opalescent ☐ Mottle
 9a. ☐ Seedy ☐ Glue Chip	 9b. ☐ Seedy ☐ Glue Chip
 10a. ☐ Cathedral ☐ Baroque	 10b. ☐ Cathedral ☐ Baroque

USING A SQUARE – A QUIZ

Document Use, Numeracy

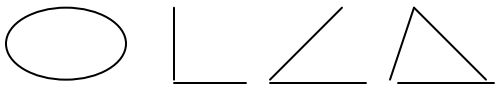
QUIZ

1. In stained glass, Squares are used to:
    a. Nail the corners of your jig
    b. Guide the solder along the outside edge of your panel
    c. Test that the corners of your jig are at right angles
    d. Hold the foil on the edges of your panel
    e. A and C
    f. None of the above

2. You cannot use a Square to help you build a panel if your panel is a rectangle:

    ☐ True or ☐ False

3. Please circle the "right angle":



PROBLEM SOLVING

Reading Text, Document Use, Oral Communication, Writing

Thinking Skills: Problem Solving, Decision Making, Critical Thinking

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

STEP ONE:

- Work independently to complete one of the two "Problem Solving - Scenarios" outlined on the following page
    - Your instructor will assign a scenario to you
- Work on your own to identify three possible solutions
- Record your solutions in the space provided

STEP TWO:

- Find the other people who were assigned the same problem as you
- Share your answers
- Identify three solutions as a group
- Decide who will be the spokesperson for your group

STEP THREE:

- Meet again with the entire group
- Have your spokesperson present the three solutions to your assigned problem
    - The spokesperson for the other group will present the three solutions to their problems
- Discuss both problems and solutions as a group

Problem Solving - Scenarios

Scenario #1

You are working on a group stained glass project. You and another group member are responsible for cutting and grinding all of the pieces for the project. You planned to work together and had a goal of completing the work by the end of the third class. Doing this work on time means other group members will be able to do their part of the project before the end of the course.

Unfortunately, your partner was away sick the last class. When your partner returned he/she told you that they wanted to work on their individual project before working on the group project. This means you are left alone to work on the group project. You want to get it done within the agreed upon timeframe; others are depending on you.

What could you do to solve this problem? List at least three options.

Scenario #2

You are enjoying this stained glass course and you think you have a knack for it; however, you work slower than the others in the class. Speed is not important to you because you are having fun and learning. You don't feel the need to keep up because you don't see it as a competition. It is more important to you that you do a good job and enjoy the work.

However, the class has become stressful. You are feeling pressure to keep up with the others. One person in the class is trying to be helpful by giving you advice. They are critical and make jokes about you always being behind. They are always the first to finish their work so they have started insisting that they help you with yours. Even though they work quickly they are not as particular as you are about the details. Also, you want to do the project on your own. You don't want to be rude, but you want this to stop.

What could you do to solve this problem? List at least three options.

HOME STUDIO

Reading Text, Document Use, Writing, Numeracy, Oral Communication, Computer Use

Thinking Skills: Decision Making, Critical Thinking, Finding Information

Even if you are not going to set up an area in your home to work on stained glass projects, it is important to the others in your group that you complete this exercise. You will need to do some research outside of class time. You will be asked to present your findings to the group in a future class.

TASK STEPS

YOU WILL NEED:

- ✓ sign-up chart
- ✓ a pen/pencil
- ✓ a computer

STEP ONE:

- Review the "**Product Research**" sign-up sheet that your instructor will provide
- Choose the item you would like to research
- Write your name in the space beside the item

STEP TWO:

- Gather information about your item using resources such as:
    - your instructor
    - the internet
    - newsletters available in the studio
    - stained glass stores
- Collect information about the item including the:
    - price and size
    - locations (where the product can be purchased)
    - value – customer reviews
    - features – why is it better/different than other products
- Record your findings on the "**Product Comparison Chart**" found on the following page
- Compare a minimum of two makes/models/brands/companies
    - If you want to compare more than two you can print another copy of the "**Product Comparison Chart**"
- Select the product you think is best and be prepared to present your recommendation to the class

PRODUCT COMPARISON CHART

The Item:

Research	Results – Product A - Name:	Results – Product B – Name:
Price		
Size		
Location (where it can be purchased)		
Value – customer reviews etc.		
Features – what makes it better/different than the other products		
Other Information		

TASK STEPS

YOU WILL NEED:

- ✓ your notes
- ✓ a pen/pencil

STEP ONE:

- Refer to your research notes recorded on the "**Product Comparison Chart**"
- Tell the group about your research including:
  - the item you researched
  - the makes/models/brands/companies you researched
  - the techniques you used for doing your research e.g. internet and newsletter
- Present the one product you would recommend for a home studio, including the:
  - company name
  - price
  - size
  - location (where can it be purchased)
  - value – customer reviews
  - features – what makes it better/different than the other products

STEP TWO:

- Record notes on the "**Results of the Group Presentations Chart**" available at the end of this task when the others in your class are presenting their research

STEP THREE:

- Work together as a group to calculate the cost of setting up a home stained glass studio
  - If information is missing ask your instructor for help

RESULTS OF THE GROUP PRESENTATIONS

Product	Is this necessary?	Make/Model/ Brand/Company	Product Details	Price
Grinder				
Glass Cutter				
Running Pliers				
Breaker/Grozing Pliers				
Foiler Machine				
Soldering Iron and Stand				
Safety Glasses				
Drawing Tools				
Copper Foil – 1 roll				
Solder – .45 kg (1 pound)				
Flux				
Patina				
Polish				
Total Costs				

MAKING YOUR OWN PATTERN – A PROJECT

INTRODUCTION TO PATTERN DESIGN

Document Use, Numeracy, Oral Communication

Thinking Skills: Decision Making, Critical Thinking

If you have not read the section in your Student Notes called Pattern Design, take some time to do that now before working on this task. Use the Table of Contents to help you find this section.

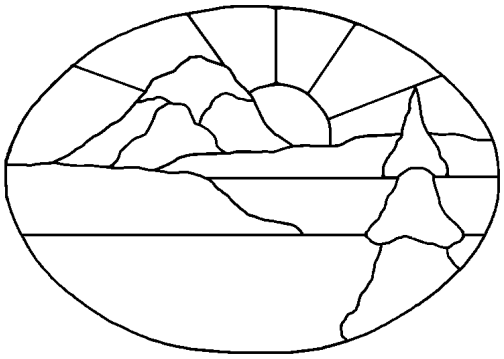
TASK STEPS

YOU WILL NEED:

- ✓ a ruler
- ✓ marker

STEP ONE:

- Work as a group
- Analyze the pattern on the following page
- Discuss how the artist:
  - created a sense of depth from the shapes of the cuts
  - captured the image without creating the need for small cuts
  - used lines to create strength in the panel without taking away from the image



Source: Microsoft Clipart

STEP TWO:

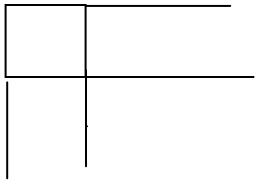
- Assess the picture of the bird (the image is on the page following the pattern)
- Discuss the following questions:
  - How could you create a stained glass pattern using this image as your guide?
  - What would you need to consider?
  - What steps would you take?
  - Where would you begin?

Source: Microsoft Clipart

STEP THREE:

- Use a ruler to draw a border around the image on the next page using one of the two corners below
- Use a marker to draw lines on the bird picture where you think solder lines should be

Square Corner



Angle/Miter Corner

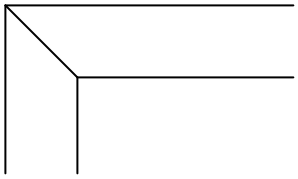


IMAGE SEARCH

Document Use, Computer Use

Thinking Skills: Decision Making, Critical Thinking, Finding Information

You will need to work between classes to complete the steps in this part of the task. You will need to select some potential images to use as a guide for creating your own stained glass pattern. For more information please review the section of your Student Notes called "Pattern Design". Use the Table of Contents to help you find this information.

TASK STEPS

- Think about the subjects you are interested in
- Think about how you could capture these subjects in stained glass
- Search for potential images (e.g. pictures/drawings)
    - At the library, at home or on online
    - Magazines, books, photographs and paintings
- Select 4-6 images to bring to your next stained glass class
    - For example, you may select a picture of a flower from a calendar and a photograph of a flower you took in your garden

IMAGE EVALUATION

Reading Text, Document Use, Oral Communication

Thinking Skills: Decision Making, Critical Thinking

You were asked to find 4-6 images that you could use to create your own stained glass pattern. The next step is to evaluate the images and select one to use as a guide for your pattern.

Deciding on an image involves analyzing each of your options so that you choose the best one for the project.

To help you make your decision we recommend using the "**Image Decision Chart**". This chart will help you analyze each of the images you are considering. Although the final decision will be yours, your instructor can help you complete this chart. Group members will also be available to help you make your final decision.

Note: After this task, you will have images left that you won't be using. If you don't select an image to use for this project, it doesn't mean that it's not a good image. You may want to set up a file at home to keep these pictures for future stained glass projects.

The following steps will help you complete the "**Image Decision Chart**".

TASK STEPS

YOU WILL NEED:

- ✓ the images you found through your research

STEP ONE:

- Lay the 4-6 pictures you have selected on the table in front of you
- Use the "**Image Decision Chart**" on the following page and rate each of your images from 1-4

  1 = hard/complex

  4 = very easy/simple

STEP TWO:

- Total the results at the bottom of each column
  - The highest possible score is 24 and the lowest possible score is 6
- Circle the two highest scores
  - The higher the score, the easier the image will be to use, in relation to your other images

Please talk to the instructor if you have any questions or would like assistance evaluating your images.

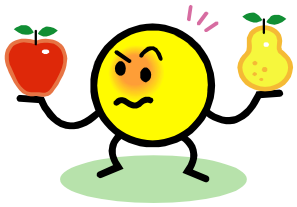


IMAGE DECISION CHART

1 = Hard/Complex and 4 = Very Easy/Simple

Ask:	Image 1	Image 2	Image 3	Image 4	Image 5	Image 6
How easy will it be to turn the image into a pattern? Please ask your instructor for their opinion.						
Will the size of this image be easy to change?						
How complex/detailed is the image? E.g. single flower or a garden						
How complex is the colour/texture/flow?						
How complex are the cuts? E.g. angles, size of pieces						
Do you feel strongly about the image? 1 = no strong feelings to 4 = I love it						
Total:						

IMAGE SELECTION

Document Use, Oral Communication

Thinking Skills: Decision Making, Critical Thinking

TASK STEPS

YOU WILL NEED:

- ✓ the two images with the highest scores on the "**Image Decision Chart**"

- Work as a group
- Present the two images with the highest scores on the "**Image Decision Chart**"
- Discuss the pros and cons of each image
- Decide on the image you will use to make your pattern

PATTERN DESIGN

Document Use, Oral Communication, Numeracy

Thinking Skills: Problem Solving, Decision Making, Critical Thinking

TASK STEPS

YOU WILL NEED:

- ✓ the image you have selected
- ✓ a pencil and drawing tools

STEP ONE:

- Assess the image and make decisions about the:
  - panel size and shape
  - central image and background image
- Make a copy of the image
  - Enlarge or reduce the image so that it is the size you need for the panel
- Trace the image onto paper
- Draw the major lines of the main image, draw the background lines
- Add detail and relief lines

STEP TWO:

- Stand back from your pattern to assess it
- Complete the "**Pattern Assessment Chart**" on the following page
- Ask others for their opinions
- Make adjustments by adding, removing and changing lines
- Draw a border

- Make a copy of your pattern
    - Adjust the size of the pattern if necessary

PATTERN ASSESSMENT CHART

Can I make all of the cuts necessary to complete this project with my current skills?	
Are there any angles that will be impossible to cut?	
Will the structure be strong enough?	
Are the pieces large enough?	
Will the number of pieces be manageable?	
Could I make it less complex?	
How many colours will I need?	
Will I be able to capture the image using colour, texture and flow?	

GROUP PROJECT

INTRODUCTION

Reading Text

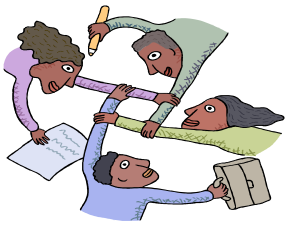
It is important to be able to work with other people in all areas of your life. This group project is designed so that you get to know the others in your group, in addition to developing the Essential Skill called Working with Others.

This group project involves working with the people in your class to complete one stained glass piece together. This lesson will lead you through some decision making steps that need to take place before you begin this project. It will then provide you with steps for monitoring and evaluating the project.

During this project you may find yourself using all nine Essential Skills; however, there are three that will stand out:

1. Thinking Skills (specifically Problem Solving, Decision Making, Critical Thinking and Job Task Planning and Organizing)
2. Oral Communication
3. Working with Others

Before you begin this task, take some time to learn more about these three Essential Skills by reading the information on the following pages.



ESSENTIAL SKILLS IN A GROUP PROJECT

Reading Text

Oral Communication

While working on this group project it will be important that you communicate with the others on your team. You will need to communicate in order to share your ideas and thoughts, present information and ask for help. You will also need to communicate to organize the flow of activities and keep team members up-to-date on your individual progress.

Of course communication is also a key component in some of the Thinking Skills. For example, in this project you will need to participate in group decision making and problem solving.

Note: As you work together on this project you will communicate in person; however, because this project will span a number of classes there may be the need to connect with each other by phone or email.

Working with Others

In this group project you will work independently on the tasks that you have agreed to complete. It will be important that you meet the timelines you agree to because the work of others will hinge on your work. For example; if you are responsible for foiling, but get behind, the person waiting to solder will be under pressure.

To complete this project you may decide to work in pairs or small groups on a specific task. Finally, there may be times when you will need to work cooperatively with the entire team.

Thinking Skills

You have probably already discovered that Thinking Skills are important in stained glass. It is likely that you have already solved problems, made decisions and thought critically about the work you have done on your individual stained glass projects. Thinking skills will also be important in this group project.

For example:

- **Problem Solving**: When you need to come up with a solution, you are problem solving. For example, your foil is crooked or a piece of glass breaks. Working with a group to solve problems often results in solutions that are far better than the ones people find on their own. You may have already asked others for help solving a problem with your individual projects.
- **Critical Thinking**: If you are using words such as evaluate, judge, compare, analyze or assess it is likely that you are using your critical thinking skills. For example, you need to assess your solder beads to be able to determine whether you need to add or remove solder.
- **Job Task Planning and Organizing**: As you know there are steps to follow in stained glass. In a group stained glass project you will be required to do some additional planning. You will need to work with others to coordinate things like roles, materials, timelines and the flow of events.
- **Decision Making**: If you find yourself choosing between several options, you are making a decision. For example, the group will need to decide on a pattern for this project. Group decisions may take a bit more time but it can be a rewarding experience.

To develop your critical thinking skills:

- keep an open mind
- be aware of your role
- be a people watcher
- listen and gather information
- analyze and evaluate ideas before proceeding
- compare and transfer your skills from other areas of your life

Note: The following page will provide you with additional steps to help you with decision making.

DECISION MAKING

Reading Text, Document Use

It is common for people to make decisions without knowing all of their options. The steps below will help you approach your next decision with a system. This decision making system will help you with both your independent and group stained glass projects. It can also be used at work and at home.

Decision Making Steps:

- Identify the decision(s) to be made
- Gather as much information as you can
    - Find information by using a variety of sources including books, people, computers
- Identify the outcome you want
- Identify a list of possible options
    - It may help to write these down or brainstorm with others
- Evaluate, compare, analyze or assess the options
- Pick an option and do it
- Evaluate it. Did it work?
- If not, return to your list of options and select another to try

Brainstorming: a technique where all ideas are listed before you move on to the critical thinking and decision making stages. Usually done in a group but can be done independently.

GROUP DECISION MAKING

Reading Text, Document Use

As a group you will need to decide how you will make decisions. For example, will you make your decisions by consensus?

Although consensus decision making is more time consuming it is the best way to ensure that everyone is comfortable.

> **For example,** there are ten people in a group. Three people want to build a sun-catcher and seven want to build a panel. With consensus decision making everyone would have the opportunity to present their opinions. As a group, you would work out a solution through discussion and compromise until everyone is content with the final decision.

The other option involves making decisions by voting or majority rules? This is quicker; however, it is possible that some people won't be happy. Some people may also feel pressured to vote along with the crowd.

> **For example,** there are ten people in a group. Three people want to build a sun-catcher and seven want to build a panel. With this method the panel group would win. This could mean that three people are left feeling unhappy, even resentful. They may not feel fully committed to the project.

GROUP PROJECT - Task

Document Use, Oral Communication, Writing

Thinking Skills: Decision Making, Critical Thinking

The following outlines the steps in decision making. Use these steps as a group to complete the "**Group Decision Chart**" on the following page.

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

- Read the "**Group Decision Chart**" for a list of decisions your group will need to make
  - Add any decisions missing from the chart
- Use the steps outlined in the "Decision Making Steps" outlined earlier in this Task to help you make these decisions:
  - Gather as much information as you can about the decision
  - Identify the outcome you want
  - Identify options
  - Evaluate, compare, analyze or assess the options
  - Pick an option and start
  - Evaluate the decision

Consensus: "General or widespread agreement among all the members of a group."

GROUP DECISION CHART:

Decisions to be Made	Decisions Made:
Select a decision making style: o Censuses or majority rules	
Select record keeper: o The person who will complete the chart	
Decide what you will do with the finished project? o E.g. draw … , donate to … gift to …	
Decide on: o timelines o a project (a panel or sun-catcher) o a theme and image o a pattern e.g. build your own or use an existing pattern o colours	

WORK PLAN DEVELOPMENT

Reading Text, Document Use, Numeracy, Oral Communication, Writing

Thinking Skills: Decision Making, Critical Thinking

Once you have completed the "**Group Decision Chart**", you can fill in the "**Work Plan Chart**" on the following page. It will identify next steps and allow you to follow up with other group members on their progress as this project moves along.

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

- Work as a group
- Assess the "**Work Plan Chart**" to determine if all of the steps have been listed
- Complete the chart so that each person knows what they are responsible for and what their timelines are

Note:

- Some of these steps can overlap. For example, someone could be cutting the glass while someone else is grinding
- When dividing up the tasks listed on the work plan, two people may decide to work together on a step. For example, cutting and grinding could be done in pairs
- When you are volunteering to do a task on the Work Plan, each person will need to evaluate their own skills and interests.
    - Do you take on a task because you are good at it, or because you need more practice?

Please remember that others will be depending on you to complete your tasks on time so they can begin their tasks.

WORK PLAN CHART

Step	Completion Date	Overlap With:	Individual(s) - Name
Prepare pattern			
Build the jig			
Transfer pieces to glass			
Cut the glass			
Grind the glass			
Foil the glass			
Trim and burnish foil			
Apply flux and tack solder			
Apply flux and solder the front			
Apply flux and solder the back			
Tin and solder the edges			
Solder a hook			
Apply patina			
Polish			

GROUP PROJECT CHECK-IN

Document Use, Oral Communication

Thinking Skills: Problem Solving, Decision Making, Critical Thinking

When you are working on a group project it is helpful to check-in with the other members of the group.

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

- Meet as a group
- Discuss the groups progress to-date
- Use the "**Work Plan Chart**" to check off the steps that have been completed
- Discuss any issues
- Use the following steps for addressing issues:
    - Identify the issue/problem
    - Gather information
    - Consider the ideal outcome
    - List possible solutions (options)
    - Evaluate, compare, analyze or assess the solutions
    - Pick a solution, and implement it

DECISION MAKING AND ESSENTIAL SKILLS

Reading Text, Document Use, Oral Communication

Thinking Skills: Decision Making, Finding Information

When your group made decisions about this project you were all using the Thinking Skill: Decision Making. However, it is likely that you also used other Essential Skills. This exercise will help you identify the other skills you used in the decision making process.

TASK STEPS

YOU WILL NEED:

- ✓ a pen/pencil

STEP ONE:

- Find a partner
- Work together to review the "**Decision Making** and **Essential Skills Chart**" on the following pages
- Think back to the decisions you made as a group
  - Review your notes
  - Look back at the "**Group Decision Chart**"
- Circle the Essential Skills that were demonstrated as your group worked through the decision making steps in order to complete this group project

STEP TWO:

- Discuss your answers with the entire group
- Discuss your experience with this project

Decision Making and Essential Skills Chart

Decision Making Steps	Circle the Essential Skills Used in this Step			
1. Identify the decisions you will need to make as a group.	Reading Document Use Numeracy Writing Oral Communication	Working with Others Continuous Learning Computer Use	Thinking Skills Problem Solving Decision Making Critical Thinking Job task Planning and Organizing	Significant Use of Memory Finding Information
2. Gather as much information as you can about the decision.	Reading Document Use Numeracy Writing Oral Communication	Working with Others Continuous Learning Computer Use	Thinking Skills Problem Solving Decision Making Critical Thinking Job task Planning and Organizing	Significant Use of Memory Finding Information
3. Identify the outcome you want.	Reading Document Use Numeracy Writing Oral Communication	Working with Others Continuous Learning Computer Use	Thinking Skills Problem Solving Decision Making Critical Thinking Job task Planning and Organizing	Significant Use of Memory Finding Information
4. Identify a list of possible options.	Reading Document Use Numeracy Writing Oral Communication	Working with Others Continuous Learning Computer Use	Thinking Skills Problem Solving Decision Making Critical Thinking Job task Planning and Organizing	Significant Use of Memory Finding Information
5. Evaluate, compare, analyze or assess the options.	Reading Document Use Numeracy Writing Oral Communication	Working with Others Continuous Learning Computer Use	Thinking Skills Problem Solving Decision Making Critical Thinking Job task Planning and Organizing	Significant Use of Memory Finding Information
6. Pick an option and start.	Reading Document Use Numeracy Writing Oral Communication	Working with Others Continuous Learning Computer Use	Thinking Skills Problem Solving Decision Making Critical Thinking Job task Planning and Organizing	Significant Use of Memory Finding Information
7. Evaluate the decision. If it did not work return to your list of options.	Reading Document Use Numeracy Writing Oral Communication	Working with Others Continuous Learning Computer Use	Thinking Skills Problem Solving Decision Making Critical Thinking Job task Planning and Organizing	Significant Use of Memory Finding Information

PROBLEM SOLVING IN STAINED GLASS

Document Use, Writing, Oral Communication

Thinking Skills: Problem Solving, Critical Thinking, Finding Information, Significant Use of Memory

TASK STEPS

STEP ONE:

- Work on your own
- Scan the "**Problem Solving Chart**" on the following page
- Read the problems one at a time
    - There are eleven problems listed on the left side of the chart

STEP TWO:

- Work as a group
- Discuss and identify the actual problems
- Identify and discuss the possible causes of these problems
- Discuss possible solution(s) to each of these problems
    - Discuss your experience solving these problems in the course
    - If you need help identifying solutions you can scan your Student Notes for information
- Enter the solutions your group identifies in the space on the left side of the chart

PROBLEM SOLVING CHART

Problem	Solution(s)
1. Your glass pieces are not breaking correctly.	
2. You assess your pieces and notice that the foil is crooked.	
3. After assembling the first part of your jig you use a square to measure the corner. You find that the corner is not at a 90 degree angle.	
4. A piece of glass in your panel cracked as you were soldering.	
5. Your solder is splattering.	
6. You notice the cord of the soldering iron has a burn in it.	
7. You assess your panel and find that your soldered seams are too large.	
8. You assess your panel and notice that your soldered seams have peaks, ridges and lumps.	
9. You find a pattern you love but then you notice the copyright. ©	
10. You love stained glass but you don't have the money to set up at home studio.	
11. You notice someone in the class is not working safely and you are worried for them and for yourself.	

PRICING MATERIALS

Reading Text, Document Use, Numeracy, Oral Communication

Thinking Skills: Critical Thinking, Finding Information

It is important to be able to price your work so that you will know approximately how much it will cost to complete future projects. This will be important whether you are completing a stained glass project for yourself, a friend, or as a gift. At some point you may even consider selling your work. It is important to be able to factor in the cost of materials, in addition to your time and equipment.

TASK STEPS

YOU WILL NEED:

- ✓ a finished stained glass piece
- ✓ a calculator
- ✓ a pen/pencil

- Work independently
- Use a stained glass piece you have completed or are soon to complete as the example for this task
- Calculate the amount of materials you used and enter the information on the "**Materials Pricing Chart"**
    - This will be an estimate
    - You may need help from the instructor to estimate the amounts you used
    - Your instructor can help you with prices
    - You can also search the internet
- Complete the calculations on the chart to determine the total costs for materials

Example Calculation:

Product	Unit	Price per Unit	Amount You Used	Calculations	Total Cost
Copper Foil	1 roll/15 feet	$15	2 feet	Cost: $15 ÷ 15' = $1 per foot If you used 2 feet of foil you would use the calculation: 2 feet x $1 per foot = $2	$2

MATERIALS PRICING CHART

Product	Unit	Price per Unit	Amount You Used	Calculations	Total Cost
Copper Foil					
Solder					
Flux					
Patina					
Polish					
				Total:	

TASK STEPS

YOU WILL NEED:

- ✓ a finished stained glass piece
- ✓ a calculator
- ✓ a pen/pencil

- Use the same finished stained glass piece you used for the first part of this pricing task
- Calculate the amount of glass you used to complete the project
- Calculate the cost for each colour (colours are priced individually)
    - You will need to ask your instructor for prices or search the internet
    - If you used free glass/scrap glass, calculate the cost as if you had purchased the glass
- Complete the calculations on the "**Glass Pricing Chart**" to determine the total costs

Example Calculation:

Glass Colours	Price per Sheet (size)	Amount Used	Calculations	Total
Green Cathedral Glass	$20 for one sheet measuring 2 square feet	.5 square feet	Cost: $20 ÷ 2 square feet = $10 a square foot If you used .5 square feet you would use the calculation: $10 a square foot x .5 square feet = $5	$5

GLASS PRICING CHART

Glass Colour	Price per Sheet (size)	Amount Used	Calculations	Total
			Project Total:	

TASK STEPS

YOU WILL NEED:

- ✓ the totals from the first two charts
- ✓ a calculator
- ✓ a pen/pencil

STEP ONE:

- Complete the "**Pricing the Project**" chart on the following page
    - Use the totals from the "**Materials Pricing Chart**" and the "**Glass Pricing Chart"**

STEP TWO:

- Add the cost of your labour to the chart
    - Calculation:
        - total hours on this project x the hourly rate you would like to charge
    - It is difficult to put an hourly price on art work, but it is worth doing it as a reference point
- Estimate, if you have not been tracking your hours

STEP THREE:

- Once you have the totals from both charts:
    - Calculate the GST and Calculate the PST
    - Add the total tax to the subtotal to get the total cost of the piece

STEP FOUR:

- Present and discuss your totals to the others in your group

PRICING THE PROJECT

Category	Totals
Materials (total from Materials Pricing Chart)	$
Glass – (total from Glass Pricing Chart)	$
Labour – (total hours x $ per hour)	
Sub Total	$
GST 5% (sub total x 5 ÷ 100)	
PST 8% (sub total x 8 ÷ 100)	
Grand Total (Sub total + GST total + PST total)	$

TECHNICAL SKILLS IN STAINED GLASS

Reading Text, Document Use, Oral Communication, Numeracy, Writing

Thinking Skills: Critical Thinking

Employers and supervisors will often ask their employees to rate their own skills and skill improvement as part of their yearly evaluations. The ratings are done to show improvement and help identify areas that still need to be improved. This task gives you an opportunity to rate your own skills development in this course.

TASK STEPS

YOU WILL NEED:

- ✓ pen/pencil

STEP ONE:

- Read the list of technical skills on the left side of the "**Technical Skills**" chart available on the following page
    - Add any skills that are missing in the blank space provided
- Rate each skill based on an estimate of your skill level at the start of this stained glass course
- Rate your current skill level now that you have almost completed this stained glass course
- Compare the two scores for each of the skills listed
    - Did your skills improve?

STEP TWO:

- Work as a group
- Brainstorm jobs that may require these same skills
    - E.g. Soldering - Electronics Assembly
- Record the job titles the group identifies
    - Use the final column on the chart to keep your own notes

TECHNICAL SKILLS

Rating your Technical Skills			
1 = Low and 5 = High			
Skill	**Starting Skill**	**Current Skill**	**Jobs Using the Same Skill**
Tools e.g. pliers, cutters	1 2 3 4 5	1 2 3 4 5	
Solder and Soldering Iron	1 2 3 4 5	1 2 3 4 5	
Grinders	1 2 3 4 5	1 2 3 4 5	
Building Jigs	1 2 3 4 5	1 2 3 4 5	
Pattern Reading	1 2 3 4 5	1 2 3 4 5	
Use of Colour	1 2 3 4 5	1 2 3 4 5	
Motor Coordination / Manual Dexterity	1 2 3 4 5	1 2 3 4 5	
Measuring - e.g. tape measure, ruler and square	1 2 3 4 5	1 2 3 4 5	
Using Chemicals Safely - E.g. Flux and Patina	1 2 3 4 5	1 2 3 4 5	
	1 2 3 4 5	1 2 3 4 5	

ESSENTIAL SKILLS IDENTIFICATION

Document Use, Oral Communication, Writing

Thinking Skills: Decision Making, Critical Thinking, Significant Use of Memory

STEP ONE:

- Work with your group to complete the "**Essential Skills Identification"** Charts on the following pages
    - You will be assigned to either Group 1 or Group 2
    - Your group will be assigned one of the two pages that follow this task

STEP TWO:

- List 1-4 examples of the Essential Skills you have demonstrated in this course for each of the Essential Skills categories on the page your group has been assigned
    - Record your groups responses on your copy
    - Complete this exercise without looking back in your notes
- Find a volunteer to present the group findings

STEP THREE:

- Work as a whole group
- Have the presenter, report your group responses
    - When the other group is presenting, record their results on your sheet

STEP FOUR:

If you have completed the Essential Skills Checklist at the end of each class:

- Work independently
- Read over your checklist as a review of the skills you have developed

ESSENTIAL SKILLS IDENTIFICATION - GROUP 1

Reading Text
Reading materials in the form of sentences or paragraphs

Document Use
Tasks that involve a variety of information displays in which words, numbers, symbols and other visual characteristics (e.g. lines, colours or shapes) are given meaning by their spatial arrangements (including charts)

Numeracy
Using numbers and thinking in quantitative terms to complete tasks

Writing
Writing text and writing in documents, such as filling in forms, and non-paper-based writing such as typing on a computer

Oral Communication
Using speech to give and exchange thoughts and information

Working with Others
Employees working with others to carry out their tasks

ESSENTIAL SKILLS IDENTIFICATION - GROUP 2

Thinking Skills

Problem Solving

addressing problems that require solutions

Decision Making

deciding between options

Critical Thinking

assessing, evaluating ideas or information to reach a rational judgment of value

Job Task Planning and Organizing

planning and organizing tasks

Significant Use of Memory

memorization of procedures, codes, numbers, remembering information, learning from an experience

Finding Information

using text, people, databases or systems to find information

Continuous Learning

Workers participating in an ongoing process of acquiring skills and knowledge

Computer Use

Using different kinds of computer applications and other related technical tools

TOP THREE ESSENTIAL SKILLS

Document Use, Oral Communication

Thinking Skills: Decision Making, Critical Thinking

TASK STEPS

YOU WILL NEED:

- ✓ pen/pencil

The top three Essential Skills identified in the Tilesetter Profile are Document Use, Problem Solving and Job Task Planning and Organizing.

STEP ONE:

- Work independently
- Review the nine Essential Skills in the list below
- Circle the top three Essential Skills you think someone would need to be successful as a stained glass artist

Nine Essential Skills:

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

Thinking Skills:

Problem Solving, Decision Making, Critical Thinking, Job Task Planning and Organizing, Significant Use of Memory, Finding Information

STEP TWO:

- Work with the group
- Present and discuss your choices for the top three Essential Skills in Stained Glass art

CAREER RESEARCH ASSIGNMENT

Reading Text, Document Use, Writing, Oral Communication, Computer Use

Thinking Skills: Decision Making, Critical Thinking, Finding Information

In this task you will:

- research a website to learn more about apprenticeships and trades
- research a website to learn more about a career you are interested in
- create a plan for further research

This assignment is to be done independently; however the Essential Skills instructor is always available to help. You can work on this task at home or in class.

TASK STEPS

YOU WILL NEED:

- ✓ pen/pencil or
- ✓ computer/printer and paper

STEP ONE:

- Talk with your instructor to arrange a time to present to the class
- Work independently
- Visit the sites listed at the end of this task or search for other apprenticeship, trade or career related sites
- Bookmark the sites you want to use to complete this task or write down the URL's

- Have a pen and paper available to record your notes
    - There is space provided in this task for notes
    - You can also use a computer and printer to type and print the notes for your presentation
- Record at least one thing you found interesting when you researched:
    - Apprenticeships and trades
    - A career you are interested in

STEP TWO: In Class Presentation:

- Present the websites you searched
- Present information you found interesting about each of the topics you researched:
- Present your plan for further research

Notes:

- Apprenticeships and trades

- Your career research

WEBSITES

Essential Skills Web Site
http://srv108.services.gc.ca/english/general/home_e.shtml

Service Canada Career Exploration
http://www.jobsetc.gc.ca/categories.jsp?category_id=12&lang=e

Service Canada Apprenticeship Page of Links – select one of the links
http://142.236.54.114/eng/on/lmi/eaid/occinfo/apprent.shtml

National Occupational Classifications NOC
http://www5.hrsdc.gc.ca/NOC/English/NOC/2006/OccupationIndex.aspx

Ministry of Training, Colleges and Universities (MTCU) - Pathway to Apprenticeship
http://www.edu.gov.on.ca/eng/training/apprenticeship/appren.html

Apprenticeship Search Ontario
http://www.apprenticesearch.com/default.asp -

Trends in Apprenticeship in Canada
http://www.statcan.gc.ca/pub/81-004-x/2006002/9250-eng.htm -

Ministry of Training, Colleges and Universities (MTCU) - What is an Apprenticeship?
http://www.hrsdc.gc.ca/eng/workplaceskills/trades_apprenticeship/index.shtml

Canadian Apprenticeship Forum
http://www.caf-fca.org/en/

BUILDING YOUR RÉSUMÉ

Document Use, Oral Communication, Writing

Thinking Skills: Decision Making, Critical Thinking

TASK STEPS

YOU WILL NEED:

- ✓ pen/pencil/highlighter

STEP ONE:

- Scan the Occupational Profile for Glazier on the following pages
- Highlight or circle any word or skill you could now add to your résumé
    - This may include a portion of a skill listed

STEP TWO: Complete only if you used the Essential Skills Checklist

- Review the individual Essential Skills checklist you completed at the end of each class
- Circle or highlight any skill you could now add to your résumé

Note: We are not assuming that you will want to be a Glazier or that this course will prepare you to work as one.

If you are interested in a career that involves glass work, go to the Essential Skills site and search profiles using the word "glass". This won't list all related jobs but it is a good place to start.

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

STEP THREE:

- Use the information you selected in Step One and Two to write a line that you could include on your résumé
    - If you have time, continue writing points you could include on your résumé

STEP FOUR:

- Work as a group
- Present what you have written to the others in your class
- Discuss any other skills you may consider adding to your résumé

The following information has been gathered from the Essential Skills Profile for Tilesetters. Found at the Human Resources and Skills Development Canada website: *http://srv108.services.gc.ca/english/profiles/215.shtml*. This site has the full, detailed profile of Tilesetters as well as many more occupational profiles.

GLAZIERS

The most important Essential Skills for Glaziers are:

- Document Use
- Numeracy
- Problem Solving

INTRODUCTION

Glaziers cut, fit, install and replace glass and frames for glass in residential, commercial and industrial buildings, on exterior walls of buildings and other structures, furniture and other products. They are employed by construction glass installation contractors, retail service and repair shops and glass fabrication shops.

Reading Text

- read job and purchase orders that include a brief description of labour and parts required, shipping information and costs.
- read notes, memos and letters from suppliers that include information on rates, charges and materials.
- read labels on products to confirm the appropriateness of the product to the situation and for correct application instructions.
- read bulletins and brochures from suppliers describing new products, parts and prices.

- read safety procedures that are site and task specific. For example, they read procedures for high risk installations such as a 300 pound light (single pane of glass) lifted to an upper floor.
- read occupational health and safety manuals. For example, they check for compliance to regulations for use of swingstages, scaffolding or outriggers.
- read MSDS (Material Safety Data Sheet) for general information such as short and long term effects of working with a hazardous material and specific information such as personal protective equipment
- read numerous technical manuals that give instructions for installing different kinds of windows and hardware or building frames using a variety of materials. Instructions are usually integrated with assembly drawings.
- may read a trade journal to learn about new products such as using window film on wired glass.
- may read engineers' reports to determine the best method of making a repair. For example, they read to understand the history and problems related to leaks in a curtain wall (an exterior, non-bearing wall), in order to make recommendations for repair.

Document Use

- read price lists and tables in parts manuals and catalogues.
- read labels/stickers on windows giving directions for installation.
- use levels, tape measures, protractors and mitring gauges.
- refer to lists and tables containing information on various types and sizes of materials such as gaskets or glazing tapes.
- read installation or delivery schedules on a construction site to coordinate and sequence tasks.

- read and complete various forms such as: daily time sheets, shipping documents, purchase orders, invoices, job sheets, city permits.
- refer to a table to determine the correct counterweights for setting up a swing stage or to verify load capacity.
- check shipping documents to determine that the correct items and quantity are delivered to the site. Details that are checked may include size, colour, angles, coating and type. A list of back order items may be required.
- refer to safety regulations, especially during technical training, regarding lock out procedure, personal protective equipment, swingstages and other topics. Information must be integrated from several sources and different document types including tables, diagrams and drawings.
- refer to a wide array of complex assembly drawings integrating text, drawings and actual components.
- refer to detail drawings to understand how elements are to be constructed by reading angles, interpreting symbols, cross referencing to other documents and information written on the drawings. This information may include constraints on order of completion and requirements such as type of sealant.
- use blueprints starting with the most general views leading through shop drawings, route sheets, specifications and finally to detailed drawings. Navigating through the layers and integrating, glaziers identify placement and details of installation by interpreting symbols, abbreviations, and referencing to other documents.

Writing

- write notes to themselves regarding work orders and customer requests that include details about measurements or scheduling information.
- write internal notes to request supplies and materials.

- complete a variety of forms such as shipping orders, time sheets, job sheets, purchase orders and invoices.
- may write a one page quote or estimate for a customer that includes costs of labour to remove existing materials and install the new product, as well as costs of all materials.
- may write a monthly summary of activities for a supervisor.
- may write memos or letters to customers or suppliers and manufacturers relaying or requesting information on prices, equipment, parts or procedures.
- may write an incident report for the company or the Worker's Compensation Board describing an accident that occurred on the job.

Numeracy

Money Math

- accept payments from customers in the form of cash, cheque or credit card and make change if necessary.
- prepare customer invoices, calculating labour at an hourly rate, materials by the linear metre or square foot and taxes.

Scheduling, Budgeting & Accounting Math

- may meet quotas for installation set in the estimation of a job. For example, one unit replaced per day or 12 units installed per day.
- determines the amount of materials needed, for example, number of tubes of sealant based on standard coverage, for various phases of a job.
- compare differing costs for materials and job procedures. For example, they calculate the most cost efficient frame fabrication by comparing products available, and calculating the least wasteful cuttings and labour costs.

Measurement and Calculation Math

- calculate the total weight of materials when shipping work to customers.
- set the required angles for cutting on the mitre saw gauge.
- use tape measure, either SI (system international) or Imperial, to make measurements to construct and fit frames.
- set up center lines and then measure to ensure that units are properly placed and centered in openings.
- calculate radius, circumference and angles in order to construct architectural features such as curved curtain walls. Glaziers use a transit to lay out points of a segment for curved or unusual shapes that may include splitting angles and finding centre points
- may calculate the measurements of architectural features where no measurements are provided. For example, using geometry in conjunction with trigonometry to calculate distances and angles in relation to established elevations and gridlines to lay out and place window and door systems.

Numerical Estimation

- estimate the size of a rough opening.
- estimate safe work loads for equipment such as swing stages by adding the weight of workers, tools and materials.
- prepare written estimates for new installations, service calls and shop work. Glaziers estimate quantities and calculate approximate costs for materials, taking into account characteristics such as thickness, size, colour and type of edge finish of glass or mirrors. Estimates also include labour costs based on an estimation of the time needed to complete a job.

Oral Communication

- ask shipping/receiving staff or unit line workers to get help unloading supplies or for information on when products will be ready
- talk with order desk staff to receive printed customer orders.
- talk with a partner or helper to relay messages, give directions or coordinate tasks.
- communicate with other members of the work team such as the draftsperson or the estimator to determine what needs to be done and what materials are required and to solve routine problems.
- may tell a supervisor about amount of work done, hours of work, or material and equipment purchases.
- may talk with customers in a friendly, professional and diplomatic manner to determine what they need and to give advice on service and repair options.
- participate in site safety meetings.
- may explain drawings to production workers.
- may reassure a customer when an installation does not go as planned and the customer's living space may be exposed to the elements.
- negotiate with foremen, contractors, building managers, clients, suppliers and other tradespeople regarding work schedules and materials and equipment. These exchanges can be complicated by conflicting priorities and a complexity of detail that will need to be considered.
- instruct others, such as an apprentice or a work crew, explaining and demonstrating procedures.

Thinking Skills

Problem Solving

- may find that a pivot needed for a frame doesn't fit. They recut the frame.
- may break glass that is being installed. They arrange for the glass to be replaced at extra cost to the company.
- may order incorrect material for a job. They attempt to use that material in another job by making size accommodations. They may need to re-schedule tasks and arrange for delivery of proper material.
- may need to deal with customer complaints such as a job site not being cleaned properly or a product not meeting customer expectations. They must take responsibility for the problem, apologize where needed, and use persuasion and negotiating skills to make the necessary corrections in as cost effective a way as possible.
- may hoist or deliver units, especially heavy or awkward shapes, to the area of installation only to find out that it can't be moved into place or doesn't fit the intended opening. Double checking of measurements of the load compared to the size of the installation opening and delivery path may result in adjustments to the load or opening before hoisting. In some cases, computer software can be used offsite to simulate practical problems and different solutions can be tried effortlessly.
- may encounter problems with other trades when priorities conflict. Unit installation on the third floor of a building will make stone work beneath unsafe. Workers from different trades coordinate work tasks. Glaziers find alternate tasks or negotiate trade offs to prevent escalation of disputes that may involve supervisors.
- may discover that measurements or elements have been omitted from drawings or are incorrectly placed. They constantly translate two dimensional blueprint specifications

into three dimensions and relate new construction with existing structures. By visualizing the parts, glaziers can identify and correct errors early in the process

Decision Making

- decide what equipment to use on a job, such as whether to use a ladder or a scaffold, based on the size and elevation of a project.
- decide whether to do a job independently or arrange for assistance.
- decide on the sequence and timing of many tasks such as whether to construct a frame before or after the doors have arrived.
- decide a method to determine the correct side in order to install a sealed unit containing two lights. "Low E" coating is used to deflect the sun and must be placed on the correct side. An error in installation could result in the unit failing. Glaziers have several methods of determining the correct side, for example, using a flame to distinguish the light reflecting a discoloured flame.
- make numerous safety decisions such as whether to proceed with a job on a windy day, or whether to put up barricades or allow public access to a work area or whether equipment is safe to operate
- decide which is the most cost efficient and safe method to move heavy or awkward loads. They consider accessibility, load capacity, labour and time involved.

Critical Thinking information was not collected for this profile.

Job Task Planning and Organizing

Glaziers: Glaziers' work schedules are planned in response to customers' needs. Although they organize and decide on the sequence of tasks, glaziers' priorities are generally decided in consultation with supervisors and others working on the contract or project. Planning and ordering of tasks are key skills for efficiency. Glaziers' work must be coordinated with the work

of many others including contractors, other building trades, draftspersons, estimators, foremen, suppliers and delivery personnel. Weather is also an important factor and glaziers adjust their schedules in response to wind, precipitation and cold.

Significant Use of Memory

Glaziers:

- remember many common product numbers.
- remember the names, phone numbers and locations of frequently used suppliers and customers.
- remember details of specifications for a particular job during the time they are on that job.

Finding Information

- refer to suppliers' lists to find parts and materials required.
- consult glass and framing parts and installation manuals for information on procedures and prices.
- May phone a supplier or manufacturer to find out about a product such as a new sealant.
- consult with a manager or others working in the industry with regard to hard to locate parts or for advice about alternative materials.
- may access a reference library containing texts on layout, hoisting and rigging and other related topics.

Working with Others

Glaziers may work independently or with partners or apprentices depending on the type of work they are performing. For example, frame fabricators often work alone while constructing frames, while installers will usually work with a partner or apprentice while installing windows. Glaziers

must coordinate their work with many other co-workers, trades and suppliers. They see themselves as members of a team who work together to provide a quality service or product. Some glaziers supervise the work of apprentices and other journeypersons on larger jobs.

Computer Use

- on some job sites, blueprints are accessed online which involves navigating a number of screens to find the right detail drawing. CAM programs may be used in fabrication shops

Continuous Learning

Glaziers frequently learn about new products and materials such as a new line of metal for framing or a new high performance window. They find out about these products by referring to brochures or manuals from suppliers and by using them on the job. Occasionally, their employer may send them for training by the manufacturer in how to use or install a new product. Glaziers also attend courses and orientations on safety procedures and the operation of equipment such as a swing stage or scissor lift. Union training plans also offer upgrading on topics such as layouts, rigging and welding.

OTHER INFORMATION

Physical Aspects

The glazier's job has significant physical demands including long periods of standing, bending, climbing and lifting. Glaziers need to have good physical coordination, balance, flexibility and strength in order to climb ladders, carry heavy materials and use a variety of hand and power tools. Good eyesight and sense of touch are also required to read measuring tapes and feel for imperfections in metal and glass. Glaziers must be able to tolerate heights and extreme weather conditions

Attitudes

The glaziers interviewed felt that glaziers should be conscientious, patient and able to take pride in their work and finished products. They should be friendly, easy to get along with and customer service oriented.

Future Trends Affecting Essential Skills

As more expensive, high performance products become available, glaziers will need to be even more accurate in their work in the future, particularly in regard to Numeracy, which will continue to be a critical skill for the trade. Document use will increase in importance as glaziers are expected to interpret more technical material. Some members of the trade will be required to learn and use computer applications for estimating, pricing or ordering materials and there will be a growing requirement for glaziers to access blueprints online. There is also a trend towards greater awareness of safety and security issues and the future will likely include increased requirements for safety certification and security authorizations. This will augment the need for Continuous Learning.

GROUP WRAP-UP

Document Use, Oral Communication

Thinking Skills: Decision Making, Critical Thinking

TASK STEPS

YOU WILL NEED:

- ✓ your finished stained glass piece

STEP ONE:

- Present your finished piece to the group and tell the group about your experience completing this project:
  - Were you confident in your skills?
  - What do you like most about your stained glass piece?
  - Are you happy with the results?
  - What would you do differently next time?
  - What problems did you solve?
  - Where will you hang it?
- Present the most important Essential Skill you learned/developed?
- Present the challenge you are most proud of overcoming?
- Discuss your overall experience in this stained glass course

STEP TWO:

- Presents your plans to the group:
  - Ongoing courses in stained glass
  - Ongoing courses in other areas
  - Job search
  - Setting up an area at home to work on stained glass