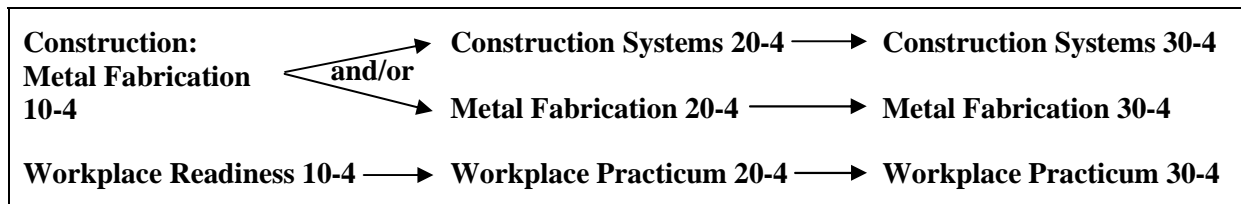

KNOWLEDGE AND EMPLOYABILITY CONSTRUCTION: METAL FABRICATION

COURSE SEQUENCE



Knowledge and Employability 10-level courses provide opportunities for *exploration* of, and *orientation* toward, an occupational grouping in a single career field. In 20-level courses, students progress from *orientation* toward *preparation*; and in 30-level courses, students are involved in *preparation* for direct job entry.

Construction courses are designed to teach occupational knowledge and skills for entry-level positions in metal fabrication, construction systems, woodworking and cabinetry, and wood frame construction by developing employability competencies that relate to all career paths.

- All courses focus on developing career awareness, safety standards and knowledge of tools, equipment and materials related to the industry.
- Construction: Metal Fabrication 10-4 provides a basis for, and an introduction to, Construction Systems 20-4 and Metal Fabrication 20-4.

- Construction Systems 20-4 and 30-4 consist of specific knowledge related to the heating, ventilation and air conditioning (HVAC), electrical, masonry and plumbing trades. These courses can either be taught as a whole or one or a combination of trades may be elaborated upon to complete a course, based on facilities, interest and the expertise of the instructor.
- Metal Fabrication 20-4 and 30-4 focus on joining and finishing metals.
- A related Workplace Practicum or Work Experience course is recommended to further enhance employability and occupational skills and to adequately prepare students for entry into the work force. In senior high school, a 30-level Workplace Practicum course, 30-level Work Experience course or 30-level Green Certificate course is required to fulfill the requirements of a Certificate of High School Achievement. Workplace practicums are supportive work placements in a related field that will allow students to validate their learning in the workplace.

COURSE DELIVERY

This Knowledge and Employability occupational strand includes two sequences of 5-credit courses. Students progress through the courses in a sequence and may combine courses across sequences to increase the depth of their knowledge.

The 10-level course is a prerequisite for both of the 20-level courses within the strand. The 20-level course in each sequence is a prerequisite for the 30-level course in that sequence.

The occupational courses may be offered in a variety of learning environments that range from a classroom in a school to a business/industry work site. The courses offer a balance between school-based and work-based learning that provides options for students to enter the workplace or to pursue post-secondary education or training.

GOALS

Students in Knowledge and Employability occupational courses will:

- identify standards determined by the workplace for the academic and occupational competencies considered necessary for success
- demonstrate practical applications through on- and off-campus experiences/community partnerships
- experience career development to assist them in exploring careers, assessing their career skills and developing a career-focused portfolio
- develop interpersonal skills to ensure respect, support and cooperation with others
- develop safety awareness and habits to ensure a safe working environment.

COMPETENCIES FRAMEWORK

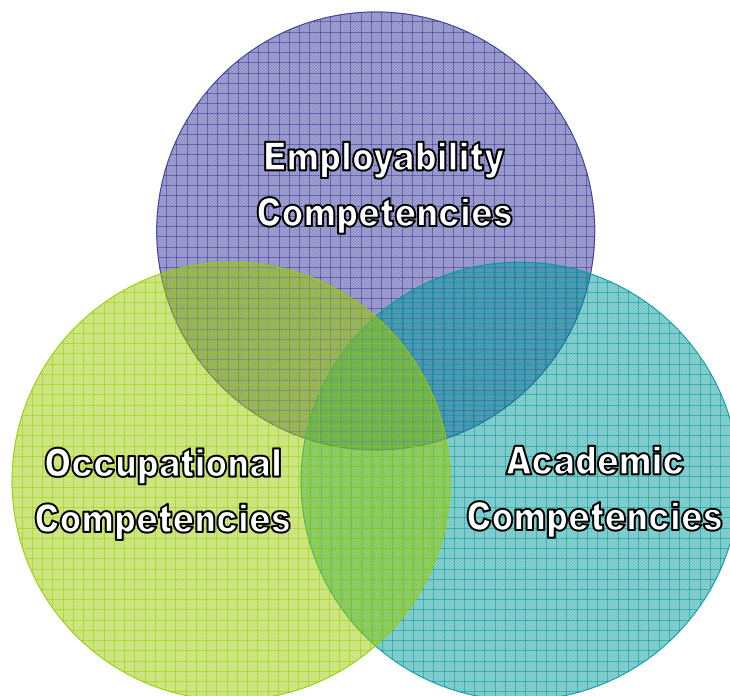
Each Knowledge and Employability occupational course is made up of three elements: employability, occupational and academic competencies. The combination of these three elements is essential to the delivery of the occupational courses.

- Employability competencies are transferable to all occupations and are consistent throughout all courses.

- Occupational competencies are specific to an occupational area and provide the context through which students will develop their employability competencies.
- Academic competencies are to be reinforced and further developed through the occupational context that provides relevance to the academic courses.

The integration of the three elements is essential to equip students to make the transition from school to the workplace.

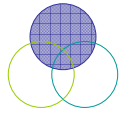
KNOWLEDGE AND EMPLOYABILITY OCCUPATIONAL COURSES COMPETENCIES FRAMEWORK



CONSTRUCTION: METAL FABRICATION 10-4 GENERAL OUTCOMES

Employability Competencies	Students will develop these competencies throughout the learning process and demonstrate them in daily life and the workplace.
Managing Transitions	<ul style="list-style-type: none"> • Students will develop an awareness of how learning contributes to personal success. • Students will develop an ability to manage change effectively. • Students will explore and discover personal aptitudes and interests related to occupational opportunities.
Personal Management	<ul style="list-style-type: none"> • Students will develop self-esteem, confidence and the ability to set personal goals and priorities. • Students will identify and understand the risks associated with occupational activities.
Working with Others	<ul style="list-style-type: none"> • Students will develop communication skills and strategies in an occupational context. • Students will demonstrate respect for the thoughts and opinions of others in the group. • Students will demonstrate positive effort and behaviour toward achieving a group's goals.
Occupational Competencies	Students will develop and demonstrate the following competencies to succeed in a specific occupation or career.
Achieving Results	<ul style="list-style-type: none"> • Students will explore a variety of occupations within a metal fabrication career environment. • Students will develop safe workplace practices and procedures. • Students will be introduced to technology to develop a high-quality product or service. • Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in metal fabrication. • Students will identify the proper procedures for welding, using a variety of devices. • Students will identify and apply proper assembly and finishing techniques to projects.
Ensuring Quality	<ul style="list-style-type: none"> • Students will develop an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.
Academic Competencies	Students will continue to develop these minimum academic competencies that provide a foundation for further learning.
Communication	<ul style="list-style-type: none"> • Students will enhance their ability to listen, speak, read and write effectively.
Thinking	<ul style="list-style-type: none"> • Students will develop problem-solving strategies.
Numeracy	<ul style="list-style-type: none"> • Students will understand the value of numeracy skills in the workplace.
Information Technology	<ul style="list-style-type: none"> • Students will familiarize themselves with the information technology used in daily workplace operation.

CONSTRUCTION: METAL FABRICATION 10-4



EMPLOYABILITY COMPETENCIES: These competencies are developed throughout the learning process and are demonstrated in daily life and the workplace. Students will develop and demonstrate these competencies through individual effort and interpersonal interaction while completing a variety of projects/activities.

MANAGING TRANSITIONS

General Outcomes	Specific Outcomes
<p>Students will develop an awareness of how learning contributes to personal success.</p>	<p>Lifelong Learning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify learning preferences and strengths and apply learning styles and strategies appropriate to the situation • set learning goals and identify how formal/informal learning can help them achieve goals • develop an awareness of senior high school courses and work experience and identify educational possibilities; e.g., Registered Apprenticeship Program (RAP), Green Certificate, Career and Technology Studies (CTS) and Career Internship.
<p>Students will develop an ability to manage change effectively.</p>	<p>Adapting to Change</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify available support resources and assess potential barriers • prepare an action plan to proactively respond to a particular change or challenge.
<p>Students will explore and discover personal aptitudes and interests related to occupational opportunities.</p>	<p>Career Development</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • create an inventory of personal competencies, interests, goals and work preferences and link this inventory to career options • identify sources of support for investigating and finding work; e.g., Alberta Learning Information Service (ALIS) Web site • describe how work contributes to individual goals • explore the workplace through community partnerships and identify employer and employee expectations, rights and responsibilities.

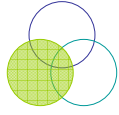
PERSONAL MANAGEMENT

General Outcomes	Specific Outcomes
Students will develop self-esteem, confidence and the ability to set personal goals and priorities.	Self-development <i>Students will:</i> <ul style="list-style-type: none">• identify personal characteristics, strengths and talents and establish an action plan to build on them• recognize the use of strengths and talents to achieve goals• identify acceptable and appropriate behaviours and present themselves to suit an activity or role; e.g., body language, grooming, clothing, manners• describe personal beliefs about what is right and wrong and assess the consequences of ethical/unethical behaviours.
Students will identify and understand the risks associated with occupational activities.	Risk Management <i>Students will:</i> <ul style="list-style-type: none">• identify current health and safety procedures; e.g., at home, at school, in the community and in the workplace• identify risks that could impact themselves and others and identify hazards in the work environment; e.g., chemical, physical, biological and ergonomic• identify a potential emergency situation and develop strategies for personal emergency responses• identify sources of support when taking risks in their personal lives and in the workplace; e.g., entrepreneurship.

WORKING WITH OTHERS

Students will develop communication skills and strategies in an occupational context.	Interpersonal Communication <i>Students will:</i> <ul style="list-style-type: none">• demonstrate appropriate communication strategies for communicating thoughts and feelings; e.g.,<ul style="list-style-type: none">– listen without interrupting– contribute to be heard– disagree courteously– accept conflicting opinions– use appropriate language and body language• develop awareness of verbal and nonverbal communication strategies• improve their ability to communicate by working with others• communicate common goals and expectations to improve their team's ability to achieve goals• identify causes of conflict.
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General Outcomes	Specific Outcomes
<p>Students will demonstrate respect for the thoughts and opinions of others in the group.</p>	<p>Building Community</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify commonly accepted courteous behaviour • assess and respect how their personal values and beliefs differ from those of others and how those beliefs impact personal behaviour • identify the value of volunteering in community activities; e.g., charity work, community car wash.
<p>Students will demonstrate positive effort and behaviour toward achieving a group's goals.</p>	<p>Teamwork</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify team goals • work independently and with others to support team goals; e.g., <ul style="list-style-type: none"> – generate ideas – assess resources – contribute abilities and interests – monitor progress – share responsibility for completion of a task • establish short- and long-term team goals.



OCCUPATIONAL COMPETENCIES: Students will develop and demonstrate the following competencies to succeed in a specific occupation or career. They will achieve results through a variety of projects/activities as appropriate to enhance their knowledge and skills. Students will ensure the quality of their work through effective task management and will highlight their achievements in a career-based portfolio.

ACHIEVING RESULTS

General Outcomes	Specific Outcomes
<p>Students will explore a variety of occupations within a metal fabrication career environment.</p>	<p>Career Awareness</p> <p>Exploration</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify local opportunities within a career field • define and recognize entrepreneurship as a potential career path • investigate local opportunities within a career field • research employment information; e.g., duties, working conditions, personal characteristics, education, salary. <p>Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify workplace protocols, procedures and standards of conduct; e.g., <ul style="list-style-type: none"> – clean the entire work area, return tools to designated areas, minimize the waste of materials – identify related health and sanitation standards – display punctuality and come prepared for classroom and shop activities – treat the shop area with care and pay attention to potential workplace health and safety risks – treat other members of the team with respect – use appropriate language and terminology – wear appropriate dress.
<p>Students will develop safe workplace practices and procedures.</p>	<p>Workplace Health and Safety</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and demonstrate preventive measures to avoid accidents and injury to themselves and others during construction procedures; e.g., <ul style="list-style-type: none"> – identify safety device locations in the shop or classroom; e.g., eyewash station, emergency shut-off, fire extinguisher, emergency exits, telephone – demonstrate the correct procedures for addressing injuries

General Outcomes	Specific Outcomes
<p>Students will be introduced to technology to develop a high-quality product or service.</p>	<ul style="list-style-type: none"> – identify the proper use of tools with regard to other classmates and shop conditions – identify personal protective equipment (PPE); e.g., coveralls, proper eyewear, proper footwear – demonstrate proper body position while at a work station – maintain a safe and clean work area – identify and practise the safe use of electrical equipment – identify the consequences of alcohol and drug use on the worker and the workplace • demonstrate an understanding of the Workplace Hazardous Materials Information System (WHMIS) as it relates to the field of study and identify WHMIS symbols, classes and labelling requirements • recognize the health and safety hazards associated with oxyacetylene welding, SMAW and GMAW procedures; e.g., <ul style="list-style-type: none"> – identify potential electrical safety hazards in the shop and at home – identify common types of ladders and scaffolds and discuss their safe use in building construction – identify safe, common rigging and hoisting methods used in the construction industry – identify common knots and hitches used in rope work and their safe application – identify interactive or online programs; e.g., Construction Safety Training System (CSTS) • identify important standards (codes) to create a safe product. <p>Products and Service</p> <p>Technology Integration</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • explore new and emerging products and technological advances in metal fabrication. <p>Providing Service</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify client relationships or interactions within the field of metal fabrication • identify services required or provided • collect necessary information to complete a purchase or to fill out a work order • identify the importance of customer or client service to all businesses/industries • identify professional practices and work habits • strive to meet and exceed the client’s expectations.

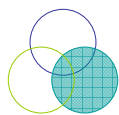
General Outcomes	Specific Outcomes
<p>Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in metal fabrication.</p>	<p>Tools, Equipment and Materials</p> <p>Tools and Equipment</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and demonstrate the correct use of common metal fabrication tools; e.g., <ul style="list-style-type: none"> – layout, measuring, shaping and boring tools – hand tools; e.g., chisel, hacksaw, bolt cutter, tin snips – power tools used for fastening, cutting and smoothing; e.g., grinder, hand shear, air shear, abrasive cut-off saw, metal band saw – clamps and vices – stationary machines and equipment; e.g., squaring shear, roll forming machine, bending brakes, ironworker • identify a variety of cutting processes • identify and practise correct storage procedures • demonstrate proper cleaning and care of tools and equipment. <p>Materials</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and describe common ferrous and nonferrous metals; e.g., <ul style="list-style-type: none"> – identify and compare metals commonly used in metal fabrication occupations – identify metal by the sizes and shapes commonly used in the industry • identify and compare commonly used welding rods; e.g., <ul style="list-style-type: none"> – explain the uses, advantages and disadvantages of each – demonstrate the proper selection of, and the techniques for using, a variety of welding rods • identify and describe types of commonly used fastening devices.
<p>Students will identify the proper procedures for welding, using a variety of devices.</p>	<p>Welding Procedures</p> <p>Oxyacetylene</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify the basic components of an oxyacetylene welding station • demonstrate safe start-up and shutdown procedures for an oxyacetylene welding station • demonstrate basic oxyacetylene welding competencies in a flat position.

General Outcomes	Specific Outcomes
<p>Students will identify and apply proper assembly and finishing techniques to projects.</p>	<p>SMAW</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify the basic components of a SMAW station • demonstrate safe start-up and shutdown procedures for a SMAW station • demonstrate basic SMAW competencies in a flat position • identify the characteristics of a good weld bead and demonstrate consistent and even stringer and weave beads • demonstrate a series of stringer beads to create a layer of weld metal.
	<p>GMAW</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify the basic components of a GMAW station • demonstrate safe start-up and shutdown procedures for a GMAW station • demonstrate basic welding competencies in a flat position.
	<p>Resistance</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify the proper use of a resistance welder.
	<p>Assembly and Finishing</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify the five basic joints used in welding; e.g., butt, lap, T, corner and edge • demonstrate one or more of the five weld joints, using the flat position and a blend of coupons • demonstrate proper assembly and finishing techniques of simple metal fabrication projects and exhibit skill in making accurate, tight fits • identify the major features, from Material Safety Data Sheets (MSDS), on the labels of finishing products • demonstrate the proper selection and use of fastening devices in metal fabrication • identify and use proper surface preparation equipment • identify, describe and demonstrate the proper application of metal finishing products.

ENSURING QUALITY

General Outcomes	Specific Outcomes
<p>Students will develop an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.</p>	<p>Task Management</p> <p>Outcomes</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read and/or listen to instructions• ask questions to clarify expected outcomes, procedures and timelines. <p>Decision Making</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the parameters of the task• generate and review alternative ideas and their consequences• make a decision or select an idea. <p>Planning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the steps involved in managing a project and identify the need for planning in metalwork• prepare a project management plan, including budget, timeline and sample drawings• identify the purpose of sketches, drawings and blueprints• identify procedures and conventions for drawing sketches and orthographic, isometric and scale drawings• plan and sketch basic shop drawings and create an accurate representation of a simple project• transfer/lay out a cutting list, from drawings to project material• identify available tools, equipment and materials. <p>Performance Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify expected standards for a product or service• work to agreed quality standards and specifications• select and use appropriate tools and technology for a task or project• demonstrate safe processes and skills to plan, fabricate, assemble and finish a useful product.

General Outcomes	Specific Outcomes
	<p>Evaluation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"><li>• identify opportunities for improving quality<li>• establish expectations and measures for improvements<li>• create evidence to support an understanding of task management and skill development for inclusion in a personal portfolio.



ACADEMIC COMPETENCIES: These are the minimum academic competencies that provide a foundation for further learning. The following outcomes are provided as a reminder to address these academic competencies within the occupational context and to reinforce cross-curricular connections.

COMMUNICATION

General Outcomes	Specific Outcomes
Students will enhance their ability to listen, speak, read and write effectively.	Listening, Speaking, Reading and Writing <i>Students will:</i> <ul style="list-style-type: none">• read, view and interpret information presented in a variety of forms, including text, videos, graphs, charts, diagrams, manuals• identify a purpose for writing• print or write legibly, spell accurately and apply rules of grammar to construct text• listen and ask questions to expand information and to appreciate the points of view of others.

THINKING

Students will develop problem-solving strategies.	Problem Solving <i>Students will:</i> <ul style="list-style-type: none">• identify and define, and ask relevant questions to clarify, the problem• evaluate the results in terms of expected outcomes.
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NUMERACY

Students will understand the value of numeracy skills in the workplace.	Basic Operations, Patterns and Relationships, Shape and Space, and Statistics and Probability <i>Students will:</i> <ul style="list-style-type: none">• apply arithmetic operations, e.g., addition, subtraction, multiplication or division, to whole numbers and decimals and use number operations when creating and solving money problems• use calculators or computers, to perform calculations involving large and small numbers, when solving problems• apply concepts of rate, ratio, percentage and proportion to solve problems in a meaningful context• demonstrate a number sense for whole numbers 0 to 100 000 and explore proper fractions and decimals
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General Outcomes	Specific Outcomes
	<ul style="list-style-type: none"> estimate, measure and compare, using decimal numbers and standard units of measure, to solve problems in everyday contexts; e.g., mass, length, volume, time, perimeter, surface area use metric and imperial units of measure.

INFORMATION TECHNOLOGY

Students will familiarize themselves with the information technology used in daily workplace operation.

Computer Operations

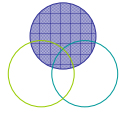
Students will:

- identify the most appropriate technology tool for the task; e.g., fax, e-mail, networks, telephone
- identify appropriate telephone operations, answer telephone calls appropriately, locate numbers and make telephone calls
- identify basic computer operations; e.g.,
 - use basic keyboarding skills
 - store, organize and retrieve information correctly
 - locate and select information and ideas using appropriate technology and information systems; e.g., Internet
 - access, send and retrieve e-mail and attachments
- identify procedures for connecting and using audio, video and digital equipment
- identify procedures for sending and receiving faxes and setting up a fax machine
- identify procedures for copying and printing documents.

CONSTRUCTION SYSTEMS 20-4 GENERAL OUTCOMES

Employability Competencies	Students will develop these competencies throughout the learning process and demonstrate them in daily life and the workplace.
Managing Transitions	<ul style="list-style-type: none"> • Students will apply their abilities and interests toward achieving learning goals. • Students will practise the skills and abilities needed to manage change. • Students will orient themselves toward an occupation that reflects their personal aptitudes and interests.
Personal Management	<ul style="list-style-type: none"> • Students will increase their self-esteem and confidence and enhance their ability to set personal goals and priorities. • Students will understand risks and be accountable for their actions.
Working with Others	<ul style="list-style-type: none"> • Students will practise effective communication skills and strategies in an occupational context. • Students will demonstrate the ability to understand and work within the culture of a group. • Students will plan and make decisions with others.
Occupational Competencies	Students will develop and demonstrate the following competencies to succeed in a specific occupation or career.
Achieving Results	<ul style="list-style-type: none"> • Students will orient themselves toward an occupation within a construction systems career environment. • Students will demonstrate safe workplace practices and procedures. • Students will develop an increased awareness of technology to develop a high-quality product or service. • Students will acquaint themselves with the use of woodworking tools, equipment and materials to prepare for and facilitate work in the trades. • Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in heating, ventilation and air conditioning (HVAC) systems. • Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in masonry. • Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in electrical systems. • Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in plumbing and pipe fitting.
Ensuring Quality	<ul style="list-style-type: none"> • Students will continue to develop an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.
Academic Competencies	Students will continue to develop these minimum academic competencies that provide a foundation for further learning.
Communication	<ul style="list-style-type: none"> • Students will demonstrate effective listening, speaking, reading and writing skills.
Thinking	<ul style="list-style-type: none"> • Students will apply creative thinking skills to solve problems.
Numeracy	<ul style="list-style-type: none"> • Students will apply mathematical concepts to solve occupational problems.
Information Technology	<ul style="list-style-type: none"> • Students will enhance their performance by using information technology to help complete tasks.

CONSTRUCTION SYSTEMS 20-4



EMPLOYABILITY COMPETENCIES: These competencies are developed throughout the learning process and are demonstrated in daily life and the workplace. Students will develop and demonstrate these competencies through individual effort and interpersonal interaction while completing a variety of projects/activities.

MANAGING TRANSITIONS

General Outcomes	Specific Outcomes
<p>Students will apply their abilities and interests toward achieving learning goals.</p>	<p>Lifelong Learning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • relate learning preferences and strengths to formal and informal learning opportunities and identify post-secondary opportunities within the related field • assess learning goals and current competencies, identify competencies needing development and identify and prioritize learning goals • create a pathway of senior high school courses to reflect learning goals • identify educational possibilities; e.g., Registered Apprenticeship Program (RAP), Green Certificate, Career and Technology Studies (CTS) and Career Internship.
<p>Students will practise the skills and abilities needed to manage change.</p>	<p>Adapting to Change</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify goals, responsibilities and commitments • assess and reflect on the success of an action plan; e.g., <ul style="list-style-type: none"> – create alternative choices to deal with unexpected change – identify stressors in personal environments that they can and cannot change • identify the need for personal support and create an inventory of available personal and community sources of support.
<p>Students will orient themselves toward an occupation that reflects their personal aptitudes and interests.</p>	<p>Career Development</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • assess work preferences and nonpreferences (e.g., indoor, outdoor, shift work), assess life/work options and outline career goals and paths • work in and seek out a variety of roles and responsibilities • measure and celebrate personal contributions to workplace goals; e.g., paid, unpaid or volunteer work • orient themselves to the workplace through community partnerships and assess personal performance in terms of workplace expectations.

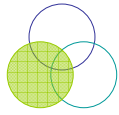
PERSONAL MANAGEMENT

General Outcomes	Specific Outcomes
Students will increase their self-esteem and confidence and enhance their ability to set personal goals and priorities.	Self-development <i>Students will:</i> <ul style="list-style-type: none">• re-evaluate an action plan to develop strengths and talents• use strengths and talents to achieve personal goals• clarify acceptable and appropriate behaviours for specific activities and roles• act ethically in personal, community and workplace contexts and accept the consequences of their actions.
Students will understand risks and be accountable for their actions.	Risk Management <i>Students will:</i> <ul style="list-style-type: none">• follow health and safety procedures; e.g., at home, at school, in the community and in the workplace• identify potential hazards, take corrective action and develop and practise action plans to ensure safety• practise personal emergency responses• assess their comfort level with, and the consequences of, taking risks.

WORKING WITH OTHERS

Students will practise effective communication skills and strategies in an occupational context.	Interpersonal Communication <i>Students will:</i> <ul style="list-style-type: none">• assess the effectiveness of communication strategies used to communicate thoughts and feelings; e.g.,<ul style="list-style-type: none">– listen without interrupting– contribute to be heard– disagree courteously– accept conflicting opinions– use appropriate body language• assess verbal and nonverbal communication strategies• apply social norms to build specific relationships• demonstrate the ability to accept praise and/or criticism.
Students will demonstrate the ability to understand and work within the culture of a group.	Building Community <i>Students will:</i> <ul style="list-style-type: none">• interact with others in a courteous manner• accommodate the beliefs of others in work and personal environments and show respect for differences in beliefs, abilities, etiquette and styles of interaction• identify opportunities for participation in community growth.

General Outcomes	Specific Outcomes
<p>Students will plan and make decisions with others.</p>	<p>Teamwork</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • participate effectively as group members; e.g., <ul style="list-style-type: none"> – generate ideas – assess resources – contribute abilities and interests – monitor progress – share responsibility for completion of a task • assume various roles within a group; e.g., leadership • clarify the expected outcomes of teamwork.



OCCUPATIONAL COMPETENCIES: Students will develop and demonstrate the following competencies to succeed in a specific occupation or career. They will achieve results through a variety of projects/activities as appropriate to enhance their knowledge and skills. Students will ensure the quality of their work through effective task management and will highlight their achievements in a career-based portfolio.

ACHIEVING RESULTS

General Outcomes	Specific Outcomes
<p>Students will orient themselves toward an occupation within a construction systems career environment.</p>	<p>Career Awareness</p> <p>Orientation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify entry-level competencies • identify post-secondary opportunities • recognize entrepreneurial opportunities within the industry • introduce themselves to local business/industry operations • match their personal interests to their job search; e.g., <ul style="list-style-type: none"> – identify sources of support for investigating and finding work – describe entry-level requirements – recognize potential career ladders • examine a brief history of contemporary practices in the trades, including: <ul style="list-style-type: none"> – heating, ventilation and air conditioning (HVAC) – masonry – electrical – plumbing • identify career opportunities in the trades and name common trade-related occupations. <p>Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • develop workplace protocols, procedures and standards of conduct; e.g., <ul style="list-style-type: none"> – demonstrate appropriate work habits – use safe and sanitary practices – demonstrate pride in themselves – demonstrate pride in their work performance – show respect for others – respect the property of others.

General Outcomes	Specific Outcomes
<p>Students will demonstrate safe workplace practices and procedures.</p>	<p>Workplace Health and Safety</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify safety device locations and procedures within the workplace environment • demonstrate knowledge of, and the ability to access information about, Occupational Health and Safety (OHS) and the Workers' Compensation Board (WCB) • demonstrate knowledge of, and adherence to, safety rules that are specific to available tools, equipment and materials; e.g., demonstrate an ability to use interactive or online programs such as the Construction Safety Training System (CSTS) • demonstrate knowledge of health hazards associated with the use of chemicals and materials and retrieve information on Material Safety Data Sheets (MSDS) using appropriate print and Internet resources • select and wear personal protective equipment (PPE) appropriate to the specific task • demonstrate knowledge of environmental issues relating to the procedures for handling hazardous waste • demonstrate an understanding of the Workplace Hazardous Materials Information System (WHMIS) as it relates to the field of study and identify WHMIS symbols, classes and labelling requirements • identify and practise good electrical safety habits and identify potential electrical safety hazards in the shop and at home • identify and develop safe work habits with tools, equipment and materials used in the trades, including: <ul style="list-style-type: none"> – HVAC – masonry – electrical – plumbing • select and demonstrate proper set-up procedures for ladders and scaffolding systems • select and use common knots and hitches for hoists and rigging • select and use appropriate hoisting and rigging equipment for common construction activities.
<p>Students will develop an increased awareness of technology to develop a high-quality product or service.</p>	<p>Products and Service</p> <p>Technology Integration</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify new and emerging products and technological advances in construction systems.

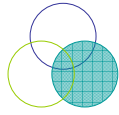
General Outcomes	Specific Outcomes
<p>Students will acquaint themselves with the use of woodworking tools, equipment and materials to prepare for and facilitate work in the trades.</p>	<p>Providing Service</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify client relationships or interactions within the field of construction systems • identify services required or provided • collect necessary information to complete a purchase or to fill out a work order • recognize the importance of customer or client service to all businesses/industries • demonstrate professional practices and work habits • strive to meet and exceed the client’s expectations. <p>Carpentry Orientation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify basic woodworking tools and equipment; e.g., <ul style="list-style-type: none"> – hand tools—hammer, framing square, measures – power tools—circular saw, mitre saw – compressed air equipment—nailers, spikers, staplers, concrete vibrators • check stock for defects and squareness • identify common fasteners and adhesives for joining wood pieces • read and lay out simple wall framing on wall plates • identify, cut and assemble the basic elements used in wall framing; e.g., studs, plates, lintels, sills and cripples.
<p>Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in heating, ventilation and air conditioning (HVAC) systems.</p>	<p>HVAC</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and describe common HVAC hand and power tools • identify and describe basic tool maintenance, cleaning and storage procedures • identify and describe common metalwork materials and fasteners • identify the purpose of sketches, drawings and blueprints in the HVAC industry and identify the basic symbols used in blueprints to denote HVAC components • identify, describe and list the major components and controls of a heating system • demonstrate entry-level ability to perform basic maintenance on a heating system • construct basic sheet metal fittings and duct work • make circular and square bends in metal • identify equipment and the basic skills required for tap and die procedures • create a drawing on metal for project layout • identify and demonstrate the basic skills required for brazing and soldering

General Outcomes	Specific Outcomes
<p>Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in masonry.</p>	<ul style="list-style-type: none"> • demonstrate copper tubing practices; e.g., cut, swage, bend, flare and solder • demonstrate the procedures required to cut, thread and connect simple black-piping projects • identify and demonstrate the proper use of leak detectors • identify the basic procedures for the venting of flue gas and water heaters. <p>Masonry</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and describe common masonry hand and power tools • identify and describe basic tool maintenance, cleaning and storage procedures • identify common structural clay products used in masonry • identify common concrete products used in masonry • identify natural and artificial products used in masonry • identify and use common mortar products • demonstrate the ability to mix mortars and cement; e.g., <ul style="list-style-type: none"> – spread mortar for brick and block – lay brick and block to line with established leads – construct a 90-degree brick and block lead – construct a simple form to hold concrete, using wood or metal – lay concrete in a form and demonstrate correct damping procedures • identify and demonstrate proper finishing techniques for simple masonry projects • demonstrate the ability to plan and construct a brick column with a concrete capstone • identify reinforcing materials used in masonry and practise the use of basic rebar ties.
<p>Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in electrical systems.</p>	<p>Electrical Systems</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and describe common electrical hand and power tools • identify and describe basic tool maintenance, cleaning and storage procedures • identify and describe devices commonly used in residential electrical practices, e.g., switches, receptacles, light fixtures, thermostats, including: <ul style="list-style-type: none"> – boxes, covers and plates – common supports, anchors and fastening devices – common connectors, terminals and lugs – common electrical cable • identify electrical safety and control devices • demonstrate the ability to identify and reset tripped circuit breakers • demonstrate the ability to strip electrical sheathing and connect conductors

General Outcomes	Specific Outcomes
<p>Students will develop basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in plumbing and pipe fitting.</p>	<ul style="list-style-type: none"> • identify and demonstrate basic techniques for residential wiring; e.g., <ul style="list-style-type: none"> – identify and construct a series circuit and a parallel circuit – diagram and install a single pole switching system and a doorbell system – demonstrate the ability to test and service smoke detectors • identify and explain common causes of power problems. <p>Plumbing and Pipe Fitting</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and describe common plumbing and pipe-fitting hand and power tools • identify and describe basic tool maintenance, cleaning and storage procedures • identify different types of pipes and where they are used; e.g., <ul style="list-style-type: none"> – copper – plastic – black steel – cast iron • identify and demonstrate pipe-cutting techniques • identify common pipe-fitting joints and connectors • identify and demonstrate proper pipe-threading techniques • identify different pipe hangars and their uses • identify the types and purposes of solder and flux • demonstrate the soldering of copper piping joints • identify procedures for cutting and joining plastic pipe • identify the basic principles of the plumbing system • identify the basic principles of water service.

ENSURING QUALITY

General Outcomes	Specific Outcomes
<p>Students will continue to develop an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.</p>	<p>Task Management</p> <p>Outcomes</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read and/or listen to instructions• ask questions to clarify expected outcomes, procedures and timelines. <p>Decision Making</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the parameters of the task• generate and review alternative ideas and their consequences• make a decision or select an idea. <p>Planning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the steps involved in managing a project• prepare a sample project plan, including budget and timeline• identify available tools, equipment and materials• transfer/lay out a cutting list, from drawings to project material• identify the need for planning in trade-related projects or tasks• identify the components of a technological system; e.g., input, process, output, feedback• apply knowledge of technological system processes to projects assigned in the course• identify the purpose of sketches, drawings and blueprints• identify procedures and conventions for drawing sketches and orthographic, isometric and scale drawings• plan and sketch basic shop drawings• create accurate representations of a simple project. <p>Performance Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify expected standards for a product or service• work to agreed quality standards and specifications• select and use appropriate tools and technology for a task or project. <p>Evaluation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify opportunities for improving quality• establish expectations and measures for improvements• create evidence to support an understanding of task management and skill development for inclusion in a personal portfolio.



ACADEMIC COMPETENCIES: These are the minimum academic competencies that provide a foundation for further learning. The following outcomes are provided as a reminder to address these academic competencies within the occupational context and to reinforce cross-curricular connections.

COMMUNICATION

General Outcomes	Specific Outcomes
<p>Students will demonstrate effective listening, speaking, reading and writing skills.</p>	<p>Listening, Speaking, Reading and Writing</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read, view and interpret occupation-related materials; e.g.,<ul style="list-style-type: none">– use related occupational terms– identify occupation-related literature– interpret and follow written instructions• select and create a text format to suit a purpose and audience, e.g., forms, letters, reports, memos, résumé, and:<ul style="list-style-type: none">– describe uses of writing skills in related occupations– write a letter of inquiry– write a letter of thanks– complete job applications• listen and present information in a clear, concise manner; e.g.,<ul style="list-style-type: none">– listen attentively to organize and classify information and ideas– organize main ideas and key messages with clarity.

THINKING

Students will apply creative thinking skills to solve problems.

Problem Solving, Decision Making and Creative Thinking

Students will:

- apply a problem-solving model to identify the problem/issue
- identify appropriate actions and develop several alternatives for each promising idea
- evaluate the results, in terms of expected outcomes related to the initial problem, and evaluate personal satisfaction with the outcome of the idea; e.g., product/process.

NUMERACY

General Outcomes	Specific Outcomes
<p>Students will apply mathematical concepts to solve occupational problems.</p>	<p>Basic Operations, Patterns and Relationships, Shape and Space, and Statistics and Probability</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• apply arithmetic operations, e.g., addition, subtraction, multiplication or division, to whole numbers and decimals and use number operations when creating and solving money problems• use calculators or computers, to perform calculations involving large and small numbers, when solving problems• apply concepts of rate, ratio, percentage and proportion to solve problems in a meaningful context• demonstrate a number sense for whole numbers 0 to 100 000 and explore proper fractions and decimals• estimate, measure and compare, using decimal numbers and standard units of measure, to solve problems in everyday contexts; e.g., mass, length, volume, time, perimeter, surface area• use metric and imperial units of measure.

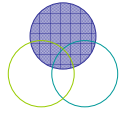
INFORMATION TECHNOLOGY

<p>Students will enhance their performance by using information technology to help complete tasks.</p>	<p>Computer Operations and Computer Applications</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• demonstrate appropriate language and etiquette when using information technology• demonstrate appropriate telephone operations; e.g., answer telephone calls appropriately, locate numbers and make telephone calls• demonstrate basic computer operations to complete a task; e.g.,<ul style="list-style-type: none">– use basic keyboarding skills– store, organize and retrieve information correctly– locate and select information and ideas using appropriate technology and information systems; e.g., Internet– access, send and retrieve e-mail and attachments• demonstrate procedures for connecting and using audio, video and digital equipment• demonstrate procedures for sending and receiving faxes and setting up a fax machine• demonstrate procedures for copying and printing documents.
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CONSTRUCTION SYSTEMS 30-4 GENERAL OUTCOMES

Employability Competencies	Students will develop these competencies throughout the learning process and demonstrate them in daily life and the workplace.
Managing Transitions	<ul style="list-style-type: none"> • Students will consistently demonstrate personal discovery and continuous learning. • Students will manage change effectively to support their goals. • Students will prepare themselves for entry-level employment in an occupation that reflects their personal aptitudes and interests.
Personal Management	<ul style="list-style-type: none"> • Students will exhibit self-esteem and confidence through the achievement of personal goals. • Students will manage risks to achieve both personal and workplace goals.
Working with Others	<ul style="list-style-type: none"> • Students will model effective communication skills and strategies in the home, school, community and workplace. • Students will promote equity in work and community endeavours. • Students will demonstrate the ability to complete tasks in a team environment.
Occupational Competencies	Students will develop and demonstrate the following competencies to succeed in a specific occupation or career.
Achieving Results	<ul style="list-style-type: none"> • Students will prepare for entry-level employment within a construction systems career environment. • Students will demonstrate entry-level standards of safe workplace practices and procedures. • Students will use technology to develop a high-quality product or service. • Students will acquaint themselves with the use of woodworking tools, equipment and materials to facilitate work in the trades. • Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in heating, ventilation and air conditioning (HVAC) systems. • Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in masonry. • Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in electrical systems. • Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in plumbing and pipe fitting.
Ensuring Quality	<ul style="list-style-type: none"> • Students will demonstrate an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.
Academic Competencies	Students will continue to develop these minimum academic competencies that provide a foundation for further learning.
Communication	<ul style="list-style-type: none"> • Students will demonstrate effective listening, speaking, reading and writing skills to prepare for employment.
Thinking	<ul style="list-style-type: none"> • Students will research information, use creative thinking skills and use effective problem-solving strategies to solve problems.
Numeracy	<ul style="list-style-type: none"> • Students will demonstrate mathematical operations to effectively solve problems in a meaningful context.
Information Technology	<ul style="list-style-type: none"> • Students will demonstrate the effective use of information technology to perform daily workplace operations.

CONSTRUCTION SYSTEMS 30-4



EMPLOYABILITY COMPETENCIES: These competencies are developed throughout the learning process and are demonstrated in daily life and the workplace. Students will develop and demonstrate these competencies through individual effort and interpersonal interaction while completing a variety of projects/activities.

MANAGING TRANSITIONS

General Outcomes	Specific Outcomes
<p>Students will consistently demonstrate personal discovery and continuous learning.</p>	<p>Lifelong Learning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify learning opportunities related to learning goals, commitments and resources; e.g., <ul style="list-style-type: none"> – identify opportunities for further education/training – locate needed financial support systems – locate needed personal support systems • practise what has been learned to build competence and confidence and evaluate the application of competencies to learning goals • create a plan that demonstrates continuous learning; e.g., <ul style="list-style-type: none"> – analyze requirements for graduation and for further education/training – modify a learning plan to reflect requirements and opportunities.
<p>Students will manage change effectively to support their goals.</p>	<p>Adapting to Change</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • prioritize and assign resources to meet commitments and goals • prioritize commitments and goals to achieve a balanced lifestyle • redefine an action plan as situations change; e.g., <ul style="list-style-type: none"> – use adaptive strategies – redefine personal goals – select personal coping mechanisms • access available and appropriate sources of support • identify opportunities for improvement and innovation; e.g., entrepreneurship.

General Outcomes	Specific Outcomes
<p>Students will prepare themselves for entry-level employment in an occupation that reflects their personal aptitudes and interests.</p>	<p>Career Development</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • analyze elements of job satisfaction; e.g., recognition, environment, pay, benefits, prestige • build personal career paths and networks • analyze how work contributes to societal and economic needs and a sense of responsibility • prepare for employment through community partnership activities and organize and complete specific job tasks effectively and efficiently.

PERSONAL MANAGEMENT

Students will exhibit self-esteem and confidence through the achievement of personal goals.

Self-development

Students will:

- continue to create a long-term self-development plan in which they consider accomplishments and redefine self-development goals
- demonstrate entry-level self-presentation appropriate to the activity and role
- maintain a high standard of personal ethics when interacting with others.

Students will manage risks to achieve both personal and workplace goals.

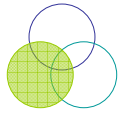
Risk Management

Students will:

- maintain health and safety procedures; e.g., at home, at school, in the community and in the workplace
- monitor success in reducing the impact of hazards on themselves and others
- demonstrate concern for the safety of others by exhibiting appropriate behaviour in the workplace
- work with others to respond to emergencies
- take planned risks to contribute to personal growth.

WORKING WITH OTHERS

General Outcomes	Specific Outcomes
<p>Students will model effective communication skills and strategies in the home, school, community and workplace.</p>	<p>Interpersonal Communication</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• communicate thoughts and feelings appropriately; e.g.,<ul style="list-style-type: none">– listen without interrupting– contribute to be heard– disagree courteously– accept conflicting opinions– use appropriate body language• maintain a balance between speaking, listening and responding• work together to achieve goals• demonstrate the ability to deal constructively with conflict.
<p>Students will promote equity in work and community endeavours.</p>	<p>Building Community</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• demonstrate and model courteous behaviour in daily interactions• demonstrate respect for others and a shared understanding of diverse beliefs, etiquette and styles of interaction• assess their personal contribution to community growth.
<p>Students will demonstrate the ability to complete tasks in a team environment.</p>	<p>Teamwork</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• assess the effectiveness of group and personal contributions; e.g.,<ul style="list-style-type: none">– generate ideas– assess resources– contribute abilities and interests– monitor progress– share responsibility for completion of a task• expand their abilities to contribute to team goals.



OCCUPATIONAL COMPETENCIES: Students will develop and demonstrate the following competencies to succeed in a specific occupation or career. They will achieve results through a variety of projects/activities as appropriate to enhance their knowledge and skills. Students will ensure the quality of their work through effective task management and will highlight their achievements in a career-based portfolio.

ACHIEVING RESULTS

General Outcomes	Specific Outcomes
<p>Students will prepare for entry-level employment within a construction systems career environment.</p>	<p>Career Awareness</p> <p>Preparation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • assess entry-level competencies • recognize opportunities for further education/training • select post-secondary opportunities • identify local entrepreneurs • establish contacts with local businesses/industries • present marketable skills and strengths; e.g., <ul style="list-style-type: none"> – write a letter of application – prepare a résumé – complete application forms – identify contacts and references – collect evidence of competencies in a portfolio • demonstrate a basic understanding of each stakeholder’s responsibilities for the successful completion of a project; i.e., helper, tradesperson, foreman, supervisor, engineer and client. <p>Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate workplace protocols, procedures and standards of conduct; e.g., <ul style="list-style-type: none"> – demonstrate appropriate work habits – demonstrate effective human-relations techniques in the workplace – practise safety in the workplace – demonstrate acceptable verbal and nonverbal communication skills – practise personal and public hygiene procedures – demonstrate entry-level competency in tools and equipment usage – use supplies correctly – follow good storage practices – demonstrate pride in their work performance – demonstrate a willingness to work – demonstrate respect for others – follow accepted principles and procedures – recognize opportunities for further education/training.

General Outcomes	Specific Outcomes
<p>Students will demonstrate entry-level standards of safe workplace practices and procedures.</p>	<p>Workplace Health and Safety</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and explain the use of safety devices within the workplace • demonstrate knowledge of, and the ability to access information about, Occupational Health and Safety (OHS) and the Workers' Compensation Board (WCB) • demonstrate a prework and postwork hazard assessment • demonstrate knowledge of, and adherence to, safety rules that are specific to available tools, equipment and materials; e.g., use interactive or online programs such as the Construction Safety Training System (CSTS) • demonstrate knowledge of health hazards associated with the use of chemicals and materials and retrieve information on Material Safety Data Sheets (MSDS) using appropriate print and Internet resources • model safety consciousness by selecting and wearing personal protective equipment (PPE) appropriate to the specific task • demonstrate knowledge of environmental issues relating to the procedures for handling hazardous waste • demonstrate an understanding of the Workplace Hazardous Materials Information System (WHMIS) as it relates to the field of study and identify WHMIS symbols, classes and labelling requirements • practise positive electrical safety habits and identify, explain and resolve potential electrical safety hazards in a workplace or home environment • demonstrate entry-level competence in the selection and use of ladders and scaffolding systems • demonstrate entry-level competence in basic rigging and hoisting procedures used in construction • develop a basic understanding of standard hand signals used when rigging and hoisting.
<p>Students will use technology to develop a high-quality product or service.</p>	<p>Products and Service</p> <p>Technology Integration</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • use new and emerging products and technological advances in construction systems; e.g., examine the effects of current technological advances in the construction systems industry and explain the impact of current technology on the job descriptions of future construction systems trade workers.

General Outcomes	Specific Outcomes
<p>Students will acquaint themselves with the use of woodworking tools, equipment and materials to facilitate work in the trades.</p> <p>Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in heating, ventilation and air conditioning (HVAC) systems.</p>	<p>Providing Service</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify client relationships or interactions within the field of construction systems • identify services required or provided • collect necessary information to complete a purchase or to fill out a work order • recognize the importance of customer or client service to all businesses/industries • demonstrate professional practices and work habits • strive to meet and exceed the client’s expectations. <p>Carpentry Orientation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • review and demonstrate the basic knowledge and skills needed when using woodworking tools and equipment; e.g., <ul style="list-style-type: none"> – hand tools—hammer, framing square, measures – power tools—circular saw, mitre saw – compressed air equipment—nailers, spikers, staplers, concrete vibrators • check stock for defects and squareness • select common fasteners and adhesives for joining wood pieces • read and lay out wall framing on wall plates • cut and assemble the basic elements used in wall framing; e.g., studs, plates, lintels, sills and cripples. <p>HVAC</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate entry-level competence in selecting and using appropriate HVAC hand and power tools for a project • demonstrate entry-level skill in the maintenance, cleaning and storage of HVAC tools and equipment • identify tools used for cold metal work • identify tools and equipment used for hot metal work • examine the principles of heat transfer and refrigeration and examine pressure–temperature relationships • identify and describe conventional heating systems; e.g., <ul style="list-style-type: none"> – forced air – hot water – steam

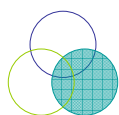
General Outcomes	Specific Outcomes
<p>Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in masonry.</p>	<ul style="list-style-type: none"> • identify nonconventional heating systems and list the advantages and disadvantages of each; e.g., <ul style="list-style-type: none"> – electrical – wood burning – solar • identify and describe the components of a refrigeration system; e.g., <ul style="list-style-type: none"> – evaporator – condenser – compressor – metering device • demonstrate entry-level ability to perform maintenance on a refrigeration system • identify procedures for correctly replacing a faulty thermostat • analyze and explain air conditioning systems; e.g., <ul style="list-style-type: none"> – types of fittings – controlled humidity – controls – installations – electronic filters • demonstrate entry-level ability to construct and install sheet metal fittings and duct work • demonstrate a basic understanding of electrical principles as they pertain to HVAC systems • identify and demonstrate basic techniques for wiring electrical control and motor circuits • demonstrate troubleshooting on HVAC systems. <p>Masonry</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate entry-level competence in selecting and using appropriate masonry hand and power tools for a project • demonstrate entry-level skill in the maintenance, cleaning and storage of masonry tools and equipment • list possible uses for structural clay products • list possible uses for concrete products • list possible uses for natural and artificial masonry products • identify and use common masonry additives, protectants, cleaning agents, sealants and water repellents • demonstrate entry-level ability to mix mortars and cements to project specifications • demonstrate the layout and construction of a section of a wall with a joint reinforcement and openings, using brick and concrete block • identify and demonstrate the use of basic tiling tools, equipment and materials • lay out and construct a simple tiling project

General Outcomes	Specific Outcomes
<p>Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in electrical systems.</p>	<ul style="list-style-type: none"> • identify the tools, equipment and materials used for stucco finishes • demonstrate basic stuccoing procedures and finishes, including parging • identify the tools, equipment and materials used for making concrete moulds • demonstrate proper procedures for making simple mould projects • demonstrate the ability to use reinforcing materials to strengthen or secure masonry projects/materials; e.g., rebar, stucco lathe. <p>Electrical</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate entry-level competence in selecting and using appropriate electrical hand and power tools for a project • demonstrate entry-level skill in the maintenance, cleaning and storage of electrical tools and equipment • identify basic residential electrical devices; e.g., support brackets, anchors, fastening devices and various types of cable • demonstrate entry-level ability to install or replace devices commonly used in residential electrical practices; e.g., switches, receptacles, bulbs, tubes and fuses • demonstrate entry-level ability to install common boxes, covers and plates used in residential electrical practices • demonstrate entry-level ability to install common supports, anchors and fastening devices used in residential electrical practices • demonstrate entry-level ability to use common electrical connectors, terminals and lugs • demonstrate the ability to choose the proper electrical cable for a project • demonstrate entry-level ability to strip electrical sheathing and connect conductors • diagram and install a three-way switching system • diagram and install a combination three-way and four-way switching system • diagram and install a multiwire branch circuit • diagram and install special appliance circuits; e.g., 240 volts • diagram and install a ground fault circuit interrupter (GFCI) system • identify and demonstrate basic techniques for installing entertainment, communication and security systems • demonstrate entry-level ability to perform basic repairs on electrical appliances • demonstrate entry-level ability to troubleshoot power problems.

General Outcomes	Specific Outcomes
<p>Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in plumbing and pipe fitting.</p>	<p>Plumbing and Pipe Fitting</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate entry-level competence in selecting and using appropriate plumbing and pipe-fitting hand and power tools for a project • demonstrate entry-level skill in the maintenance, cleaning and storage of plumbing and pipe-fitting tools and equipment • identify common plumbing adhesives and fasteners • identify common piping and their dimensions • demonstrate entry-level standards in the ability to measure, cut and join pipe and fittings • identify and demonstrate basic tube cutting, bending and joining techniques • demonstrate entry-level standards in the ability to cut and join gas-fitting pipe • define and describe gas-fitting terms; e.g., <ul style="list-style-type: none"> – BTUs – natural gas – propane gas – fuel oil • recognize the characteristics of a gas flame • recognize and demonstrate safety practices specific to gas fitting • identify control systems and valves used by gas fitters • identify the procedures used to connect and disconnect gas pipe and valves to a gas source • demonstrate the ability to identify, operate and replace simple controls; e.g., <ul style="list-style-type: none"> – room thermostats – fan switches – safety switches – 100 percent shut-off valves • demonstrate entry-level ability to troubleshoot basic plumbing and pipe-fitting problems.

ENSURING QUALITY

General Outcomes	Specific Outcomes
<p>Students will demonstrate an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.</p>	<p>Task Management</p> <p>Outcomes</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read and/or listen to instructions• ask questions to clarify expected outcomes, procedures and timelines. <p>Decision Making</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the parameters of the task• generate and review alternative ideas and their consequences• make a decision or select an idea. <p>Planning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the steps involved in managing a project• prepare a sample project plan, including budget and timeline• identify available tools, equipment and materials• explain the importance of an effective project-planning process• build a project from a supplied blueprint• draw basic blueprints for simple projects• demonstrate the ability to inventory tools, equipment and materials• identify the purpose of sketches, drawings and blueprints• identify procedures and conventions for drawing sketches and orthographic, isometric and scale drawings• plan and sketch basic shop drawings and create an accurate representation of a simple project• transfer/lay out a cutting list, from drawings to project material. <p>Performance Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify expected standards for a product or service• work to agreed quality standards and specifications• select and use appropriate tools and technology for a task or project. <p>Evaluation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify opportunities for improving quality• establish expectations and measures for improvements• create evidence to support an understanding of task management and skill development for inclusion in a personal portfolio.



ACADEMIC COMPETENCIES: These are the minimum academic competencies that provide a foundation for further learning. The following outcomes are provided as a reminder to address these academic competencies within the occupational context and to reinforce cross-curricular connections.

COMMUNICATION

General Outcomes	Specific Outcomes
<p>Students will demonstrate effective listening, speaking, reading and writing skills to prepare for employment.</p>	<p>Listening, Speaking, Reading and Writing</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read, view and interpret occupation-related materials for a specific purpose; e.g.,<ul style="list-style-type: none">– read related health and safety documents– read terms of employment documents– follow written instructions specific to an occupational area• create text for a specific purpose that clearly communicates information; e.g.,<ul style="list-style-type: none">– write a résumé– write a job description– submit job application forms• communicate thoughts and ideas and listen to the thoughts and ideas of others to effectively complete a task; e.g.,<ul style="list-style-type: none">– follow oral instructions– give effective oral instructions when necessary.

THINKING

Students will research information, use creative thinking skills and use effective problem-solving strategies to solve problems.

Problem Solving, Decision Making, Finding Information and Creative Thinking

Students will:

- demonstrate an effective problem-solving model; e.g.,
 - identify the need for a solution to a problem/issue
 - identify why information is needed; e.g., make decisions, inform, persuade
- identify appropriate actions and select and apply information that meets their purposes and needs
- evaluate the results in terms of expected outcomes and assess the impact of information on their purpose and audience.

NUMERACY

General Outcomes	Specific Outcomes
<p>Students will demonstrate mathematical operations to effectively solve problems in a meaningful context.</p>	<p>Basic Operations, Patterns and Relationships, Shape and Space, and Statistics and Probability</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• apply arithmetic operations, e.g., addition, subtraction, multiplication or division, to whole numbers and decimals and use number operations when creating and solving money problems• use calculators or computers, to perform calculations involving large and small numbers, when solving problems• apply concepts of rate, ratio, percentage and proportion• demonstrate a number sense for whole numbers 0 to 100 000 and explore proper fractions and decimals• estimate, measure and compare, using decimal numbers and standard units of measure, to solve problems in everyday contexts; e.g., mass, length, volume, time, perimeter, surface area• use metric and imperial units of measure.

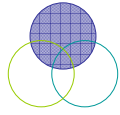
INFORMATION TECHNOLOGY

<p>Students will demonstrate the effective use of information technology to perform daily workplace operations.</p>	<p>Computer Operations and Computer Applications</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• model and assume personal responsibility for the ethical use of information technologies• demonstrate appropriate telephone operations within the workplace; e.g., answer telephone calls appropriately, locate numbers and make telephone calls• use computer operations to assist in the completion of daily workplace operations; e.g.,<ul style="list-style-type: none">– use basic keyboarding skills– store, organize and retrieve information correctly– locate and select information and ideas using appropriate technology and information systems; e.g., Internet– access, send and retrieve e-mail and attachments• demonstrate procedures for connecting and using audio, video and digital equipment• demonstrate procedures for sending and receiving faxes and setting up a fax machine• demonstrate procedures for copying and printing documents.
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METAL FABRICATION 20-4 GENERAL OUTCOMES

Employability Competencies	Students will develop these competencies throughout the learning process and demonstrate them in daily life and the workplace.
Managing Transitions	<ul style="list-style-type: none"> • Students will apply their abilities and interests toward achieving learning goals. • Students will practise the skills and abilities needed to manage change. • Students will orient themselves toward an occupation that reflects their personal aptitudes and interests.
Personal Management	<ul style="list-style-type: none"> • Students will increase their self-esteem and confidence and enhance their ability to set personal goals and priorities. • Students will understand risks and be accountable for their actions.
Working with Others	<ul style="list-style-type: none"> • Students will practise effective communication skills and strategies in an occupational context. • Students will demonstrate the ability to understand and work within the culture of a group. • Students will plan and make decisions with others.
Occupational Competencies	Students will develop and demonstrate the following competencies to succeed in a specific occupation or career.
Achieving Results	<ul style="list-style-type: none"> • Students will orient themselves toward an occupation within a metal fabrication career environment. • Students will demonstrate safe workplace practices and procedures. • Students will develop an increased awareness of technology to develop a high-quality product or service. • Students will demonstrate a basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in metal fabrication. • Students will demonstrate correct welding procedures, using a variety of devices. • Students will demonstrate proper assembly and finishing techniques when creating projects.
Ensuring Quality	<ul style="list-style-type: none"> • Students will continue to develop an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.
Academic Competencies	Students will continue to develop these minimum academic competencies that provide a foundation for further learning.
Communication	<ul style="list-style-type: none"> • Students will demonstrate effective listening, speaking, reading and writing skills.
Thinking	<ul style="list-style-type: none"> • Students will apply creative thinking skills to solve problems.
Numeracy	<ul style="list-style-type: none"> • Students will apply mathematical concepts to solve occupational problems.
Information Technology	<ul style="list-style-type: none"> • Students will enhance their performance by using information technology to help complete tasks.

METAL FABRICATION 20-4



EMPLOYABILITY COMPETENCIES: These competencies are developed throughout the learning process and are demonstrated in daily life and the workplace. Students will develop and demonstrate these competencies through individual effort and interpersonal interaction while completing a variety of projects/activities.

MANAGING TRANSITIONS

General Outcomes	Specific Outcomes
<p>Students will apply their abilities and interests toward achieving learning goals.</p>	<p>Lifelong Learning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • relate learning preferences and strengths to formal and informal learning opportunities and identify post-secondary opportunities within the related field • assess learning goals and current competencies, identify competencies needing development and identify and prioritize learning goals • create a pathway of senior high school courses to reflect learning goals • identify educational possibilities; e.g., Registered Apprenticeship Program (RAP), Green Certificate, Career and Technology Studies (CTS) and Career Internship.
<p>Students will practise the skills and abilities needed to manage change.</p>	<p>Adapting to Change</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify goals, responsibilities and commitments • assess and reflect on the success of an action plan; e.g., <ul style="list-style-type: none"> – create alternative choices to deal with unexpected change – identify stressors in personal environments that they can and cannot change • identify the need for personal support and create an inventory of available personal and community sources of support.
<p>Students will orient themselves toward an occupation that reflects their personal aptitudes and interests.</p>	<p>Career Development</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • assess work preferences and nonpreferences (e.g., indoor, outdoor, shift work), assess life/work options and outline career goals and paths • work in and seek out a variety of roles and responsibilities • measure and celebrate personal contributions to workplace goals; e.g., paid, unpaid or volunteer work • orient themselves to the workplace through community partnerships and assess personal performance in terms of workplace expectations.

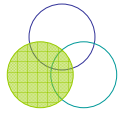
PERSONAL MANAGEMENT

General Outcomes	Specific Outcomes
<p>Students will increase their self-esteem and confidence and enhance their ability to set personal goals and priorities.</p>	<p>Self-development</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• re-evaluate an action plan to develop strengths and talents• use strengths and talents to achieve personal goals• clarify acceptable and appropriate behaviours for specific activities and roles• act ethically in personal, community and workplace contexts and accept the consequences of their actions.
<p>Students will understand risks and be accountable for their actions.</p>	<p>Risk Management</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• follow health and safety procedures; e.g., at home, at school, in the community and in the workplace• identify potential hazards, take corrective action and develop and practise action plans to ensure safety• practise personal emergency responses• assess their comfort level with, and the consequences of, taking risks.

WORKING WITH OTHERS

<p>Students will practise effective communication skills and strategies in an occupational context.</p>	<p>Interpersonal Communication</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• assess the effectiveness of communication strategies used to communicate thoughts and feelings; e.g.,<ul style="list-style-type: none">– listen without interrupting– contribute to be heard– disagree courteously– accept conflicting opinions– use appropriate body language• assess verbal and nonverbal communication strategies• apply social norms to build specific relationships• demonstrate the ability to accept praise and/or criticism.
<p>Students will demonstrate the ability to understand and work within the culture of a group.</p>	<p>Building Community</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• interact with others in a courteous manner• accommodate the beliefs of others in work and personal environments and show respect for differences in beliefs, abilities, etiquette and styles of interaction• identify opportunities for participation in community growth.

General Outcomes	Specific Outcomes
<p>Students will plan and make decisions with others.</p>	<p>Teamwork</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • participate effectively as group members; e.g., <ul style="list-style-type: none"> – generate ideas – assess resources – contribute abilities and interests – monitor progress – share responsibility for completion of a task • assume various roles within a group; e.g., leadership • clarify the expected outcomes of teamwork.



OCCUPATIONAL COMPETENCIES: Students will develop and demonstrate the following competencies to succeed in a specific occupation or career. They will achieve results through a variety of projects/activities as appropriate to enhance their knowledge and skills. Students will ensure the quality of their work through effective task management and will highlight their achievements in a career-based portfolio.

ACHIEVING RESULTS

General Outcomes	Specific Outcomes
<p>Students will orient themselves toward an occupation within a metal fabrication career environment.</p>	<p>Career Awareness</p> <p>Orientation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify entry-level competencies • identify post-secondary opportunities • recognize entrepreneurial opportunities within the industry • introduce themselves to local business/industry operations • match their personal interests to their job search; e.g., <ul style="list-style-type: none"> – identify sources of support for investigating and finding work – describe entry-level requirements – recognize potential career ladders. <p>Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • develop workplace protocols, procedures and standards of conduct; e.g., <ul style="list-style-type: none"> – demonstrate appropriate work habits – use safe and sanitary practices – demonstrate pride in themselves – demonstrate pride in their work performance – show respect for others – respect the property of others.
<p>Students will demonstrate safe workplace practices and procedures.</p>	<p>Workplace Health and Safety</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify safety device locations and procedures within the workplace environment • demonstrate knowledge of, and the ability to access information about, Occupational Health and Safety (OHS) and the Workers' Compensation Board (WCB) • demonstrate knowledge of, and adherence to, safety rules that are specific to available tools, equipment and materials; e.g., use interactive or online programs such as the Construction Safety Training System (CSTS)

General Outcomes	Specific Outcomes
<p>Students will develop an increased awareness of technology to develop a high-quality product or service.</p>	<ul style="list-style-type: none"> • demonstrate knowledge of health hazards associated with the use of chemicals and materials and retrieve information on Material Safety Data Sheets (MSDS) using appropriate print and Internet resources • select and wear personal protective equipment (PPE) appropriate to the specific task • demonstrate knowledge of environmental issues relating to the procedures for handling hazardous waste • demonstrate an understanding of the Workplace Hazardous Materials Information System (WHMIS) as it relates to the field of study and identify WHMIS symbols, classes and labelling requirements • identify and practise good electrical safety habits and identify potential electrical safety hazards in the shop and at home • recognize the health and safety hazards associated with a variety of welding procedures; e.g., identify and demonstrate preventive measures to avoid accidents and injury to themselves and others during welding procedures. <p>Products and Service</p> <p>Technology Integration</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify new and emerging products and technological advances in metal fabrication. <p>Providing Service</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify client relationships or interactions within the field of metal fabrication • identify services required or provided • collect necessary information to complete a purchase or to fill out a work order • recognize the importance of customer or client service to all businesses/ industries • demonstrate professional practices and work habits • strive to meet and exceed the client's expectations.

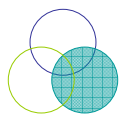
General Outcomes	Specific Outcomes
<p>Students will demonstrate a basic knowledge of, and the skills required to properly use, the tools, equipment and materials used in metal fabrication.</p>	<p>Tools, Equipment and Materials</p> <p>Tools and Equipment</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate the consistent and accurate use of common metal fabrication tools; e.g., <ul style="list-style-type: none"> – demonstrate the accurate use of measuring and layout tools – develop and demonstrate entry-level skills with fastening, cutting and finishing hand tools – demonstrate the correct handling and safe use of stationary machines and equipment • demonstrate correct storage practices and locations for tools, equipment and materials • demonstrate proper care of tools and equipment • explain criteria for the selection of tools appropriate for specific projects • demonstrate straight and curved cuts on metal. <p>Materials</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify samples of sheet stock by their appearance and properties and select appropriate sheet metal for a project; e.g., explain criteria for the selection of metal for specific projects • identify appropriate fastening devices for specific applications; e.g., explain criteria for the selection of appropriate fastening devices.
<p>Students will demonstrate correct welding procedures, using a variety of devices.</p>	<p>Welding Procedures</p> <p>Oxyacetylene</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and name the components of an oxyacetylene welding station • demonstrate safe start-up and shutdown procedures for oxyacetylene cutting equipment • demonstrate proper use of the components of an oxyacetylene welding station • demonstrate oxyacetylene welding competencies; e.g., <ul style="list-style-type: none"> – in vertical and horizontal welding positions – weld butt, lap, T, corner and edge joints using welding coupons • demonstrate pierced holes and straight, irregular and bevelled cuts.

General Outcomes	Specific Outcomes
<p>Students will demonstrate proper assembly and finishing techniques when creating projects.</p>	<p>SMAW</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and name the basic components of a SMAW welding station • demonstrate safe start-up and shutdown procedures for a SMAW welding station • demonstrate basic SMAW welding competencies; e.g., <ul style="list-style-type: none"> – in vertical and horizontal welding positions – weld butt, lap, T, corner and edge joints using welding coupons • identify the characteristics of a good weld bead and self-evaluate their ability to produce welds • identify the characteristics and properties of four common electrodes.
	<p>GMAW</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and name the basic components of a GMAW welding station • demonstrate safe start-up and shutdown procedures for a GMAW welding station • demonstrate basic GMAW welding competencies; e.g., <ul style="list-style-type: none"> – in vertical and horizontal positions – weld butt, lap, T, plug, corner and edge joints using welding coupons • identify the characteristics of a good weld bead and self-evaluate their ability to produce welds; e.g., identify variables that can affect weld quality • identify set-up procedures for flux-cored arc welding (FCAW) (optional).
	<p>Assembly and Finishing</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and select appropriate tools and materials to make a product • demonstrate the proper selection of, and the techniques for using, common fastening devices • explain criteria for the selection of appropriate media used to finish a simple project; e.g., <ul style="list-style-type: none"> – identify major features, from Material Safety Data Sheets (MSDS), on the labels of finishing products – explain the advantages of making accurate, tight fits – make accurate, tight fits continuously • identify and describe appropriate finishing techniques • explain criteria for the selection of surface preparation equipment • demonstrate the ability to prepare surfaces for applying finishes • explain the proper application of metal finishing products.

ENSURING QUALITY

General Outcomes	Specific Outcomes
<p>Students will continue to develop an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.</p>	<p>Task Management</p> <p>Outcomes</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read and/or listen to instructions• ask questions to clarify expected outcomes, procedures and timelines. <p>Decision Making</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the parameters of the task• generate and review alternative ideas and their consequences• make a decision or select an idea. <p>Planning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the steps involved in managing a project• prepare a sample project plan, including budget and timeline• identify available tools, equipment and materials• transfer/lay out a cutting list, from drawings to project material• identify the need for planning in metal fabrication• identify the components of a technological system; e.g., input, process, output, feedback• apply knowledge of technological system processes to projects assigned in the course• identify the purpose of sketches, drawings and blueprints• identify procedures and conventions for drawing sketches and orthographic, isometric and scale drawings• plan and sketch basic shop drawings• create an accurate representation of a simple project. <p>Performance Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify expected standards for a product or service• work to agreed quality standards and specifications• select and use appropriate tools and technology for a task or project.

General Outcomes	Specific Outcomes
	<p>Evaluation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"><li>• identify opportunities for improving quality<li>• establish expectations and measures for improvements<li>• create evidence to support an understanding of task management and skill development for inclusion in a personal portfolio.



ACADEMIC COMPETENCIES: These are the minimum academic competencies that provide a foundation for further learning. The following outcomes are provided as a reminder to address these academic competencies within the occupational context and to reinforce cross-curricular connections.

COMMUNICATION

General Outcomes	Specific Outcomes
<p>Students will demonstrate effective listening, speaking, reading and writing skills.</p>	<p>Listening, Speaking, Reading and Writing</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read, view and interpret occupation-related materials; e.g.,<ul style="list-style-type: none">– use related occupational terms– identify occupation-related literature– interpret and follow written instructions• select and create a text format to suit a purpose and audience, e.g., forms, letters, reports, memos, résumé, and:<ul style="list-style-type: none">– describe uses of writing skills in related occupations– write a letter of inquiry– write a letter of thanks– complete job applications• listen and present information in a clear, concise manner; e.g.,<ul style="list-style-type: none">– listen attentively to organize and classify information and ideas– organize main ideas and key messages with clarity.

THINKING

Students will apply creative thinking skills to solve problems.

Problem Solving, Decision Making and Creative Thinking

Students will:

- apply a problem-solving model to identify the problem/issue
- identify appropriate actions and develop several alternatives for each promising idea
- evaluate the results, in terms of expected outcomes related to the initial problem, and evaluate personal satisfaction with the outcome of the idea; e.g., product/process.

NUMERACY

General Outcomes	Specific Outcomes
<p>Students will apply mathematical concepts to solve occupational problems.</p>	<p>Basic Operations, Patterns and Relationships, Shape and Space, and Statistics and Probability</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• apply arithmetic operations, e.g., addition, subtraction, multiplication or division, to whole numbers and decimals and use number operations when creating and solving money problems• use calculators or computers, to perform calculations involving large and small numbers, when solving problems• apply concepts of rate, ratio, percentage and proportion to solve problems in a meaningful context• demonstrate a number sense for whole numbers 0 to 100 000 and explore proper fractions and decimals• estimate, measure and compare, using decimal numbers and standard units of measure, to solve problems in everyday contexts; e.g., mass, length, volume, time, perimeter, surface area• use metric and imperial units of measure.

INFORMATION TECHNOLOGY

Students will enhance their performance by using information technology to help complete tasks.

Computer Operations and Computer Applications

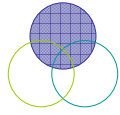
Students will:

- demonstrate appropriate language and etiquette when using information technology
- demonstrate appropriate telephone operations; e.g., answer telephone calls appropriately, locate numbers and make telephone calls
- demonstrate basic computer operations to complete a task; e.g.,
 - use basic keyboarding skills
 - store, organize and retrieve information correctly
 - locate and select information and ideas using appropriate technology and information systems; e.g., Internet
 - access, send and retrieve e-mail and attachments
- demonstrate procedures for connecting and using audio, video and digital equipment
- demonstrate procedures for sending and receiving faxes and setting up a fax machine
- demonstrate procedures for copying and printing documents.

METAL FABRICATION 30-4 GENERAL OUTCOMES

Employability Competencies	Students will develop these competencies throughout the learning process and demonstrate them in daily life and the workplace.
Managing Transitions	<ul style="list-style-type: none"> • Students will consistently demonstrate personal discovery and continuous learning. • Students will manage change effectively to support their goals. • Students will prepare themselves for entry-level employment in an occupation that reflects their personal aptitudes and interests.
Personal Management	<ul style="list-style-type: none"> • Students will exhibit self-esteem and confidence through the achievement of personal goals. • Students will manage risks to achieve both personal and workplace goals.
Working with Others	<ul style="list-style-type: none"> • Students will model effective communication skills and strategies in the home, school, community and workplace. • Students will promote equity in work and community endeavours. • Students will demonstrate the ability to complete tasks in a team environment.
Occupational Competencies	Students will develop and demonstrate the following competencies to succeed in a specific occupation or career.
Achieving Results	<ul style="list-style-type: none"> • Students will prepare for entry-level employment within a metal fabrication career environment. • Students will demonstrate entry-level standards of safe workplace practices and procedures. • Students will use technology to develop a high-quality product or service. • Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in metal fabrication. • Students will demonstrate entry-level welding procedures, using a variety of devices. • Students will demonstrate entry-level assembly and finishing techniques when creating projects.
Ensuring Quality	<ul style="list-style-type: none"> • Students will demonstrate an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.
Academic Competencies	Students will continue to develop these minimum academic competencies that provide a foundation for further learning.
Communication	<ul style="list-style-type: none"> • Students will demonstrate effective listening, speaking, reading and writing skills to prepare for employment.
Thinking	<ul style="list-style-type: none"> • Students will research information, use creative thinking skills and use effective problem-solving strategies to solve problems.
Numeracy	<ul style="list-style-type: none"> • Students will demonstrate mathematical operations to effectively solve problems in a meaningful context.
Information Technology	<ul style="list-style-type: none"> • Students will demonstrate the effective use of information technology to perform daily workplace operations.

METAL FABRICATION 30-4



EMPLOYABILITY COMPETENCIES: These competencies are developed throughout the learning process and are demonstrated in daily life and the workplace. Students will develop and demonstrate these competencies through individual effort and interpersonal interaction while completing a variety of projects/activities.

MANAGING TRANSITIONS

General Outcomes	Specific Outcomes
<p>Students will consistently demonstrate personal discovery and continuous learning.</p>	<p>Lifelong Learning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify learning opportunities related to learning goals, commitments and resources; e.g., <ul style="list-style-type: none"> – identify opportunities for further education/training – locate needed financial support systems – locate needed personal support systems • practise what has been learned to build competence and confidence and evaluate the application of competencies to learning goals • create a plan that demonstrates continuous learning; e.g., <ul style="list-style-type: none"> – analyze requirements for graduation and for further education/training – modify a learning plan to reflect requirements and opportunities.
<p>Students will manage change effectively to support their goals.</p>	<p>Adapting to Change</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • prioritize and assign resources to meet commitments and goals • prioritize commitments and goals to achieve a balanced lifestyle • redefine an action plan as situations change; e.g., <ul style="list-style-type: none"> – use adaptive strategies – redefine personal goals – select personal coping mechanisms • access available and appropriate sources of support • identify opportunities for improvement and innovation; e.g., entrepreneurship.

General Outcomes	Specific Outcomes
<p>Students will prepare themselves for entry-level employment in an occupation that reflects their personal aptitudes and interests.</p>	<p>Career Development</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • analyze elements of job satisfaction; e.g., recognition, environment, pay, benefits, prestige • build personal career paths and networks • analyze how work contributes to societal and economic needs and a sense of responsibility • prepare for employment through community partnership activities and organize and complete specific job tasks effectively and efficiently.

PERSONAL MANAGEMENT

Students will exhibit self-esteem and confidence through the achievement of personal goals.

Self-development

Students will:

- continue to create a long-term self-development plan in which they consider accomplishments and redefine self-development goals
- demonstrate entry-level self-presentation appropriate to the activity and role
- maintain a high standard of personal ethics when interacting with others.

Students will manage risks to achieve both personal and workplace goals.

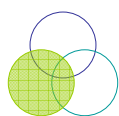
Risk Management

Students will:

- maintain health and safety procedures; e.g., at home, at school, in the community and in the workplace
- monitor success in reducing the impact of hazards on themselves and others
- demonstrate concern for the safety of others by exhibiting appropriate behaviour in the workplace
- work with others to respond to emergencies
- take planned risks to contribute to personal growth.

WORKING WITH OTHERS

General Outcomes	Specific Outcomes
<p>Students will model effective communication skills and strategies in the home, school, community and workplace.</p>	<p>Interpersonal Communication</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• communicate thoughts and feelings appropriately; e.g.,<ul style="list-style-type: none">– listen without interrupting– contribute to be heard– disagree courteously– accept conflicting opinions– use appropriate body language• maintain a balance between speaking, listening and responding• work together to achieve goals• demonstrate the ability to deal constructively with conflict.
<p>Students will promote equity in work and community endeavours.</p>	<p>Building Community</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• demonstrate and model courteous behaviour in daily interactions• demonstrate respect for others and a shared understanding of diverse beliefs, etiquette and styles of interaction• assess their personal contribution to community growth.
<p>Students will demonstrate the ability to complete tasks in a team environment.</p>	<p>Teamwork</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• assess the effectiveness of group and personal contributions; e.g.,<ul style="list-style-type: none">– generate ideas– assess resources– contribute abilities and interests– monitor progress– share responsibility for completion of a task• expand their abilities to contribute to team goals.



OCCUPATIONAL COMPETENCIES: Students will develop and demonstrate the following competencies to succeed in a specific occupation or career. They will achieve results through a variety of projects/activities as appropriate to enhance their knowledge and skills. Students will ensure the quality of their work through effective task management and will highlight their achievements in a career-based portfolio.

ACHIEVING RESULTS

General Outcomes	Specific Outcomes
<p>Students will prepare for entry-level employment within a metal fabrication career environment.</p>	<p>Career Awareness</p> <p>Preparation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • assess entry-level competencies • recognize opportunities for further education/training • select post-secondary opportunities • identify local entrepreneurs • establish contacts with local businesses/industries • present marketable skills and strengths; e.g., <ul style="list-style-type: none"> – write a letter of application – prepare a résumé – complete application forms – identify contacts and references – collect evidence of competencies in a portfolio. <p>Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate workplace protocols, procedures and standards of conduct; e.g., <ul style="list-style-type: none"> – demonstrate appropriate work habits – demonstrate effective human-relations techniques in the workplace – practise safety in the workplace – demonstrate acceptable verbal and nonverbal communication skills – practise personal and public hygiene procedures – demonstrate entry-level competency in tools and equipment usage – use supplies correctly – follow good storage practices – demonstrate pride in their work performance – demonstrate a willingness to work – demonstrate respect for others – follow accepted principles and procedures – recognize opportunities for further education/training.

General Outcomes	Specific Outcomes
<p>Students will demonstrate entry-level standards of safe workplace practices and procedures.</p>	<p>Workplace Health and Safety</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and explain the use of safety devices within the workplace • demonstrate knowledge of, and the ability to access information about, Occupational Health and Safety (OHS) and the Workers' Compensation Board (WCB) • demonstrate a prework and postwork hazard assessment • demonstrate knowledge of, and adherence to, safety rules that are specific to available tools, equipment and materials; e.g., use interactive or online programs such as the Construction Safety Training System (CSTS) • demonstrate knowledge of health hazards associated with the use of chemicals and materials and retrieve information on Material Safety Data Sheets (MSDS) using appropriate print and Internet resources • model safety consciousness by selecting and wearing personal protective equipment (PPE) appropriate to the specific task • demonstrate knowledge of environmental issues relating to the procedures for handling hazardous waste • demonstrate an understanding of the Workplace Hazardous Materials Information System (WHMIS) as it relates to the field of study and identify WHMIS symbols, classes and labelling requirements.
<p>Students will use technology to develop a high-quality product or service.</p>	<p>Products and Service</p> <p>Technology Integration</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • use new and emerging products and technological advances in metal fabrication; e.g., examine the effects of current technological advances in the metal fabrication industry and explain the impact of current technology on the job descriptions of future metal fabrication trade workers. <p>Providing Service</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify client relationships or interactions within the field of metal fabrication • identify services required or provided • collect necessary information to complete a purchase or to fill out a work order • recognize the importance of customer or client service to all businesses/industries • demonstrate professional practices and work habits • strive to meet and exceed the client's expectations.

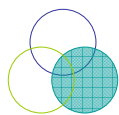
General Outcomes	Specific Outcomes
<p>Students will demonstrate entry-level knowledge of, and the skills required to properly use, the tools, equipment and materials used in metal fabrication.</p>	<p>Tools, Equipment and Materials</p> <p>Tools and Equipment</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate consistent and accurate use of common metal fabrication tools; e.g., <ul style="list-style-type: none"> – develop and demonstrate entry-level skills with measuring, layout, fastening, cutting and finishing hand tools – select appropriate tools for a variety of applications • demonstrate consistent safe handling and use of stationary machines and equipment • display consistent and correct storage procedures for tools, equipment and materials • demonstrate the consistent, proper care of tools and equipment • select tools appropriate for specific projects • display, continuously, accurate and high-quality straight and curved cuts on metal • identify and differentiate between types of destructive and nondestructive testing • evaluate their personal work through destructive testing. <p>Materials</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • select appropriate metal stock for use in projects • identify and select different types of carbon steel for a variety of applications • demonstrate a spark test to identify a variety of ferrous and nonferrous metals • explain criteria for the selection of carbon steel for specific projects • understand basic metallurgy concepts • demonstrate the consequences of tempering and cold quenching • select appropriate fastening devices for a variety of applications.

General Outcomes	Specific Outcomes
<p>Students will demonstrate entry-level welding procedures, using a variety of devices.</p>	<p>Welding Procedures</p> <p>Oxyacetylene</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate consistent and safe start-up and shutdown procedures for an oxyacetylene welding station • demonstrate basic oxyacetylene welding competencies; e.g., <ul style="list-style-type: none"> – use appropriate welding positions based on the task, including the overhead position – weld butt, lap, T, corner and edge joints, using welding coupons • identify applications appropriate for brazing; e.g., describe the advantages and disadvantages of brazing and braze welding • demonstrate basic brazing competencies; e.g., <ul style="list-style-type: none"> – braze in all positions – weld lap and T joints, using welding coupons • demonstrate consistent, high-quality pierced holes and straight, irregular and bevel cuts. <p>SMAW</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate consistent and safe start-up and shutdown procedures for a SMAW welding station • demonstrate basic SMAW welding competencies; e.g., <ul style="list-style-type: none"> – use appropriate welding positions based on the task, including the overhead position – weld butt, lap, T, corner and edge joints, using welding coupons • identify the characteristics of a good weld bead and self-evaluate their ability to create welds • select appropriate weld electrodes based on their characteristics and properties. <p>GMAW</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate consistent and safe start-up and shutdown procedures for a GMAW welding station • demonstrate basic GMAW welding competencies; e.g., <ul style="list-style-type: none"> – use appropriate welding positions based on the task, including the overhead position – weld butt, lap, T, plug and corner joints, using welding coupons • identify the characteristics of a good weld bead and self-evaluate their ability to create welds • identify set-up procedures for flux-cored arc welding (FCAW) (optional).

General Outcomes	Specific Outcomes
<p>Students will demonstrate entry-level assembly and finishing techniques when creating projects.</p>	<p>GTAW</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • demonstrate consistent and safe start-up and shutdown procedures for a GTAW welding station • demonstrate GTAW welding competencies; e.g., <ul style="list-style-type: none"> – in all positions – weld butt, lap, T and corner joints, using welding coupons; e.g., mild steel and/or aluminum and/or stainless steel • identify the characteristics of a good weld bead and self-evaluate their ability to create welds; e.g., identify variables that can affect weld quality.
	<p>Plasma Arc</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and name the basic components of a plasma arc cutting station • identify safe start-up and shutdown procedures for a plasma arc cutting station.
	<p>Carbon Arc</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • identify and name the basic components of a carbon arc cutting station • identify safe start-up and shutdown procedures for a carbon arc cutting station.
	<p>Assembly and Finishing</p> <p><i>Students will:</i></p> <ul style="list-style-type: none"> • select appropriate tools and materials to construct a product • demonstrate installation techniques for common fastening devices • perform appropriate welding procedures based on project requirements • select appropriate media used to finish projects; e.g., identify major features, from Material Safety Data Sheets (MSDS), on the labels of finishing products • select and demonstrate appropriate finishing techniques; e.g., grinding, chipping, buffing, sanding • select appropriate surface preparation equipment for projects • demonstrate consistent and accurate joint preparation before welding • demonstrate the entry-level ability to prepare surfaces for the application of a variety of finishes • identify and apply appropriate finishing products.

ENSURING QUALITY

General Outcomes	Specific Outcomes
<p>Students will demonstrate an understanding of the value of effective task management processes by applying knowledge and skills to simulated and actual work situations.</p>	<p>Task Management</p> <p>Outcomes</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read and/or listen to instructions• ask questions to clarify expected outcomes, procedures and timelines. <p>Decision Making</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the parameters of the task• generate and review alternative ideas and their consequences• make a decision or select an idea. <p>Planning</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify the steps involved in managing a project• prepare a sample project plan, including budget and timeline• identify available tools, equipment and materials• identify the need for planning in metal fabrication• identify the purpose of sketches, drawings and blueprints• identify procedures and conventions for drawing sketches and orthographic, isometric and scale drawings• plan and sketch basic shop drawings and create an accurate representation of a simple project• transfer/lay out a cutting list, from drawings to project material. <p>Performance Standards</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify expected standards for a product or service• work to agreed quality standards and specifications• select and use appropriate tools and technology for a task or project. <p>Evaluation</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• identify opportunities for improving quality• establish expectations and measures for improvements• create evidence to support an understanding of task management and skill development for inclusion in a personal portfolio.



ACADEMIC COMPETENCIES: These are the minimum academic competencies that provide a foundation for further learning. The following outcomes are provided as a reminder to address these academic competencies within the occupational context and to reinforce cross-curricular connections.

COMMUNICATION

General Outcomes	Specific Outcomes
<p>Students will demonstrate effective listening, speaking, reading and writing skills to prepare for employment.</p>	<p>Listening, Speaking, Reading and Writing</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• read, view and interpret occupation-related materials for a specific purpose; e.g.,<ul style="list-style-type: none">– read related health and safety documents– read terms of employment documents– follow written instructions specific to an occupational area• create text for a specific purpose that clearly communicates information; e.g.,<ul style="list-style-type: none">– write a résumé– write a job description– submit job application forms• communicate thoughts and ideas and listen to the thoughts and ideas of others to effectively complete a task; e.g.,<ul style="list-style-type: none">– follow oral instructions– give effective oral instructions when necessary.

THINKING

Students will research information, use creative thinking skills and use effective problem-solving strategies to solve problems.

Problem Solving, Decision Making, Finding Information and Creative Thinking

Students will:

- demonstrate an effective problem-solving model; e.g.,
 - identify the need for a solution to a problem/issue
 - identify why information is needed; e.g., make decisions, inform, persuade
- identify appropriate actions and select and apply information that meets their purposes and needs
- evaluate the results in terms of expected outcomes and assess the impact of information on their purpose and audience.

NUMERACY

General Outcomes	Specific Outcomes
<p>Students will demonstrate mathematical operations to effectively solve problems in a meaningful context.</p>	<p>Basic Operations, Patterns and Relationships, Shape and Space, and Statistics and Probability</p> <p><i>Students will:</i></p> <ul style="list-style-type: none">• apply arithmetic operations, e.g., addition, subtraction, multiplication or division, to whole numbers and decimals and use number operations when creating and solving money problems• use calculators or computers, to perform calculations involving large and small numbers, when solving problems• apply concepts of rate, ratio, percentage and proportion• demonstrate a number sense for whole numbers 0 to 100 000 and explore proper fractions and decimals• estimate, measure and compare, using decimal numbers and standard units of measure, to solve problems in everyday contexts; e.g., mass, length, volume, time, perimeter, surface area• use metric and imperial units of measure.

INFORMATION TECHNOLOGY

Students will demonstrate the effective use of information technology to perform daily workplace operations.

Computer Operations and Computer Applications

Students will:

- model and assume personal responsibility for the ethical use of information technologies
- demonstrate appropriate telephone operations within the workplace; e.g., answer telephone calls appropriately, locate numbers and make telephone calls
- use computer operations to assist in the completion of daily workplace operations; e.g.,
 - use basic keyboarding skills
 - store, organize and retrieve information correctly
 - locate and select information and ideas using appropriate technology and information systems; e.g., Internet
 - access, send and retrieve e-mail and attachments
- demonstrate procedures for connecting and using audio, video and digital equipment
- demonstrate procedures for sending and receiving faxes and setting up a fax machine
- demonstrate procedures for copying and printing documents.