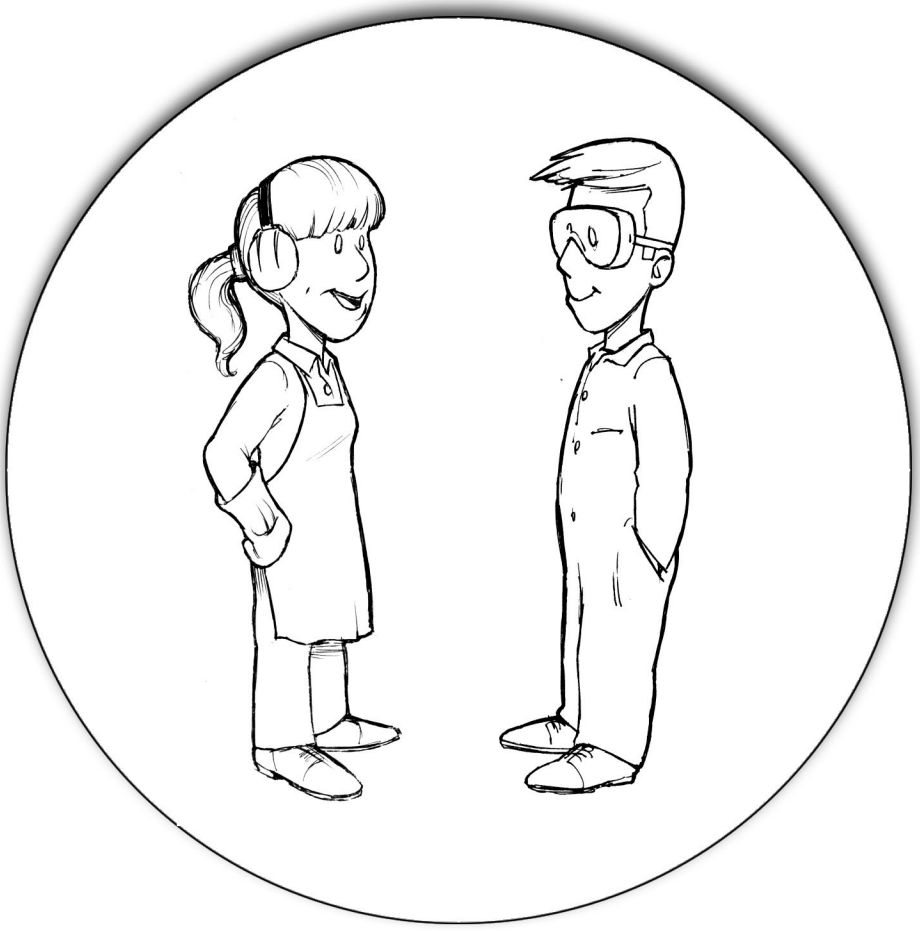
A Safety Handbook for Technology Education Teachers

HEADS UP! for Safety



CENTRE FOR CURRICULUM, TRANSFER & TECHNOLOGY

WorkSafe™

WORKERS' COMPENSATION BOARD OF BRITISH COLUMBIA

BRITISH COLUMBIA
Ministry of Education

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Disclaimer

Ministry of Education (MEd) and the Workers' Compensation Board of BC (WCB) developed this instructional guide and materials. The aim is to assist in the prevention and reduction of injury and disease in technical education shops in BC secondary schools. However, MEd and WCB cannot and do not warrant the accuracy or the completeness of this instructional guide and materials, and as a result, they will not be liable to any person or organization for any loss or damage of any nature, whether arising out of negligence or otherwise, which may be occasioned as a result of the use of this instructional guide and materials.

List of Resource Materials

Acknowledgements

HEADS UP! for Safety is a safety manual for technology educators in BC. It was prepared with the assistance of Workers' Compensation Board, Risk Management Branch of the Ministry of Finance, and Curriculum Branch of the Ministry of Education. The goal of the project (as envisioned by the BC Technology Education Association) was to create a standard guide for occupational health and safety in technology education and trades training facilities in BC. Technical expertise was provided by:

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Preface

In 2001 the Schools Protection Program and the Workers' Compensation Board identified a need to provide an acceptable standard of safety throughout technology education classes in BC.

For the Schools Protection Program, this recognition came as a result of a report on the number of accidents in public schools throughout the province. Even though the majority of accidents occurred on the playground or in the gym, the accidents which took place in shop classes were more likely to result in serious injuries and litigation.

Workers' Compensation Board (WCB) studies reveal that young workers between the ages of 15 and 24 are at the highest risk for injury. This is attributed to overconfidence, lack of training and experience, a reluctance to appear 'stupid' or scared, lack of maturity to make sound judgements about safety, and a sense of invincibility. Workers' Compensation Board statistics show that, in BC, on average:

- 44 young workers are injured every working day;
- 5 young workers are permanently disabled each week as a result of accidents at work; and
- In 2000, 1 in 23 young workers were injured on the job.

Based on the analysis of their reports, the Schools Protection Program and the Workers' Compensation Board sought the cooperation of the BC Ministry of Education and the BC Technology Education Association in the development of this safety handbook.

Introduction

Educators have a responsibility, to both students and their parents, to provide a safe learning environment in which the risk of personal injury is low. For technology educators, however, this responsibility is compounded by the fact that students generally have little or no experience working in hazardous environments where the knowledge of risks and the need for safe work practises are crucial.

This handbook was designed to provide you, the instructor, with assistance in your efforts to teach specific skills and best practises within the context of a broader shop safety program. In support of the safety-related learning outcomes prescribed by the Technology Education Integrated Resource Package, this handbook outlines best practises and minimum standards required in shop classes throughout BC in an effort to keep students safe and to provide them with an awareness of the importance of safety in the workplace.

The title ***"HEADS UP! for Safety"*** was designed to attract the attention of people who deal with their own and other's safety—people who are in a position to reduce the number of accidents by following safe work practises. It symbolizes a need for awareness and caution about the environment they are in, and for the well-being of themselves and others.

The words "Heads Up" are used throughout the English-speaking world to draw people's attention to something that is happening around them—someone passing close by, an object moving within close range, a signal of danger ahead, etc. Whenever and wherever the words are used, it is generally in relation to safety.

For this shop safety handbook, the words "HEADS UP!" have been adopted as an acronym to represent the following:

Hands are the most vulnerable part of the body.
Eyes and ears also need protection.
Ask when you are not sure!
Dress safely using the appropriate protection.
Safety devices must always be used as intended.
UP!

Students are, or soon will be, part of the workforce. Technology education classes provide a perfect opportunity to teach them about the importance of safety in the work place while providing them with skills they need to get ahead.

Implementing Safety in a Technology Education Program

Educating students about shop safety can be a challenge—how do you provide them with enough information to ensure their safety without overwhelming them or losing their interest? And what do you do about those students who are inclined to disregard safety instructions with a wave of bravado and misplaced confidence? Unfortunately, we can't solve the problems in your shop area, but we can offer you some suggestions on how to build safety into your current and future programs.

We suggest that a technology education safety program be organized into manageable units that focus on the important safety points and repeat the crucial ones. Following is an outline of the process we recommend for integrating safety into your shop program:

1. Provide an introductory lesson about safety in shop settings for all students entering a technology education program. Alert students to the health and safety issues that arise, the roles and responsibilities of everyone involved, as well as appropriate attitudes in the work place.

2. Supply basic safety instruction on the general use of hand tools and the handling of industrial materials. This lesson could be given to students before they move from the design phase of a project to the implementation stage.

3. Give a general overview on the safe use of portable power tools for all students enrolled in shop programs.

4. Discuss generic safety considerations and procedures that apply to the use of all stationary power tools and equipment. This lesson could be given to students as they approach the phase of their project work that requires the use of power tools.

5. Provide instruction and testing on the safe use of each power tool before qualifying students to use the tool in the school shop.

When giving a lesson on a particular tool, describe (simply and briefly) **and** demonstrate the tool and how it operates. Each lesson should cover the following areas:

- purpose of the tool;
- operation of the tool;
- potential hazards of the tool; and
- controlling the hazards.

In teaching about potential hazards, students should be encouraged to think about the action/reaction that takes place between the tool and the material—does the action of the tool threaten kickback? eject debris? generate heat? If students learn to ask and answer these kinds of questions for themselves, they will have acquired a valuable skill in regards to their own and others' safety—the ability to predict and control hazards.

When a teacher makes safety an integral part of the instructional program, it is learned in much the same manner as skills and operations. However, safety can also be 'caught' as readily as 'taught,' implying that proper safety attitudes and practices are contagious and their development strongly influenced by the teacher's attitude and conduct in the shop. Safety does not just happen, but is the result of a well-planned program administered and modeled by the technology education teacher.

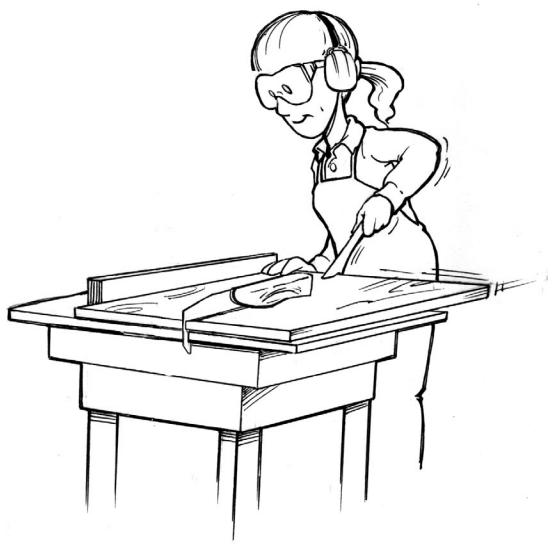


Table Saw Accident

Student using a table saw had three fingers severed when the dado blade caught on the wood and the wood slipped away from the blade exposing the hand to the saw. Student was not using a push stick and a proper guard was not in place. Safety tip: Students need to be instructed to use a push stick or feather stick and proper guards need to be installed and used.

Suggested Strategies

Teaching and implementing safety in a technology education program does not have to be dry or boring. You want your students to be attentive to what you are teaching them, for it may mean their life and/or the lives of those around them, including yours!

From an instructional perspective, there are two main approaches to teaching safety in the shop area—separated and integrated. You will likely include elements of both styles in your safety program.

- The **separated approach** is where you design and teach individual units on specific safety topics such as lab conduct, general use of hand and power tools, proper clothing, eye safety, hearing protection, use of fire extinguishers, reporting of unsafe conditions and accidents, etc.
- The **integrated approach** is where you design and teach units on skill development and/or machine operation that include safe use and practise. This approach allows you to integrate safety as 'part and parcel' of the skill being taught.

Following are some recommended strategies for implementing safety training into your existing shop programs.

Demonstration

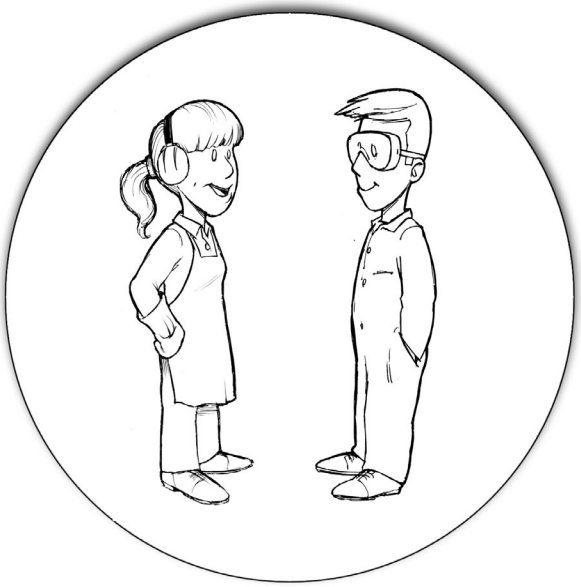
"Actions speak louder than words" is a phrase that is well suited to classroom instruction about safety, particularly for shop students who chose your class because they want to "do" something rather than listen to another lecture. A variety of means can be used to demonstrate safety:

- Demonstrate the set-up and operation of each machine.
- Set up the shop to replicate a hazardous work area (e.g. spills on the floor, locker doors left open, power tools left turned on, extension cords where they can trip people, safety guards detached from the equipment, improper storage of hazardous materials, empty fire extinguishers, emergency exit blocked). Then ask the students to carefully conduct a health and safety inspection of the shop, and have them explain what is wrong and why. When the exercise is over, they can all work together to make the shop a safe place to work again.
- Demonstrate the danger of a small, fast moving object. Have the students huddle in a tight group directly in front of you. Using a medicine ball and a bat, hit the ball directly at them. Then switch to a hardball—but don't hit it! Your students should get the point.
- Demonstrate the average person's reaction time in relation to the speed of a blade or cutter.
- Take your students out into the shop area and demonstrate mock accidents to show them what can go wrong if they neglect to follow the safety rules in the shop.
- Keep evidence of accidents and demonstrate or explain to students what went wrong at the time the accident occurred and the injuries suffered.

Student Participation

People generally remember more of what they learn if they are actively involved during the learning process. So, whenever possible, offer students an activity where they can actually do something to demonstrate safe work practises. The most obvious, of course, is to ask them to perform a new task modeling the safe work practises you have taught them. Other methods include:

- Ask students to research a certain aspect of safety in the shop area. Then ask them to present a mock demonstration of the correct and incorrect ways to perform the task and explain the consequences.
- For those who have a talent for art, you might suggest they research and design a poster about safety that will appeal to their age group.
- Following a simulated work accident, have students fill out an accident report and discuss as a group.
- Ask students to share with the class their own experiences of accidents that occurred because safety was not practised.



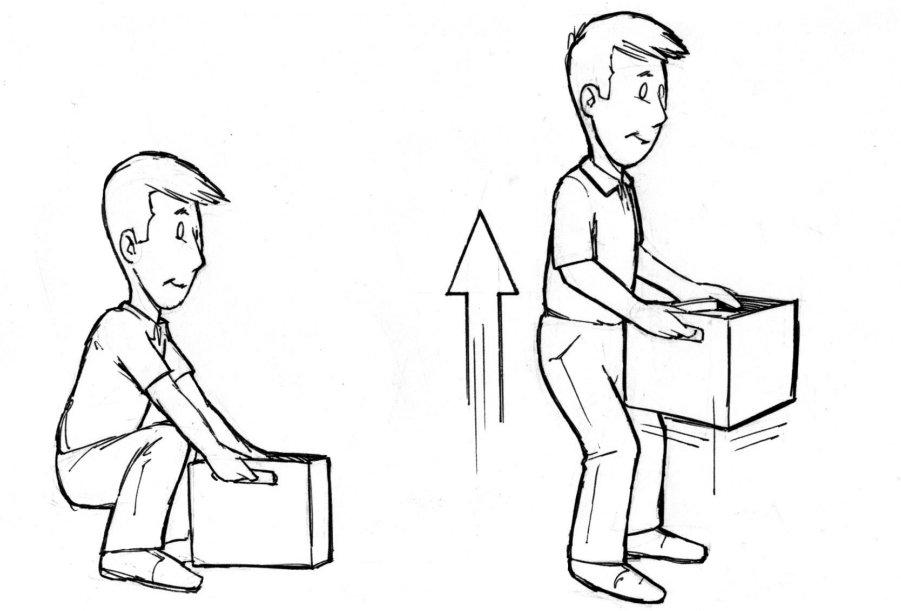
The issue of safety in the workplace has necessitated the development of a number of initiatives to encourage people to think about and practise safe work habits on the job. Some of these same initiatives could be implemented into your shop program:

- Pledges – have students sign a pledge form or a statement of commitment stating that they are familiar with the safety practises and procedures required in the shop.
- Committee – have students form a safety committee to monitor the activities in the shop.
- Competitions – implement inter-class competitions for accident-free days.
- Bonus Marks/Awards – give bonus marks/awards to students who maintain good safety records.
- Operator's Card – provide each student with a card identifying which machines they can work on independently based on having met the required safety standards.

Community Resources

Take advantage of the resources in your community to demonstrate to students that safety is a very important part of working in the 'real' world.

- Arrange for an industrial tour to promote the importance of a good safety program in the workplace.
- Invite accident victims to speak directly with students.
- Invite people from the community to speak to your class about the benefits of working safely (industrial safety supervisor, WCB safety officer, rehabilitation counselor, physiotherapist, paramedic, shop manager, etc.).



Classroom Resources

- bulletin boards
- charts, posters
- safety rules
- library
- WCB resources

Testing for Comprehension

As an instructor, you must test to make certain that your students have learned the importance of safety in the shop area, and that they are willing and able to practise the safe work habits that you have taught them. Some methods of evaluating their knowledge include:

- Performance tests where each student must pass a written exam identifying how to perform certain skills or operate specific equipment safely.
- Demonstration tests where each student must demonstrate the ability to perform the skill or operate the equipment safely before you give them permission to work independently in that area.

Jointer Accident

Student A showed Student B how to use a table-mounted jointer. Student B engaged the equipment's start mechanism causing severe injuries to the hand of Student A resulting in partial amputation to his fingers. Safety tip: Students need to be properly instructed and tested on all equipment.

Shop Responsibilities

Safety in the shop is everyone's business. Following is a list of responsibilities as adapted from the Workers' Compensation Board in their *WorkSafe Online* document entitled, "Safety on the job is everyone's business." (website: http://www.worksafebc.com/publications/Health_and_Safety_Information/by_industry/assets/pdf/safetyonthejob.pdf)

Employer *(School District)*

- provide a safe environment
- take action immediately when the worker or supervisor tells you about a potentially hazardous situation
- initiate an immediate investigation into accidents
- report serious staff accidents to WCB; report student accidents to the school district office and the Schools Protection Program (see Schools Protection Program Manual)
- provide adequate First Aid facilities and services
- provide personal protective equipment where required

Supervisor (*Shop Teacher*)

- instruct new students in safe work procedures
- train students for all tasks assigned to them and check their progress
- ensure that only authorized, adequately trained students operate tools and equipment
- enforce safety regulations
- correct unsafe acts and conditions
- identify students with problems such as drugs or alcohol that could affect their safety and the safety of others; follow up with interviews and referrals where necessary
- formulate safety rules and inspect for hazards in your own area
- keep accurate safety and training records
- complete a Schools Protection Program Incident Report each time an accident occurs

Employee (*Student*)

- know and follow safety and health procedures affecting your work
- if you don't know, ask for training before you begin work
- work safely and encourage your classmates to do the same
- correct or immediately report any unsafe conditions to your teacher
- take the initiative—make suggestions for improved safety conditions

Note: Students are not employees and, therefore, if injured, are not entitled to Workers' Compensation Benefits.

Assessment Tools

Record Keeping

In order to qualify students to work with minimal supervision on shop equipment, you will need to keep accurate records to verify that they have met the necessary criteria:

- Did they attend the demonstrations on how to use the equipment?
- Did they complete and pass the safety test?
- Did they attend/pass a make-up if they missed the demonstration or test?

The importance of maintaining this information cannot be stressed enough. Not only will it give you some 'peace of mind' knowing who qualifies to use the equipment, but it will provide you with the required information should an issue of liability arise.

In BC, a student or their family has the right to make a claim for an injury that occurred during a school activity up until the student reaches the age of 21. **All** class records must be kept for seven years; in the case of an accident, they must be kept for ten years. As you will see in the sample case studies provided in this handbook, in a court of law, the shop teacher may be expected to identify the student's skill level and training up to the point when the accident occurred. Without accurate class records, your chances of remembering this information is poor.

Circular Saw Accident

A student was using a circular saw and contacted the saw blade with his right hand. There was no safety guard over the blade and significant injuries to the student's thumb and fingers resulted in a permanent disability. If a safety guard had been in place it would have been impossible for the accident to have occurred the way it did. Safety tip: Equipment without safety guards should be withdrawn from use until proper safety guards are installed.

Assessing the Risks

Shop teachers have a duty to conduct risk assessments to ensure protection against hazards in the shops. Conducting risk assessments is fundamental to preventing and reducing injuries and diseases.

What Does a Risk Assessment Involve?

Assessing the risks involves identifying the hazards that exist and assessing the impact of the identified hazards on those that work in the area. A hazard is a thing or condition that may expose a person to a risk of injury or occupational disease. Assessing the risk means determining the likelihood that the hazard may lead to injury and/or disease. In other words, determine if the risk is low, medium or high. For example, a tripping hazard is present when an extension cord is placed across an area in the shop. The risk, however, may be low or high dependent on a number of factors. The risk may be low if no one ever walks in that area. The risk may be high if any one of the following is present: the area is used frequently by students and/or teachers, the lighting in the area is poor, and/or there are no warning signs or devices to indicate there is a hazard.

Controlling the Risks

Once hazards are identified and risks are assessed, the risks need to be controlled. To ensure protection against a hazard, a hierarchy of risk control planning is used within the health and safety professional community:

1. Reduce the risk
    - Can the task be avoided?
    - Can the hazardous part of the task be removed?
    - Can it be done in such a way that students are not exposed to the hazard?

2. Substitute with something else to produce a less hazardous situation
    - Can a different machine or tool be used?
    - Can less hazardous materials or chemicals be substituted?
    - Can different work practices be developed to reduce exposure to the hazard?

3. Implement an engineering control
    - Can the layout arrangements, equipment, materials, or other aspects of the physical work environment be re-designed?
    - Can the hazard be controlled at its source (e.g. local ventilation)?
    - Can the hazard be enclosed (e.g. noise control)?
    - Can a physical barrier be provided (e.g. guarding)?

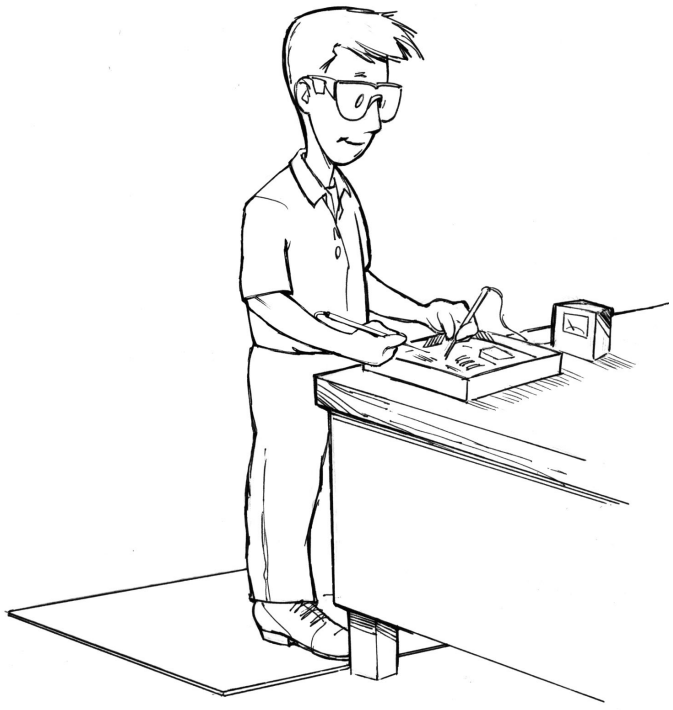
4. Apply an administrative solution
    - Can tasks be organized, scheduled and coordinated differently (e.g. two students do the lift instead of one)?
    - Can the shop be reorganized to provide distance between the hazard and the students?
    - Can tasks be scheduled to reduce the individual exposure to the hazard (e.g. providing regular breaks, rotating work assignments)?

5. Provide personal protective equipment (PPE)
    - PPE should only be used when the other four options discussed above have been considered and found to be impracticable.
    - Is PPE provided?
    - Are students trained in the proper use of PPE?
    - Are students following safe work procedures when using PPE?

To summarize, assessing and controlling risks is a continuous and fluid process. The four key elements are:

- Identifying hazards;
- Assessing the likely consequences of the hazards;
- Assessing exposure to the hazards; and
- Assessing probability of injury and/or disease.

The goal is to prevent or reduce the risk of injury and disease.



Liability

The law places a very strict 'duty of care' upon School Districts and teachers with respect to students in shop classes. School Districts are required to provide safe equipment and teachers must provide proper instruction in the use of dangerous machinery. According to legal principles, the duty of care required is determined by the following factors:

1. The **probability** of an accident happening;
2. The **potential** severity of such an accident; and
3. The **costs** of reducing risk.

Judges have determined that there is a high probability of risk if safety instructions are not given clearly and carefully to students receiving instruction in the use of power tools and machinery. Consequently, if an accident happens and a student is injured, the courts may judge relatively minor omissions in instruction to be an act of negligence and find the teacher (and thus the School District, as employer) responsible, or partially responsible, for the student's injuries.

Source: Industrial Education – Safety is Everyone's Responsibility, Risk Ed, Vol., Issue 3, May 1994

Vicarious Liability

Normally, it is the school board who will be held to be liable for the negligence of teachers, administrators, or other employees. This liability arises under the doctrine of vicarious liability which provides that an employer is liable for the torts committed by an employee while acting in the course of employment. The phrase 'in the course of employment' generally encompasses those authorized acts of an employee which are wrongful, and unauthorized ways of performing an authorized task. Therefore a board will not only be liable if a teacher is negligent in carrying out an assigned task, but may also be liable where the negligent acts occur during the course of unauthorized conduct. But see Beauporlant et al. v. Board of Trustees of Separate School Section No. 1 of Appley (1995) 4 D.L.R. 558, where the Court held that even though a school board is liable for the negligent acts of its teachers, such acts must fall within the 'scope of employment.' The court concluded that a teacher who gave students half a holiday for a field trip to a nearby town without obtaining consent from the school board, and who was negligent in arranging the type of transportation, exceeded his authority and there was no basis for assigning responsibility to the school board.

Duty of Care

Historically, the courts have imposed a special duty of care on teachers and school districts commonly referred to as the rule of the careful parent. It was modified by a decision of the Supreme Court in Myers et al v. Peel County Board of Education. The court identified a number of factors which would be considered to determine if the standard of care had been met in a particular case:

1. The number of students being supervised at any given time;
2. The nature of the exercise of activity in progress;
3. The age and degree of skill and training which students may have received in connection with such activity;
4. The nature and condition of the equipment in use at the time;
5. The competency and capacity of the students involved; and
6. A host of other matters which may be widely varied but which, in a given case, may effect the application of the prudent parent standard to the conduct of the school authority in the circumstances.

Source: Jennifer Canas, Langley School District

Safety

Safety comes from man's mastery of his environment and himself.

It is won by individual effort and group cooperation.

It can be achieved only by informed, alert,

skillful people who respect themselves

and have a regard for the welfare of others.

Author Unknown

Teacher's Duty of Care Checklist

If you can answer yes to the following questions, you should feel confident that you have met the duty of care required by law:

- Ç Do you know and understand your health and safety responsibilities?
- Ç Do you have systems in place to identify and control hazards?
- Ç Have you integrated health and safety into all aspects of your teaching?
- Ç Do you make health and safety a part of a student's overall mark?
- Ç Have you committed appropriate resources to health and safety?
- Ç Have you assigned health and safety responsibilities to the students?
- Ç Have students been given sufficient instruction and training so they can successfully discharge their health and safety responsibilities?
- Ç Do you keep records of the instruction each student has received, especially in regards to health and safety?
- Ç Do you keep records of your program activities and improvements?
- Ç Do your records show that you take disciplinary action when necessary?
- Ç Do you review your safety instructions, procedures and policies at least once a year and make improvements, as needed?
- Ç Do you make adequate accommodations for students with special needs?
- Ç Do you properly supervise each student to ensure they are carrying out their class activities as required?

Case Studies

A number of school accidents have resulted in litigation in the BC court system. The following case studies have been provided to give you some insight into how the courts view the issue of liability, and to reinforce the need for precautions to protect your students from injury and yourself from liability.

Case No. 1	**Loss of Arm**
Location	Metal Shop
Incident	A grade 10 student lost his lower arm while assisting the operator of a metal lathe.
Circumstances	Student A was operating a metal lathe in an after-school Stagecraft class. He was turning the end of a long piece of round metal stock that protruded through the head stock. Student A asked Student B to put on a pair of leather gloves and cradle the end of the stock as it turned to minimize wobbling from the protruding end. Student B did as he was asked. The stock grabbed Student B's gloves and an unbuttoned sleeve of his jean jacket. Even though the machine was shut off almost immediately, Student B's arm was twisted from its socket at the shoulder and broken in two places. It was held together only by sinews. One of the two shop teachers present at the time was qualified in Industrial First Aid. He laid the student on a bench and used pressure points to prevent Student B from bleeding to death. An ambulance arrived shortly thereafter. During extensive surgery the arm was reattached but efforts to restore circulation to the lower arm were not successful. The arm had to be amputated at the elbow. Student B was eventually fitted with a prosthesis.
Liability	After a thorough investigation, it was found that there was no negligence on the part of the teachers. Although both were present in the shop, the procedure that resulted in the accident happened without their prior knowledge or permission. It was found that adequate instruction and supervision was in place.

Case No. 2	**Hand Injury**
Location	Wood Shop
Incident	A student in a grade 9 shop class severely cut three fingers on her left hand while using an electrically operated wood planer.
Circumstances	The student testified that the injury occurred when she experienced a problem while operating the planer—it was clogging up with chips and sawdust as she was using it. During her first attempt to solve the problem, she shut off the planer, lifted the rubber flap with her dominant left hand, and scraped the chips and sawdust into the dust collector at the back of the table with her right hand. However, the problem continued. During her second attempt to solve the problem, she lifted the safety flap and scraped the chips and sawdust towards the dust collector **while the machine was running**. Her left hand came into direct contact with the planer's cutting head. Three fingers were severely cut. Before the accident, the student had received safety instruction in grades 8 and 9 on the use of power tools and machinery. She was also instructed to never make any adjustments of any kind while a machine was running, to keep her hands away from moving parts, and to ask for help when she had a problem. The teacher, who had over 10 years of experience as a shop teacher, emphasized the importance of safety and tested his students in this area. Only those who achieved high marks were allowed to operate all the woodworking machinery. In regards to the planer, the teacher could not remember any particular instructions on what to do if the planer was clogged, as this was a very rare occurrence. His advice in the past was to bang on the dust collector from the outside.
Liability	The student's parents sued the teacher, claiming that he was negligent in failing to properly instruct the student in the use of a planer, i.e., to clearly advise the student that it was highly dangerous to attempt to clear chips and sawdust from the planer while it was still running. They also alleged that the School District was negligent in that it did not provide a properly guarded planer (a screwed-on metal guard vs. the existing rubber flap). During the two years following the accident, the student underwent nine surgical procedures. Although she made a good recovery, she will be permanently limited in performing manual tasks that require dexterity in both hands. Consequently, her ability to earn income could be negatively impacted. After hearing the evidence, the court concluded that: • the teacher omitted to give adequate instruction on the dangers of lifting the flap and manually unclogging the planer while it was operating. This omission amounted to negligence. • the student, in failing to heed the instructions to turn off the machine before lifting the flap and clearing the shavings, was also negligent. • the School District, in failing to install a metal guard over the opening of the cover, was also negligent. The court split financial responsibility of negligence three ways: teacher – 20%; School District – 20%; and student – 60%. Because the School District was vicariously liable for the negligence of the teacher, it paid 40% of the damages. The student did not receive compensation for her share of the damages.

Case No. 3	**Hand Injury**
Location	Wood Shop
Incident	A student was injured when the push stick he was using slipped off the end of the wood causing his left hand to go over the front of the board and come in contact with the knives of the jointer.
Circumstances	The student was familiar with the operation of the jointer, having received proper instruction in its safe operation. There was no defect in the jointer, but the push stick was defective.
Liability	The court concluded that the student was 65% contributorily negligent because the student should have examined the push stick before using it. The teacher was assessed 35% negligent as proper precautions had not been taken to ensure that defective or damaged push sticks were not available for student use.

Case No. 4	**Leg Injury**
Location	Wood Shop
Incident	While two students were standing talking in front of a revolving sanding wheel, one student flicked a chisel blade up and down close to the sanding wheel. The chisel blade hit the perimeter of the sanding wheel and became temporarily embedded in the wood. Centrifugal force caused the chisel to spring downward. It penetrated the student's right thigh, severing his femoral artery.
Circumstances	The student's parents sued the teacher and the School District for negligence. They suggested that the teacher was not in the classroom at the time of the accident, and that the sanding wheel was revolving at too high a speed. During the proceedings, the court found that: • the teacher had warned the student, many times, to return to his bench after obtaining a tool; • the sanding machine was not dangerous and did not require a guard; • a wood chisel is not needed while using a sanding machine; • the student had used the machine15 to 20 times without incident; • the student had been given sufficient warning as to the nature of the machines in the shop; • the operation of the sander did not lead to the injury; and • the injury had been caused by the student holding the tool too close to the revolving wheel. The court found that the teacher had met the standard of care required of him. It also dismissed the allegation that the sanding wheel was revolving at an excessive speed (840 rpm).
Liability	The court determined that the student was solely responsible for his injury. Case dismissed.

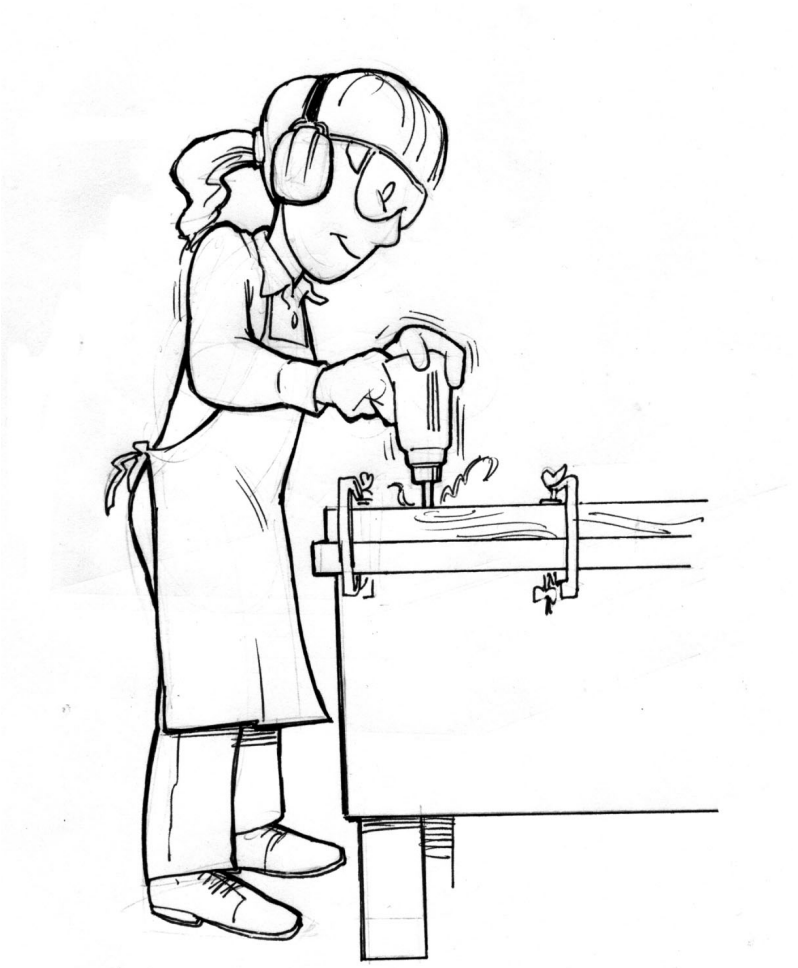
Case No. 5	**Hand Injury**
Location	Wood Shop
Incident	An 18-year old deaf student suffered serious injury to his left hand when he touched the unguarded blade of a circular power table saw that he was using.
Circumstances	The student was directed by the teacher to trim some chest drawers. The operation was not normally done on chest drawers, however, and required the removal of the safety guard. The teacher showed the student two cuts and watched him make one or two as well. The teacher then moved about 15-25 feet away to work on another bench where he could keep his eye on the student. After a short period of time, the student let his attention drift and his hand struck the saw.
Liability	The judge held that performing the operation with an unguarded saw was dangerous and that the duty of care required of the teacher was not met in these circumstances where the student had special needs. The judge reasoned that a higher duty of care is owed to such students because one cannot warn them quickly enough of what may be wrong. The responsibility of negligence was split two ways: teacher – 60%, student – 40%. On appeal, the Appellate Court overturned the trial judge's decision. On further appeal, the Supreme Court of Canada concluded that the Appeal Court's decision was incorrect. It applied a higher duty of care and supervision for deaf students who are subject to a greater risk of injury than other students who could be warned quickly enough to avoid such an injury. This case suggests that closer supervision may be necessary for special needs students who are more vulnerable to risk of injury because the usual precautions may be ineffective.

Case No. 6	**Hand Injury**
Location	Wood Shop
Incident	A 17-year old student lost the tips of three fingers on a jointer.
Circumstances	The accident occurred while the student was taking Construction 11. At the beginning of the course, the teacher had provided students with a 15-page set of safety instructions detailing the rules for each machine. They were also given a textbook that included a description and illustration of a jointer and safety tips on its use. Throughout the course, the importance of safety was stressed. During demonstrations by the teacher of the various tools in the shop, including the jointer, the student had been absent due to illness. However, this same student passed all the tests administered during the course, including those on safety. There was also evidence to suggest that the student had used the jointer in a previous woodworking course, as well as about 15 times in the current course before the accident occurred.
Liability	The trial judge found that even though the student used the jointer in an improper fashion the teacher was negligent because he failed to ensure that the student received the necessary instructions required to operate the equipment safely through teacher demonstration. The Court of Appeal agreed with the trial judge in finding the teacher negligent. There was evidence to support the need for make-up instruction to students who were absent during teacher demonstrations.

Instructional Materials

Since resource information is hard to come by on the subject of safety in the shop environment, we have put together a series of lesson plans, student information sheets and tests on shop-related subjects. We have also added a few other documents that may be useful in the shop classroom such as a class safety instruction record, safety pledge, and crossword puzzles.

Please feel free to use this material in your shop programs. The handouts and tests, in particular, will help draw students' attention to the potential hazards of working around dangerous equipment.



Workshop Safety

Training on personal protective equipment, Workplace Hazardous Materials Information System, and lockout must be provided as the first order of business prior to operating tools, machinery or equipment. Also involve students in routine shop/equipment inspections.

Topic	Notes	Student Information
Accidents	Make sure you have First Aid supplies on hand at all times, conduct accident/ incident investigations and keep records.	• immediately report all accidents or injuries so that proper treatment can be given and the dangers removed or dealt with
Behaviour	Providing for the safety of the students in your care is your most important role. Expectations about student behaviour should be clearly defined, explained and enforced. Horseplay will not be tolerated.	• workshops are hazardous environments; adopt a calm, careful attitude at all times • walk, don't run; avoid pushing or bumping • horseplay (e.g., throwing things) is not allowed
Clothing	Expectations about student attire should be clearly defined, explained and enforced.	• tuck in loose clothing, tie back long hair, remove jewelry • wear sturdy shoes, appropriate clothing for activity; wear protective gear when required
Emergencies	Make sure you have adequate emergency equipment on hand at all times, and teach your students what to do if an emergency occurs. Practice emergency routines regularly. Ensure all switch gear is marked as to the equipment it belongs to. Post emergency procedures. Explain the risk of contacting blood or other bodily fluids.	• know what to do in an emergency • be familiar with emergency equipment including fire extinguishers, power shut off buttons, fire blankets, and eye wash stations
Eye protection	Ensure eye protection is available and in good condition. Students should wear eye protection at all times when in the shop.	• wear eye protection when required, e.g., when using power tools, or hammering metal, stone or other hard materials
Housekeeping	Develop, implement and oversee an effective 'clean up' routine. Also provide adequate storage for tools, materials, projects and waste. Students will not keep the shop clean without your insistence.	• clutter poses unnecessary slipping and tripping hazards; keep the floor and work surfaces clean and clear • tools, materials and projects should all be stored safely and securely • aisles and exits should be unobstructed at all times; keep cupboard doors closed, unused vises closed, etc.
Mental condition	Do not assign students work if they will endanger self or others	• most accidents occur to people who are tired, rushed or under the influence of alcohol or drugs, so avoid working in these states
Personal responsibilities	Encourage students to take responsibility for themselves and their classmates at all times. Encourage students to regularly conduct safety checks on themselves, their material and the tool.	• if you feel unsafe about a particular activity, consult with your instructor before proceeding • if you see something dangerous, report it so it can be fixed • be aware of the risks your work may pose to others, especially when using equipment like arc welders, compressed air, and grinders
Working conditions	This is a good time to teach about ergonomics, repetitive strain injuries, etc.	• make sure your work area is well lit • ensure adequate ventilation • set your work up so that you are in a comfortable position and can avoid strains

Tools and Materials Safety

Topic	Notes	Student Information
Compressed air	Refer to *Occupational Health and Safety Regulations* (WCB) Book 1, Part 1, Section 42 (4.42 on p. 4-6)	• compressed air should not be used to clean clothing except in carefully controlled circumstances (WCB regulation) • compressed air should not be used for cleaning off equipment if someone could be exposed to the jet or to the material it expels (WCB regulation) • use vacuums to clean clothing and shop areas
Condition of tools	Remove all dull, broken and maladjusted tools from the workshop area until they have been repaired.	• only use tools that are in good working order • if a tool is dull, broken or out of adjustment, give it to your instructor or ask for permission to fix it
Material handling	If students are lifting heavy objects, give a separate lesson on proper lifting techniques.	• move heavy objects using proper lifting techniques • when moving heavy objects, be aware of others in the room • make sure materials are safely and securely stored, if necessary, ask for help
Protect your hands	Statistics identify that most injuries in school workshops occur to students' hands.	• keep your hands behind the blade on any cutting tool • test tools for sharpness on wood or paper, not with your fingers • to test for heat, place your hand near, but not on, the object
Secure your work		• make sure the piece you are working on is stable • secure the piece you are working on by putting it in a vise or clamp on the workbench • never hold stock with one hand while trying to cut, chisel or drill it with the other hand
Sharp objects		• do not carry sharp objects such as nails, chisels, etc., in your pockets or mouth • carry them with the pointed end facing downward
Use tools as intended	Emphasize the importance of using tools properly and setting a good example.	• using tools improperly can lead to injury of self or damage to the tool, e.g., hammering with a wrench, prying with a chisel, using files without handles

Workplace Hazardous Materials Information System (WHMIS) Safety

Topic	Notes	Student Information
Identification/ Classification	Explain how being informed about hazardous material can save your life. Information is given to us in three ways: labels, MSDS, and training.	• check with the teacher before using any substance that may be harmful • if in doubt ask • you must familiarize yourself in how things can harm you
Labels and Material Safety Data Sheets (MSDS)	Explain the types of labels and what information is on each. Explain what MSDS are and what information is found in them. Show the students where they are kept and how to find the proper MSDS for each product.	• always read the label and the MSDS, and follow the safe handling procedures before you use any product for the first time or cannot remember how to use it correctly
Handling		• always use the proper safety equipment and procedures • know where all the protective equipment is kept (respirators, dust mask, gloves, face shields, etc.)
Storage and disposal	Have the class do an inventory of all controlled products, either as individuals, pairs or in small groups. On their inventory list, have them explain: - where and how it is stored, - whether or not it has an MSDS - whether or not it is properly labeled - how to dispose of it At the same time it is a good idea to have the class write a report explaining emergency evacuation procedures and map out the shop showing the fire alarm pulls, fire extinguishers, eye was station location and first aid station location.	• make sure you find all the controlled products in the shop; now where you can get rid of them safely and correctly

Combustibles and Toxic Substances Safety

Topic	Notes	Student Information
Combustibles and toxic substances	Monitor the use of combustibles and toxic substances and provide adequate storage. Explain and follow procedures for safe handling, use, storage, and disposal, including emergency and spill cleanup procedures.	• note that many industrial supplies are flammable, explosive or subject to spontaneous combustion • store combustible supplies and waste in fire safe containers
Chemicals / hazardous substances	Explain the Workplace Hazardous Materials Information System (WHMIS) including safe use, storage, handling, supplier labels, workplace labels, Material Safety Data Sheets (MSDS), disposal and emergency and spill clean up procedures for products used in shops. Label container if you transfer product from original (e.g., when transferring product into another container). See WCB publication 'WHMIS at Work' for more information.	• follow procedures for safe handling, use, storage, and disposal, including emergency procedures and spill clean up • label containers if you transfer product from original • know where to find Material Safety Data Sheets (MSDS) • be able to answer the following questions for each product used: 1. What are the hazards of the product you are using? 2. How do you protect yourself from the hazards of the product? 3. What would you do if an emergency occurred? 4. Where can you find out more information about the product you are using?
Corrosives	Acids and caustics can burn skin and eyes causing permanent damage and corrode metals. Use protective equipment: goggles, face shield if needed, gloves, shop coat and apron. Emergency eyewash and skin washing facilities are required.	• acids and caustics can burn skin and eyes causing permanent damage; they can also corrode metals • wear goggles, gloves, and protective clothing
Flammables and combustibles	Monitor the use of flammables and combustibles and provide adequate storage. Supply only the minimum quantity required for daily use. Explain and follow procedures for safe handling, use, storage and disposal, including emergency and spill clean up procedures.	• note that many industrial supplies are flammable, explosive or subject to spontaneous combustion • store combustible supplies and waste in fire safe, closed containers • keep flammables and combustibles away from ignition sources
Hazardous waste	Ensure procedures are in place and explain handling and disposing of hazardous waste (e.g., antifreeze, used oil)	• follow procedures for handling and disposing of hazardous waste
Poisons	Poisons can be ingested, inhaled or absorbed through skin, therefore it is important to wear appropriate protective equipment. Avoid accidental poisoning by labelling containers (e.g., when transferring product into another container).	• follow procedures for safe use • label containers if you transfer product from original

Combustibles and Toxic Substances Safety (continued)

Topic	Notes	Student Information
Substances under pressure (e.g., compressed gas cylinders)	Protect substances under pressure from sparks, flames, heat, physical damage, electrical contact, and corrosion. Explain procedures for safe handling, use, storage and emergency procedures. Ensure: • pressure testing is current • cylinder indicates type of gas • cylinders are secured to prevent falling or rolling and kept upright • valves are kept closed when empty or not in use • flashback arresters and uniflow valves are used • the valve cover is in position when not connected for use or guarded • regulators are regularly maintained (clean, no broken glass, missing screws or grease) • procedures for safe use are followed	• cylinders can explode if dropped or heated • follow procedures for safe use • keep cylinders away from ignition sources
Wood dust	Some wood dusts cause allergies, fore example: oak, mahogany, Western red cedar, and California redwood. Avoid using these woods.	• some wood dusts cause allergies (e.g., oak, mahogany, Western red cedar, California redwood).

Power Tools Safety

Topic	Notes	Student Information
Authorization	How strict you are about students asking for permission to use power tools depends on a number of variables: age and experience of the student, power tool in question, and the operation to be performed. The safest approach is to have them ask you for permission each time they want to use a power tool. Students should not run tools unless they are trained or under direct supervision.	• you must have authorization before using any power tools
Condition of tools	Remove broken machines and damaged electrical cords from the workshop until they have been adequately repaired. Make sure all guards are in place and in good working order. In unusual circumstances where a guard cannot be used, the instructor must be present.	• only use tools that are in good operating condition • check out any unusual vibrations or noises before using a machine
Personal protective equipment	High noise areas should be identified and signs posted to require hearing protection. Eye and hearing protection should be required in all shops when conditions warrant it.	• wear hearing protection when operating all power tools • long hair must be contained before using any power equipment
Know how your machine works		• know which direction your tool will go when you run material through it and which way the material will go; in other words, make sure you know what is going to happen before you operate a machine so you can be ready to control those forces
Lockout	Conduct specific lockout training. Refer to *Occupational Health and Safety Regulation*, Book 2, Part 10, for industrial lockout procedures. If the unexpected energization or startup of machinery or equipment, or the unexpected release of an energy source could cause injury, the energy source must be isolated and effectively controlled. Post written lockout procedures. Refer to WCB publication on lockout for more information.	• when doing any maintenance work on a power tool, isolate the source of power (unplug it, switch the breaker off and follow written lockout procedures)
Operator		• the power tool operator must be qualified to use the tool • the machine operator must concentrate on the task at hand • avoid distracting, bumping or rushing anyone using a machine

Power Tools Safety (continued)

Topic	Notes	Student Information
Path of the tool		• whatever tool you are using, make sure it will cut, drill or grind only what you want to cut, drill or grind—you do not want the saw blade sticking out the bottom of the stock, the cutter hitting the top of a vise, or the drill bit breaking through the stock • be aware of the cutting path of the tool—keep your hands away from this area • make sure the cutting part is not going to come in contact with the power cord
Power cord damage		• check all power cords daily for tears or cuts in the insulation, loose connections (plug to wire, wire to tool) and poor ground connections
Secure your work		• when working with portable power tools, make sure the material stays in place—put stock in a vice or clamp it to a workbench before approaching it with a power tool • when operating a power tool, maintain a firm grip at all times
Start-up		• check to ensure that all guards and safety devices are in place and functioning properly • check to make sure the power switch is in the off position before plugging in a portable power tool • only the operator is to turn the tool on
Stay beside running power tools		• do not walk away from a machine you have been using until it comes to a complete stop—it takes only a few seconds for a power tool to 'wind down' after it has been shut off
Stop to make adjustments	Adjustments should never be made to a power tool while it is running. The operator's full attention should be on the cutter or active part of the machine.	• always unplug or lockout the tool before making any adjustments or changing settings where there is a danger of being injured in the event of a start up of the tool

Electrical Safety

Topic	Notes	Student Information
Avoid burns		• electricity generates heat, so take care to avoid burning yourself on hot components like resistors or light bulbs, or hot tools such as soldering irons or torches
Avoid cuts		• handle small components with care to avoid scratches or stab wounds.
Blown fuse		• if a breaker or fuse blows, disconnect the power source, then identify and fix the problem before resetting the breaker or replacing the fuse
Capacitors		• some capacitors can store a large electric charge, so discharge the capacitor appropriately using correct discharge method
Clothing		• wear rubber gloves and dry, non-conductive clothing
De-energize circuits	Students can build circuits but not troubleshoot while plugged in.	• to prevent getting a shock, de-energize circuits before working on them—pull the plug, turn off the breaker or disconnect the battery—follow lockout procedures • check with your teacher before doing any work on live circuits
Emergency response		• if someone gets elect shock, shut off the power before trying to help them.
Footwear		• wear shoes with insulating soles and/or stand on a non-conducting mat
Hot circuits	All plugged-in projects must be inspected and tested for the first time by the instructor.	• be careful not to become part of the circuit (stay out of the loop)
Knowledge of live circuits	Explain hazards of live circuits. Any voltage in excess of 50 volts is potentially lethal.	• make sure you know what you are doing when working around live circuits--ask when in doubt
Soldering		• do not use solder containing cadmium or lead • check the MSDSs for the solder and flux; effective local ventilation or respiratory protection may be required
Start up circuits	Wear safety glasses.	• stand back when turning on a circuit or project for the first time, just in case there are sparks, flames, smoke, etc.
Switch gear	Demonstrate correct way to turn on switch gear.	• stand to the right hand side if the switches are on the right
Tools		• only use tools that are insulated against electric shock (e.g., plastic or rubber handles)
Wet conditions		• water is a great conductor of electricity, so do not work in wet conditions; when this is unavoidable use a ground fault circuit interrupter (GFCI)

Wood Shop Safety

Topic	Notes	Student Information
Band saw	Sometimes students can 'hear' if they are overloading the saw. Many accidents occur as the blade comes out at the end of the cut. Explain why the blade may come off. The need for relief cuts depends on the width of the blade. Don't leave the machine while the blade is still in motion. Eye protection is required. Hearing protection is recommended.	• set the upper guide and blade guard so it is just above the stock. Set the upper guide within 3mm of the stock • first option—use a push stick • keep your fingers at least 5cm away from blade • feed stock with light pressure, especially towards the end of the cut; avoid excessive twisting of the blade • plan your work to avoid backing out of long cuts • use relief cuts on sharp corners • never cut round or irregular stock unless it is held in a jig of some sort to stabilize it • if the blade breaks, turn off the saw and inform your teacher • do not stand to the right of the band saw when someone else is using it (if the blade breaks, it may flip out to the right) • eye and hearing protection are required
Electric hand drill	Eye and hearing protection are required.	• secure the stock; be especially careful with small pieces • centre punch metals before drilling • make sure the bit is tight in the chuck • be especially careful with long hair that can get caught in the chuck or drawn into the motor vents • maintain a good grip on the drill, especially as the bit breaks through the back of your stock • keep cord away from drill area • eye and hearing protection are required
Jointer	Most jointer accidents are caused by "trying to mill stock that is too small." (*Fine Woodworking*, #42, p. 76) Open jackets, untucked shirts and loose cuffs are especially dangerous on the jointer. Eye and hearing protection are required.	• after set up, ensure that all guards are in place and functional before turning on the jointer • minimum length of stock: 300mm • maximum depth of cut when edge jointing: 3mm; when surface jointing: 1.5mm • joint with the grain • beware of staples, grit or other debris in the wood, as well as loose knots and severe checks • step hands over cutter head • use a push stick if the stock is lower than the fence • never change the depth of the outfeed table • eye and hearing protection are required

Wood Shop Safety (continued)

Topic	Notes	Student Information
Planer	Never allow students to use the planer without the dust cover in place and the cutter head fully protected. Keep the rollers and pressure boards well adjusted to provide smooth operation and prevent kickback. An accident is more likely if students have to struggle to get wood through the planer. Eye and hearing protection are required.	• minimum length of stock: 300mm; maximum depth of cut: 3mm • stand to the side in case of kickback • never look into a running planer • never brush shavings off the table unless the planer is at a full stop; always use a brush to remove the shavings • beware of staples, grit or other debris in the wood, as well as loose knots and severe checks • beware of pinching your fingers or clothes between the stock and the table • use a backing board when planing stock less than 10 cm thick • if your wood gets stuck, disengage the clutch and turn off the planer. Do not use your hand to clear the blockage—ask your instructor for assistance • eye and hearing protection are required
Portable circular saw	The most frequent mishaps when using portable circular saws involve kickback, the blade getting pinched, or the blade guard not returning properly. Eye and hearing protection are required.	• make sure your stock is stable; put it in a vice or clamp, if necessary • position stock so that it will not pinch the blade as the cut proceeds • never use the saw if the blade guard is sticking • make sure the line of cut is clear underneath • the blade must be clear of the stock before the saw is turned on • keep a firm grip on the saw as a pinch or bind will thrust it back towards the operator • eye and hearing protection are required
Router	Routers are very noisy, so wear hearing protection. Suggest students check each setup using scrap wood. Eye and hearing protection are required.	• unplug the router to change bits; put at least 15mm inside the collet • check that the switch is off before plugging in the router • secure stock • hold router firmly with two hands, and make sure the cord stays clear • ensure the bit is clear of the stock before turning on the router • for best control, cut against the rotation of the bit • make sure the bit has stopped rotating before putting the router down

Wood Shop Safety (continued)

Topic	Notes	Student Information
Radial arm saw	Because the blade can pull itself forward, the area in front of the blade is always dangerous and hands should be kept clear. Consider painting this danger zone on the saw table. Rip cutting is hazardous on the radial arm saw. You might mention that it is possible, but suggest students use the table saw instead. Give a separate lesson on this operation, if needed. Eye and hearing protection are required.	• minimum length, 300mm supported by a fence • make sure blade guard is in place and working properly • make sure all stock is stable and well supported • keep hands 150mm on either side of the blade; push small scraps clear with another piece of wood • check wood for knots and non-wood material such as gravel, nails, etc. • anticipate a tendency of the saw to pull itself into the cut • when finished, lock the carriage behind the fence • never cross your arms when using the radial arm saw • do not cut round or irregular stock unless it is carefully secured • support the ends of long boards • if a stop is being used, hold the wood against the fence between the stop and the blade • eye and hearing protection are required
Table saw	"By far and away, the table saw is involved in more serious hand injuries than any other woodworking tool or machine. . . Hardly anybody, however, reported a serious table saw accident that occurred with a blade cover, kickback pawls and splitter all in place." (*Fine Woodworking*, #42, p. 76) The board must be larger than the chord of the blade that is exposed. Trying to use the fence when crosscutting is a common cause of accidents on the table saw. The stock outside the blade rarely, if ever, kicks back. Authorize and supervise students who remove guards, splitters or kickback fingers. Eye and hearing protection are required.	• adjust blade to 5mm above stock • minimum length: 300mm • use a push stick, especially if your fingers will come within 100mm of the blade • stand to the side in case of kickback • use the fence for rip cutting only, never for crosscutting • use a mitre gage or cross cut jig for crosscutting • always control the stock between the blade and the fence until it has passed the blade • shut off the saw, then reach around the blade, never over it • do not make freehand or unguided cuts; always use either the fence or the mitre gauge • always use the guards, splitter and kickback fingers unless you have authorization to remove them for special circumstances and then reinstall them immediately • eye and hearing protection are required

Wood Shop Safety (continued)

Topic	Notes	Student Information
Wood lathe	Most lathe mishaps involve stock coming off the machine or chisels catching. Large, heavy and especially irregular stock increase the likelihood of accidents on the lathe. Eye protection is required.	• mount stock securely, tighten all locks • begin each turning on low speed • beware of staples, grit or other debris in the wood, as well as loose knots, weak glue joints and severe checks • keep tool rest close to your work • rotate stock by hand before turning on the lathe • hold the chisel close to each end, not in the middle; your front hand should control the cut by riding against the tool rest; your backhand should steady the chisel by holding the butt against your hip • remove the tool rest when sanding and applying a finish • eye protection is required

Metal Shop Safety

Topic	Notes	Student Information
Arc welder	Ensure equipment is correctly installed. All protective gear must be in good condition, including helmets and gloves which must be worn whenever operating an arc welder. All exposed skin must also be protected. Ensure effective local ventilation—respirators may also be required. Explain that hot work must be marked "hot" or effectively guarded to prevent contact. Explain location and use of fire extinguisher.	• wear appropriate protective clothing to protect against electric shock, metal splatter and UV rays • do not weld in wet conditions • ensure that cables will not interfere with your work • wear a welding helmet with a #10 lens or darker • wear eye protection when chipping or grinding • ensure effective local ventilation • suspect everything in a welding area of being hot • never weld where flammable fumes or liquids may be present, especially tanks or containers • use screens to protect others from flash
Bench grinder	Explain rest <= 1.5mm clearance from grinding the wheel. No grinding on side of wheel. Explain types of wheels for types of metals. Explain wheel dressing procedure.	• full face shield, leather apron and hearing protection are required
Buffer and wire wheel	The buffer can be very dangerous so the safety rules are very important to understand and follow. Eye protection is required.	• hold the work just below the center of the wheel and always buff "off" the edge • a build-up of heat while buffing can be dangerous • eye protection is required
Drill press	Long hair must be tied back, and strings or jewelry that could get caught must be removed. Explain set up, drill speed and tightening precautions. Eye protection is required.	• secure the stock in a drill vice or clamps • center punch hard materials before drilling • make sure the chuck key is clear before starting the drill • make sure the bit is clear of stock before moving the stock • set up your operation to avoid drilling the vice or the table • eye protection is required

Metal Shop Safety (continued)

Topic	Notes	Student Information
Foundry operations	Moisture is a constant hazard when pouring molten metal. If there is moisture in the ingots, casting stock, concrete or mold, it can instantly vaporize and explode from the heat of the molten metal.	• do not light or adjust the furnace unless you have been authorized to do so • preheat metal before adding it to a pot of molten metal • wear a mesh face guard and burn-proof gloves and leggings when pouring a cast • stand to the side as you pour a casting • molten metal falling on cold concrete can cause it to fracture and pop • use caution to avoid burning yourself when opening up a recent casting • freshly poured castings must be marked “HOT”
Metal cut off saws	There are a variety of cut off saws in use—power hack saws, horizontal band saws, chop saws—but the safety procedures for all are similar. If your cut off saw has an unusual feature or characteristic, remember to add it to this lesson.	• make sure the stock is securely clamped in place • keep your hands clear of the path of the blade at all times • let the cut proceed at a comfortable pace—do not force it • monitor the cut as it progresses to ensure that it proceeds smoothly and the saw shuts off on completion • be careful when handling freshly cut pieces as they may be very hot and/or have sharp burrs on them • clean the machine with a brush, not your hand • wear hearing protection, eye protection and appropriate gloves when handling stock
Metal lathe	Common accidents on the metal lathe involve clothing caught in moving parts and long pieces of stock extending through the headstock and whipping around. Explain the hazards involved in using cutting fluids.	• make sure the stock is secure and the locks are tight before turning on the lathe • never leave the chuck key in the chuck • any material that extends more than twice its diameter from the chuck should be supported by the tailstock or a steady rest • use extreme caution whenever material extends through the headstock • tuck in shirt-tails or they may get caught in the lead screw • wear eye protection • use gloves when handling stock but not while handling the lathe

Metal Shop Safety (continued)

Topic	Notes	Student Information
Oxy-acetylene torch	Explain that hot work must be marked “hot” or effectively guarded to prevent contact. Explain location and use of fire extinguisher. Ensure flashback arrestors and uniflow valves are included. Ensure effective local ventilation—respirators may be required. Ensure acetylene cylinders are kept upright.	• never use grease or oil to lubricate fittings • never weld where flammables may be present, especially tanks or containers • check for leaks by listening or brushing with soapy water • open cylinders slowly, ½ turn at a time • always wear leather gloves and welding goggles • ensure effective local ventilation, especially with galvanized metal, brass or bronze • be aware of the location of the hoses are all times • light with a striker, acetylene first • suspect everything in a welding area of being hot • always be conscious of where you are pointing the torch; do not put it down unsecured or flaming • when finished, turn off torch valves, turn off the cylinder valve, then go back to the torch and bleed the lines
Right angle grinder	Ensure no flammables are in the area. Guard must be installed. Explain rpm of disk must match rpm of grinder.	• inspect grinder to ensure no cracks in the abrasive disc • never remove the guard • secure the stock before grinding it • grind with light to moderate pressure only • be conscious of where the sparks expelled by the grinder are going and avoid endangering others • beware of burns, as the material being ground will get hot • wear ear and eye protection and flame resistant clothing

Automotive Shop Safety

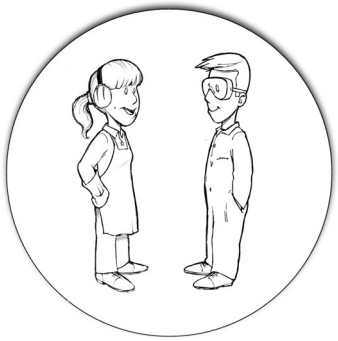
Topic	Notes	Student Information
Batteries	Sulphuric acid is very corrosive. Personal protective clothing requirements are goggles and/or face shield, gloves, and coveralls and/or apron. Batteries are heavy. Caution students to take care in moving them. A metal tool shorting across battery terminals can get hot very quickly.	• batteries contain sulfuric acid, so wear personal protective equipment and avoid contact with the acid • battery action produces explosive gas, so take precautions to keep sparks away from batteries, especially when charging • to start charging a battery, connect the leads first, then turn the charger on • to finish charging a battery, turn the charger off, then disconnect the leads • while charging a battery, monitor the temperature; stop charging if the battery gets really hot • always disconnect the ground cable first • never attempt to charge or jump start a frozen battery • never attempt to charge or jump start a maintenance-free battery if the charge indicator shows low electrolyte (clear or yellow)
Spill clean-up	Many absorbent materials are hazardous and contain silica. Use respiratory protection for clean-up, after teaching hours.	
Safety in the shop	The conditions in a mechanics shop present some hazards not common to other shop settings. Students should be informed of these special circumstances Ensure MSDS sheets are accessible and up to date. Identify appropriate respiratory protection required. Refer to WCB's *Breath Safer* manual for further information on respirator selection, care, use and maintenance. Explain procedures for handling, use, storage, disposal and emergency and spill clean up of gasoline.	• keep the floor clear to minimize the risk of tripping • gasoline is very powerful and its vapours are extremely flammable; handle according to safe work procedures • wipe up all spills and dispose of rags in the identified, covered, metal container • know where fire extinguishers are and how to use them • protect your lungs from dust and toxic substances—wear appropriate respiratory protection • wear goggles and gloves when handling solvents or other caustic chemicals • protect your ears from continual loud noise

Automotive Shop Safety (continued)

Topic	Notes	Student Information
Safety around engines	These points are valid in either a small engine or automotive class. Explain how to check the radiator hose for pressure.	• remove rings, metal watches and bracelets before working on any engine • keep your hands away from moving parts • use extreme caution around engine fans which may strike you, fling things at you, start unexpectedly, or catch dangling leads or strings • avoid touching hot engine parts; never open the radiator on a hot engine • do not run engines in enclosed, indoor spaces and always guard against carbon monoxide poisoning • avoid electric shock from battery or ignition systems • protect your ears from excess engine or shop noise • on small engines, make sure you can't start the engine by moving the crank • after repair, and prior to startup, ensure that engine is safe to start
Safety around vehicles	Students must receive authorization to use a hoist, based on their demonstrated level of competence. Refer to "*Lifting it Right*," a safety manual from the Automotive Lift Institute for more information—www.autolift.org	• before beginning work on any vehicle, put the transmission in park (automatic) or neutral or low (standard), as appropriate, set the parking brake, remove keys from ignition, then chock the wheels • if you need to jack up a vehicle, chock the wheels and position the jack carefully • support any vehicle that you will be working underneath of on approved jack stands located in the correct position for the appropriate repair (e.g., running engines) • never start a vehicle unless you are sure no one will be injured by the motion of the engine • hoist pads must be placed under solid, horizontal frame parts • do not use a hoist that is jerky, leaking oil or settling, once in place

Automotive Shop Safety (continued)

Topic	Notes	Student Information
Safety around brakes and clutches	Brake and clutch linings may contain asbestos. Exposure to asbestos must be kept as low as possible. Safe work procedures for removing and installing brake and clutch linings must be followed: display signs, wear HEPA filter respirator and disposable coveralls, use wet clean up methods, label asbestos waste, and provide training. Refer to the requirements for friction materials in Part 6 of the *Occupational Health & Safety Regulation*. For further information on asbestos, refer to the WCB booklet "*Safe Work Practices for Handling Asbestos*".	• brake and clutch linings may contain asbestos • follow procedures for safe handling and disposal
Spray painting	Do not use paints that contain isocyanates.	



Information Sheet

WORKSHOP SAFETY

Topic	Information
Accidents	Immediately report all accidents or injuries to your teacher so that proper treatment can be given and the dangers removed or dealt with.
Behaviour	Workshops are hazardous environments—adopt a calm, careful attitude at all times. Walk, don't run, avoid pushing, bumping or startling others, and don't throw things.
Clothing	Dressing appropriately for the job is a very important consideration when working in a shop area. Tuck in loose clothing, remove all jewelry and tie back long hair to prevent them from getting caught in machinery. Wear sturdy, protective shoes and use the protective gear provided, i.e., eye and hearing protection. Students wearing high heels or sandals will not be permitted in the shop.
Emergencies	Know what to do in an emergency! Be familiar with all emergency equipment in the shop, including fire extinguishers, power shut off buttons, fire blankets, first aid kits, and eye wash stations.
Eye protection	Eye protection must be worn if there is any chance of injury or irritation of the eye.
Housekeeping	Clutter and spills pose unnecessary hazards—tripping, slipping, bumping into things, dropping things off messy work surfaces—so keep the floor and work areas clear and clean, store your tools, materials and projects away safely and securely, and keep aisles and exits free of obstructions at all times.
Mental condition	Most accidents occur when people are tired, rushed or under the influence of alcohol or drugs, so think SAFETY. If you are tired, stop and rest. If you are rushed, slow down. If you are under the influence of alcohol or drugs—DO NOT WORK in the shop area.
Personal responsibilities	When working in a shop environment, be aware of the risks your work may pose to others, especially when using equipment such as arc welders, compressed air, and grinders. If you see something dangerous or consider your work environment to be unsafe, report it so that it can be fixed. If you feel unsafe about a particular activity, consult with your instructor before proceeding. Conduct regular safety checks on yourself, your material and your tool.
Working conditions	Set up your work area so that it is well-organized, well-lit, and adequately ventilated. To prevent unnecessary strain, make sure that you are in a comfortable working position.

Name: _____ Date: _____

Test

WORKSHOP SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. How should you behave while in the workshop?

   _____

2. What kind of accidents can be caused by a cluttered work place?

   _____

3. How should you dress while working in the workshop?
   a. _____
   b. _____
   c. _____

4. When is eye protection required?
   a. _____
   b. _____
   c. _____

5. What are three conditions necessary in a good working environment?
   a. _____
   b. _____
   c. _____

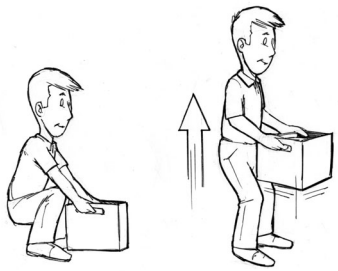
6. Why is it important to report all accidents?
   a. _____
   b. _____

7. What should you do if there is a serious accident or other emergency?

   _____

8. Most accidents happen to people who are _____, _____ or _____.

9. What are three things you can and should do to keep yourself and your classmates safe?
   a. _____
   b. _____
   c. _____

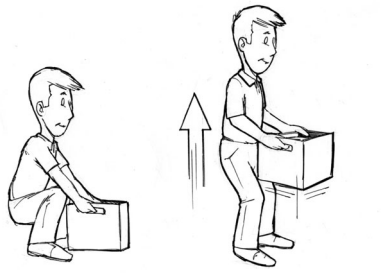


Information Sheet

TOOLS AND MATERIALS SAFETY

Topic	Information
Compressed air	*Occupational Health and Safety Regulation* (WCB) states that compressed air should not be used to clean clothing, except in carefully controlled circumstances (e.g., where the pressure is limited to 10 psig), or for cleaning off equipment if someone could be exposed to the jet of air or to the material it expels. Use a vacuum cleaner to clean clothes and the shop area.
Condition of tools	Only use tools that are in good working order. If a tool is dull, broken or out of adjustment, give it to your instructor or ask for permission to fix it.
Material handling	Back injuries are common among people who work in shop areas, so handle large and/or heavy materials with care using proper lifting techniques. Also make sure that you don't run into other people when you are moving things, and ensure that all large and/or heavy objects are safely and securely stored. Ask for help if materials are heavy.
Protect your hands	Most accidents in school workshops involve students' hands. To prevent injuries, adhere to the following rules: a) keep your hands behind the blade when using a cutting tool, b) do not use your fingers to test tools for sharpness and c) place your hand near, but not on, an object when testing for heat.
Secure your work	If the object you are working on is stable, it is less likely to slip and cause an injury; so use the vice or clamp on your workbench to secure the object. Never hold stock with one hand while trying to cut, chisel or drill it with the other hand.
Sharp objects	Do not carry sharp objects such as nails, chisels, etc., in your pockets or your mouth! Carry them with the pointed end facing downward.
Use tools as intended	Using tools improperly can lead to frustration, injury of self or damage to the tool, e.g., hammering with a wrench, prying with a chisel, or using files without handles. Take the time to get the right tool for the job.

Name: _____ Date: _____



Test

TOOLS AND MATERIALS SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What should you do with a tool that is dull, broken or out of adjustment?

   _____

   _____

2. What part of your body is most likely to be injured if you have an accident?

   _____

3. Why is it important to secure the object you are working on?

   _____

   _____

4. What could happen if you use the wrong tool for the job?
   a. _____
   b. _____

5. What kind of hazards should be avoided when moving large or heavy objects around the shop?
   a. _____
   b. _____

6. What should you do if you are unclear about how to safely use or store a dangerous product?
   a. _____
   b. _____

7. You should never carry sharp things in your _____ or your _____.

8. What do the *Occupational Health and Safety Regulation* (WCB) say about using compressed air?
   a. _____
   b. _____

Information Sheet

WHMIS SAFETY

Topic	Information
Identification / Classification	Check with the teacher before using any substance that may be harmful. If in doubt, ask. You must familiarize yourself in how things can harm you.
Label and Material Safety Data Sheet (MSDS)	Always read the label and the MSDS, and follow the safe handling procedures before you use any product for the first time or cannot remember how to use it correctly.
Handling	Always use the proper safety equipment and procedures. Know where all the protective equipment is kept (respirators, dust mask, gloves, face shields, etc.).
Storage and Disposal	Make sure you find all the controlled products in the shop. Know where you can get rid of them safely and correctly.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

WHMIS SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What does the acronym MSDS stand for? _____

2. What information can be found on an MSDS? _____

3. What does the acronym HEADS UP! stand for?

Information Sheet

COMBUSTIBLES AND TOXIC SUBSTANCES SAFETY

Topic	Information
Combustibles and Toxic Substances	Many industrial supplies are flammable, explosive or subject to spontaneous combustion. Store combustible supplies and waste in fire safe containers.
Chemicals/ Hazardous Substances	Follow procedures for safe handling, use, storage, and disposal of chemicals/hazardous substances, including emergency procedures and spill clean up. Label containers if you transfer the product from the original container. Know where to find Material Safety Data Sheets (MSDS) and be able to answer the following questions for each product used: What are the hazards of the product you are using? How do you protect yourself from the hazards of the product? What would you do if an emergency occurred? Where can you find out more information about the product you are using?
Corrosives	Acids and caustics can burn skin and eyes causing permanent damage; they can also corrode metals—wear goggles, gloves, and protective clothing.
Flammables and Combustibles	Many industrial supplies are flammable, explosive or subject to spontaneous combustion, so store combustible supplies and waste in fire safe, closed containers, and keep them away from ignition sources.
Hazardous Waste	Follow procedures for handling and disposing of hazardous waste.
Poisons	Follow procedures for the safe use of poisons and label the containers if you transfer the product from the original container.
Substances Under Pressure (e.g. compressed gas cylinders)	Cylinders can explode if dropped or heated, so keep them away from ignition sources. Always follow procedures for safe use.
Wood Dust	Note that some wood dusts cause allergies (e.g., oak, mahogany, Western red cedar, California redwood).

Name: _____ Date: _____

Test

COMBUSTIBLES AND TOXIC SUBSTANCES SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What is spontaneous combustion? _____

2. What questions must you be able to answer when using chemicals/hazardous substances?
   a. _____
   b. _____
   c. _____
   d. _____

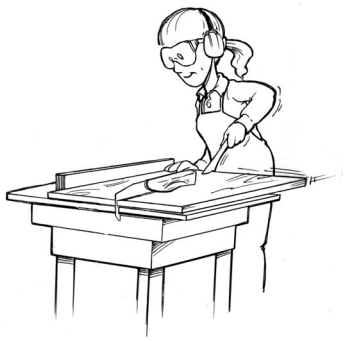
3. What should you wear when working with corrosives?

4. How should you store flammable or combustible materials?

5. What should you do if you transfer a substance from one container to another?

6. Why is it important to keep cylinders away from ignition sources?

7. Why is wood dust considered a toxic substance?

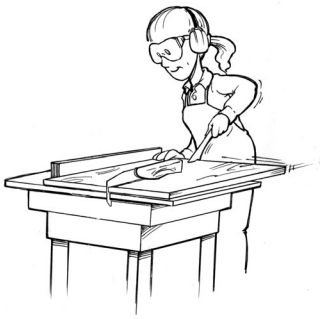


Information Sheet

POWER TOOLS SAFETY

Topic	Information
Authorization	You must have authorization from your teacher before using any power tools.
Condition of tools	Only use tools that are in good operating condition. If anything seems wrong with a machine—unusual vibrations or noises—check it out before using the machine.
Personal protective equipment	Wear ear and eye protection when operating all power tools. Long hair must be contained before operating any power equipment.
Know how your machine works	Know which direction your tool will go when you run material through it, and which way the material will go. In other words, make sure you know what is going to happen before you operate a machine so that you can be ready to control those forces.
Lockout	When doing any maintenance work on a power tool, isolate the source of power (unplug it, switch the breaker off and follow written lockout procedures) to ensure that the machine does not start running when you are working on it.
Operator	The power tool operator must be qualified to use the tool. Each power tool is designed for only one operator. This person must always concentrate on the task at hand, so never distract, bump or rush them when they are using a machine—no horseplay!
Path of the tool	Whatever tool you are using, make sure it will cut, drill or grind only what you want to cut, drill or grind—you do not want the saw blade sticking out the bottom of the stock, the cutter hitting the top of a vice, or the drill bit breaking through the stock. Be aware of the cutting path of the tool—keep your hands away from this area. Make sure the cutting part is not going to come in contact with the power cord.
Power cord damage	Check all power cords daily for tears or cuts in the insulation, loose connections (plug to wire, wire to tool) and good ground connections.
Secure your work	When working with portable power tools, make sure the material stays in place—put stock in a vice, or clamp it to a workbench before approaching it with a power tool. While operating the tool, maintain a firm grip at all times.
Start-up	Check to ensure all guards and safety devices are in place and functioning properly. Make sure the power switch is in the off position before plugging in a portable power tool. Only the operator is to turn the tool on.
Stay beside running power tools	Do not walk away from a machine you have been using until it comes to a complete stop—it takes only a few seconds for a power tool to 'wind down' after it has been shut off.
Stop to make adjustments	Always unplug or lockout the tool before making any adjustments or changing settings where there is danger of being injured in the event of start up of the tool.

Name: _____ Date: _____



Test

POWER TOOLS SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. Why do you need your teacher's permission before using a power tool?

   _____

2. Why should you stay clear of someone who is using a power tool?

   _____

3. What should you always check before plugging in a power tool?

   _____

4. What should you do if there is a problem with a machine (e.g. unusual vibration or noises, damaged cord)?

   _____

5. What should you do before making adjustments to the settings on any machine?

   _____

6. Why is it important to secure the material when using portable power tools?

   _____

7. Why do you need to maintain a firm grip on the tool when operating it?

   _____

8. What does it mean to 'make sure the path of the tool is clear'?

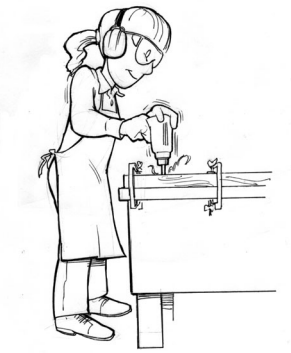
   _____

9. What personal protective equipment should you wear when using noisy, portable tools? _____

10. How long should you stay beside a machine after turning it off? _____

11. What are 'lockout procedures' and when should you follow them?

    _____



Information Sheet

PORTABLE POWER TOOLS SAFETY

Topic	Information
Damaged power cord	Do not use tools if the power cord is damaged. The insulation should be intact and without tears, the ground connection should be working if the tool is designed with a ground, and the connections plug to wire and wire to tool should be solid. Fix or replace damaged cords
Direction of the tool and material	Understand which way the action of the tool will push the material and the tool itself. Usually they try to go in opposite directions. Power planers push the stock away and the tool towards the operator. Belt sanders do the opposite. Right angle grinders depend on which part of the wheel you grind with. The point is to make sure you know what is going to happen and are ready to control those forces. Hold that tool with a firm grip.
Ear and eye protection	Many portable power tools run at very high speeds and scream in operation. Wear hearing protection if the tool is noisy or you have to raise your voice to speak to others. Wear eye protection when using portable power tools.
Path of the tool	Make sure the path of the tool is clear. Saw blades stick out the bottom of the stock. Will they cut anything unintentionally? Is the cutter on your router or power planer going to hit the top of the vice? When the drill bit breaks through, where is it going? Whatever tool you are using, make sure it will cut, drill or grind only what you want to cut, drill or grind! Make sure the cutting part is not going to come in contact with the power cord.
Power switch	Check that the power switch is in the off position before plugging in any portable power tool.
Secure your work	Large machines stay in place while the material moves. With portable machines, the tool moves and the material is supposed to stay in place—make sure it does! Put the stock in a vice, clamp it to a work bench or wedge it in a corner, but don't try to hold a small piece of material in one hand while you approach it with a power tool held in the other.
Unplug the tool	Unplug the tool whenever you are changing bits, replacing blades or fixing something on the tool. You could easily bump the trigger unintentionally while handling the tool. Keep the plug within your sight and control so that it doesn't get inadvertently plugged in while you are working on the tool.

Name: _____ Date: _____

Test

PORTABLE POWER TOOLS SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. Why is it important to secure the material when using portable power tools?

2. Why do you need to maintain a firm grip on the tool at all times?

3. What does it mean to say “make sure the path of the tool is clear?”

4. What should you do if you find a damaged cord on a power tool?

5. What extra safety gear should you wear when using high speed portable tools?

6. What should you do when changing blades or bits?

7. Why must you keep the unplugged cord within your sight and control when changing blades or bits?

8. What should you always check before plugging in any power tool?

Information Sheet

ELECTRICAL SAFETY

Topic	Information
Avoid burns	Electricity generates heat. Take care to avoid burning yourself on hot components like resistors or light bulbs, or hot tools such as soldering irons or torches.
Avoid cuts	Handle small components with care to avoid scratches or stab wounds.
Blown fuse	If a breaker or fuse blows, disconnect the power source, then identify and fix the problem before resetting the breaker or replacing the fuse.
Capacitors	Some capacitors can store a large electric charge, so short them out before working around them.
Clothing	Wear rubber gloves and dry, non-conductive clothing.
De-energize circuits	To prevent getting a shock, de-energize circuits before working on them—pull the plug, turn off the breaker or disconnect the battery. Check with your teacher before doing any work on live circuits.
Emergency response	If someone gets an electric shock, shut off the power before trying to help them.
Footwear	Wear shoes with insulating soles and stand on a non-conducting mat.
Hot circuits	Be careful—don't become part of the circuit.
Knowledge of live circuits	Make sure you know what you are doing when working around live circuits—ask if you are in doubt.
Start up circuits	Stand back when turning on a circuit or project for the first time, just in case there are sparks, flames, smoke, etc. Wear appropriate eye protection.
Tools	Only use tools that are insulated to protect against electric shock (e.g., with plastic or rubber handles).
Wet conditions	Water is a great conductor of electricity, so do not work in wet conditions unless you are using a ground fault circuit interrupter (GFCI) breaker.

Name: _____ Date: _____

Test

ELECTRICAL SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. How do you de-energize circuits before working on them?

_____

2. Why is it important to short-out large capacitors before working around them?

_____

3. Why is it dangerous to work with electricity in wet conditions?

_____

4. If someone gets a serious shock, what should you do first?

_____

5. Why should you stand back when you turn on a circuit or project for the first time?

_____

6. Why is it really important not to work around live electricity unless you know what you are doing?

_____

7. How do you prevent current flowing through you to the ground?

_____

8. Why is water so dangerous around live circuits?

_____

9. As an extra precaution, what is the advantage of working with one hand in your pocket?

_____

10. If a circuit breaker or fuse trips, what do you do before resetting the breaker or replacing the fuse?

_____

Information Sheet

BAND SAW SAFETY

Á Set the upper guide and blade guard so they are just above the stock. This guards the blade and helps to keep the cut straight. The upper guide should be within 3mm of the wood.
Á While cutting, use a push stick and keep your fingers at least **5cm** away from the blade at all times. You can't cut your fingers if you don't touch the blade!
Á Always feed the stock with light pressure and avoid excessive twisting of the blade. If you push too hard or twist too much, you will hear the saw slow down. This is your cue to lighten up. Too much pressure or twisting can break the blade. Use even less pressure as you near the end of a cut because the blade will come out the last millimetre or so.
Á If you have a number of cuts to make, plan your work so you can proceed in a sensible order. Never back out of long, curved cuts.
Á Use relief cuts on sharp corners. Thinner blades can cut sharper corners without relief cuts.
Á Round or irregular shaped wood presents special dangers because the force of the blade can twist it out of your control. Never cut round or odd shaped pieces unless you use a jig to stabilize them.
Á If the machine has a brake, use it to stop the blade after the power has been switched off; otherwise, stay with the machine until the blade stops moving. Recognize that a blade is sharp enough to cut even when it is not in motion.
Á If the blade breaks, turn off the machine and tell your teacher.
Á Do not stand to the right of the band saw while someone else is using it. If the blade breaks, it might flip out in that direction.
Á Both eye and hearing protection are required when using a band saw.

Name: _____ Date: _____

Test

BAND SAW SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. How close to the stock should you set the upper guide? _____

2. What is the minimum distance you should keep your fingers from the blade? _____

3. How can you tell if you are using too much pressure or twisting the blade excessively?

   _____

   _____

4. If you have a number of cuts to make, what should you do before you start?

   _____

5. When are 'relief cuts' needed?

   _____

   _____

6. Why is it dangerous to cut round or odd shaped pieces on the band saw?

   _____

   _____

7. What should you do if the blade breaks?

   _____

8. Why should you stay away from the right hand side of the saw while it is running?

   _____

   _____

9. Identify three steps for shutting down a band saw?

   _____

   _____

   _____

10. What personal protective equipment is required when operating a band saw?

    _____

    _____

Information Sheet

ELECTRIC HAND DRILL SAFETY

Á Secure your stock before drilling. Large pieces may be stable on their own, but smaller pieces should be held in a vice. If there is any chance that the stock could catch on the bit and spin around, secure it in a vice or clamp. Keep the cord away from the drilling area.
Á Centre punch metals before drilling. Many of you have had the experience of trying to use a hand drill on a piece of metal only to find the bit scooting all over the surface. A small dimple made with a punch will keep the bit in place.
Á Make sure the bit is properly sharpened, and straight and tight in the chuck.
Á Tie long hair back—otherwise power equipment must not be used. Bending over your work or lifting the drill in the air are perfect opportunities for the electric hand drill to grab a strand or two.
Á Large drills are powerful enough to break your arm, so make sure you have a good grip on the drill and be prepared to hold it if it 'kicks,' especially as the bit passes through the far side of a piece of metal.
Á Both eye and hearing protection are required when using an electric hand drill.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

ELECTRIC HAND DRILL SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What could happen if the stock you are drilling is not secured?

2. What do you need to do before you try to drill a piece of metal?

3. Drill bits must be _____ and _____ in the chuck.

4. Why is long hair a particular hazard when using drills?

5. When is an electric hand drill most likely to 'kick'?

6. What personal protective equipment is required when using an electric hand drill?

7. What does the acronym HEADS UP! stand for?

Information Sheet

JOINTER SAFETY

Á After set up, ensure that all guards are in place and functional before turning on the jointer.
Á Most jointer accidents are caused by trying to joint wood that is too small—the wood flips up and back, often breaking the operator's thumb. Never joint stock that is less than 300mm long.
Á On the jointer, you push the wood through the cut. If you try to cut too much, a kickback is likely to result. The maximum depth of cut when jointing an edge is 3mm. Maximum depth of the cut when jointing a surface (anything wider than 50mm) is 1.5mm.
Á Always joint with the grain. This will give you a smoother cut and a better finish.
Á Check your stock for staples, grit or other junk in the wood, and also look for loose knots and severe checks. Defects in the wood could damage the machine and cause kickback.
Á Step your hands passed the cutter head. If the wood were to kick out when your hand was above the cutter, your hand would drop onto the knives.
Á You must use a push stick if the stock you are jointing is lower than the fence. It is hard to get a good grip on wood below the fence.
Á Don't change the depth of the outfeed table. Adjustments must be made by a qualified person. Your teacher probably spent hours getting it just right and the setting is critical. If you change it, you will mess up your cut and create a hazard.
Á Wear eye and hearing protection when using a jointer.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

JOINTER SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What is the minimum length of stock that should be cut on the jointer? _____

2. What is the maximum depth of cut that should be used when:
   a. jointing an edge _____
   b. jointing a surface _____

3. Why do you always joint with the grain?

   _____

   _____

4. Why are bad checks in the wood or loose knots dangerous on the jointer?

   _____

   _____

5. Why should you never pass your hands directly over the cutter head?

   _____

   _____

6. When do you have to use a push stick?

   _____

   _____

7. Is it okay to adjust the height of the outfeed table? Why or why not?

   _____

   _____

8. What does the acronym HEADS UP! stand for?

   _____

   _____

   _____

   _____

   _____

Information Sheet

PLANER SAFETY

Á After set up, ensure all guards are in place and functional before turning on the planer.
Á Never plane stock that is less than 300mm long. Short stock can get hung up between the power rollers inside the planer.
Á Most planers have a shear pin that will break if the machine is overloaded. This protects more expensive machine parts from damage. Do not plane more than 3mm per pass.
Á As with many power tools, wood can kick back out of the planer. Stand to the side so you won't get 'kicked' if the wood does shoot out. Never look into a running planer.
Á Sometimes, if the vacuum system is plugged, shavings build up on the table of the planer. Never brush them off the table with your hand. If you need to clear the table, you should shut the planer off, wait for it to stop and use a brush.
Á Check your stock for staples, grit or other junk in the wood, and also look for loose knots and severe checks. Defects in the wood could damage the machine and cause kickback.
Á The rollers on this machine push the wood down against the table, hard. Tuck all loose clothing in and don't get your fingers pinched between the wood and the table.
Á You can plane really thin wood but, because it has a tendency to flex under the rollers, it is recommended that you use a backing board when planning stock that is less than 10mm thick.
Á If your wood gets stuck, disengage the clutch and turn off the planer. Do not use your hand to clear the blockage—ask your instructor for assistance.
Á Because the planer is a very noisy machine, wear hearing protection while operating it.
Á Protect your eyes—wear eye protection.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

PLANER SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What is the minimum length of stock that should be cut on the planer? _____

2. What is the maximum depth of cut that should be made on a planer? _____

3. Why should you never look into a running planer or stand to the side as you operate it?

_____

_____

4. What should you do if you need to clear shavings off the table of the planer?

_____

_____

5. Why are severe checks in the wood or loose knots dangerous on the jointer?

_____

_____

6. What is dangerous about having your fingers or shirt-tail close to the table of the planer?

_____

_____

7. You need to use a backing board if you are planing stock that is less than _____ thick.

8. What should you do if your wood gets stuck in the planer?

_____

_____

9. What personal protective equipment should you wear when using a planer?

_____

_____

_____

Information Sheet

PORTABLE CIRCULAR SAW SAFETY

Á Position the stock so that it is stable and stationary and can be cut from a balanced and comfortable position by the operator. Smaller pieces should be secured in a vice or clamped to a bench.
Á Pinching the blade is probably the most common mistake made when using a portable circular saw. To prevent it, make sure the two ends fall apart when the wood falls at the end of the cut. If the two ends fall together, they will pinch the blade and cause the saw to kick back towards you.
Á Never use a portable circular saw if the blade guard is sticking. It is too easy to forget about the guard and set the saw down while the blade is spinning unprotected. If you do this, the saw will run in a circle on the floor towards you.
Á Make sure the line of cut is clear underneath because you can't see the bottom of the blade. It will cut through anything it runs into. Lots of people have been shocked when their saw cut its own cord, or when the sawhorse they were working on split in half.
Á Let the saw reach full speed before you begin your cut. If the blade is touching the wood when you pull the trigger, the saw will kick back towards you.
Á The rotation of the blade on a portable circular saw is such that if there is a problem, the saw will jump back towards you. So keep a firm grip on the saw at all times. Keep in mind that things behind the saw, like feet or fingers, are in more danger than things in front of the saw—it never jumps forward!
Á Because the portable circular saw is a very noisy machine, hearing protection must be worn when operating it.
Á Protect your eyes—wear eye protection.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

PORTABLE CIRCULAR SAW SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. Before making a cut with the portable circular saw, you should position the stock so it is

   _____

2. What will happen if the ends of the wood you are cutting fall together as you finish a cut with the portable circular saw?

   _____

3. What could happen if the blade guard on a portable circular saw is sticking open?

   _____

   _____

4. Why is it important to keep the line of the cut clear underneath the wood?

   _____

   _____

5. What will happen if the blade is touching the wood when you pull the trigger to start the saw?

   _____

   _____

6. Why is it important to keep a firm grip on the saw at all times?

   _____

   _____

7. What does the acronym HEADS UP! stand for?

   _____

   _____

   _____

   _____

   _____

   _____

Information Sheet

RADIAL ARM SAW SAFETY

Á Make sure the blade guard is in place and works properly.
Á It is not safe to cut wood that is less than 300mm long on the radial arm saw because your fingers will end up too close to the blade.
Á Make sure the wood you are cutting is well supported, and not stacked above the fence. If you are cutting a bunch of pieces at once (gang cutting) make sure they are piled securely, otherwise the blade could find a loose piece and snap it towards the fence. This would take the cut out of your control.
Á Check wood for knots and non-wood material such as gravel, nails, etc.
Á Keep your hands at least 150mm to either side of the blade at all times. The area in front of the blade is always dangerous because the carriage could come forward at any time, e.g., if the blade hooked a small piece of scrap. Use another piece of wood to push cuts clear of this area—don't use your hand.
Á The radial arm saw has a tendency to pull itself into the cut because of the way the blade rotates. Anticipate this and control the rate of feed carefully.
Á When you have finished with the saw, lock the carriage behind the fence so that the blade is secured safely out of the way when the next person comes to use it.
Á Never cross your arms when using the radial arm saw.
Á Do not cut round or irregular stock unless it is secured. The force of the blade can twist the wood around and pull your hand into its path.
Á If a stop is being used, hold the wood against the fence between the stop and the blade.
Á Some radial arm saws have a small table. Make sure the ends of long boards are supported to prevent the middle from flipping as you finish a cut.
Á Wear both eye and hearing protection when using a radial arm saw.

Name: _____ Date: _____

Test

RADIAL ARM SAW SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What is the minimum length of stock that should be cut on the radial arm saw? _____

2. Why is it important to make sure all the stock being cut is well supported?

_____

_____

3. How far to either side of the blade should you keep your hands? _____

4. Why does the radial arm saw tend to pull itself into the cut?

_____

_____

5. When you have finished using the radial arm saw, what should you do with the carriage?

_____

_____

6. Is it safe to cross your arms when using the radial arm saw? _____

7. Why is it dangerous to cut round or odd shaped wood?

_____

_____

8. What will happen as you cut long boards that are not supported by a long table?

_____

_____

9. What personal protective equipment must be worn when operating a radial arm saw?

_____

_____

Information Sheet

ROUTER SAFETY

Á Unplug the router before changing the bits—you don't want to bump the switch when your hand is on the cutter!
Á Install bits with at least 15mm of the shaft in the collet chuck. Any less and the bit could vibrate loose during use.
Á After you have changed the bit, make sure the switch is off before you plug in the router, otherwise you might get an unwanted surprise.
Á Unless the object you are going to route is really big and heavy, and won't move around, you need to secure the stock with a vice or clamps. Never hold the stock with one hand while routing with the other.
Á When you are ready to go, make sure the bit is clear of the stock before you turn the router on. Once the router is up to speed, cut with even pressure at a steady pace. Don't force the cut or overload the router.
Á Always cut against the rotation of the bit. This gives you better control as you push the router into the cut. If you go the other way, the router will pull itself along.
Á When you have finished your cut, let the bit stop before you put the router down.
Á Because the router is a very noisy machine, hearing protection must be worn when operating it.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

ROUTER SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What should you always do before changing bits on a router?

   _____

2. What is the minimum shaft length on a bit that is inserted in the chuck? _____

3. What should you check before you plug in the router?

   _____

4. Under what conditions are you allowed to use the router without securing it in clamps or a vice?

   _____

   _____

5. What should you check before you turn the router on?

   _____

   _____

6. What should you do before setting the router down after you have finished a cut?

   _____

   _____

7. What does the acronym HEADS UP! stand for?

   _____

   _____

   _____

   _____

   _____

   _____

Information Sheet

TABLE SAW SAFETY

Á Prior to use, ensure all guards, anti-kickback fingers and splitters are in place and functional.
Á Always use the guards, splitter and anti-kickback fingers **unless you have authorization to remove them**. Under special circumstances, e.g., dadoing or undercutting, and then they are to be reinstalled immediately.
Á Set the blade height to clear the wood by about 5mm. If you set it higher, you may create a hazard. Only set it lower for special circumstances such as undercutting or partial cutting.
Á Never cut stock that is less than 300mm long. Small stock is dangerous because: a) it brings your fingers closer to the blade and, b) it can kick back more easily because it is lighter.
Á Always use a push stick if your fingers will come within 100mm of the blade.
Á Wood can 'kick back' out of the table saw. In fact, this is one of the most common table saw accidents. Stand to the side when rip cutting so that you won't get 'kicked.'
Á When cutting on the table saw, always support the wood on its longest side. Use the fence when rip cutting, and use a miter gage or cross cut jig for cross cutting. Never use the fence when crosscutting—you will have an accident!
Á Always push the stock between the blade and the fence until it has passed the back of the blade; otherwise, the wood inside the fence could easily be caught by the blade and kicked back.
Á If you are taking stock off the back of the saw, reach around the blade, not over it. If possible, have someone help you or let the stock drop to the floor. Never reach around or over a running saw. Shut it off first.
Á Never make free hand cuts on the table saw. It is too easy to twist the wood or pinch the blade. Always use either the fence or the mitre gauge.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

TABLE SAW SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. How high should the blade be set above the wood? _____

2. What is the minimum length of stock that should be cut on the table saw? _____

3. You must use a push stick if your fingers will come within _____ of the blade.

4. Where should you stand when rip cutting on the table saw?

   _____

5. What device should you use to guide the wood when:
   a. rip cutting _____
   b. cross cutting _____

6. Which of the following conditions would produce kickback: a) the piece of wood between the blade and the fence, or b) the wood outside the blade? _____

7. Is it okay to reach over the blade? _____

8. Why is it dangerous to make freehand cuts on the table saw?

   _____

   _____

9. What three safety devices should always be used when working with a table saw?
   a. _____
   b. _____
   c. _____

Information Sheet

WOOD LATHE SAFETY

Á When setting up a turning in the lathe, make sure the wood is solidly mounted and all locks are secure. Many lathe accidents result when wood jumps off the machine.
Á Inspect the stock for bad glue joints, loose knots or severe checks. Any of these defects could cause an accident.
Á Keep the tool rest close to the work at all times—within 12mm, if possible. As you turn a project and the gap between the wood and the tool rest increases, so does the chance of the chisel catching.
Á Make it a habit to rotate the stock by hand before turning on the lathe. This will let you know if anything is going to bump when you turn on the power.
Á Begin turning the lathe at a low speed. The wood may be unbalanced (especially large, rough stock) and could vibrate badly at high speed.
Á Hold the chisel close to each end, not in the middle. Your front hand should control the cut by riding against the tool rest. Your backhand should steady the chisel by holding the butt against your hip.
Á Remove the tool rest from the lathe when sanding or finishing your project so there is no danger of pinching your fingers.
Á Wear eye protection when operating a wood lathe.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

WOOD LATHE SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What could happen if the wood and the locks on the lathe were not tightened down when you turned the machine on?

2. Why should you always begin your turnings at low speed?

3. What kinds of defects in the wood could cause a problem on the lathe?

4. Why is it important to keep the tool rest close the work at all times?

5. What should you do before you turn on the power to activate the lathe?

6. Explain how to hold the chisel when turning.

7. What should you do before sanding a project on the lathe?

8. What does the acronym HEADS UP! stand for?

Information Sheet

ARC WELDING SAFETY

Á	Arc welding can burn or shock you! Wear protective clothing to protect exposed skin from welding splatter and UV rays, and wear leather gloves (without holes) to protect against burns and shock.
Á	Use screens to protect others from flash.
Á	Do not weld in wet conditions or while wearing wet clothing. Water is a good conductor and could cancel out the protective qualities of your clothing and gloves.
Á	Always wear an approved arc welding helmet with a no. 10 lens or darker. The light from arc welding is bright enough to damage your eyes permanently. Gas welding goggles or sunglasses are not good enough. Do not watch the arc when someone else is welding and make sure they don't watch you work unless they also have a helmet on.
Á	Wear clear eye protection when chipping, brushing or grinding your welds.
Á	Ensure that cables will not interfere with your work.
Á	Arc welding makes a lot of smoke. Make sure you have effective local ventilation to clear away the fumes.
Á	Make a habit of feeling, not touching, for heat before you grab anything. Vices, tools or steel near your weld can give a serious burn even though they may not look hot.
Á	Vapours or fumes from solvents, fuels or other flammable liquids can be explosive. Never weld a container that has held flammables unless it has been steam cleaned or is filled with water.
Á	Mark hot work "Hot" or guard it so it can't be contacted.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

ARC WELDING SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. When arc welding, your clothing must protect you against what three potential hazards?
   a. _____
   b. _____
   c. _____

2. Why is it dangerous to arc weld in wet conditions?

   _____

   _____

3. Do gas welding goggles or sunglasses provide enough eye protection for arc welding? Why or why not?

   _____

   _____

4. Clear eye protection must be worn when _____ or _____.

5. Why is it important to have lots of ventilation when arc welding?

   _____

   _____

6. In addition to the material you are welding, what else can get hot enough to burn you?

   _____

   _____

7. Why is it extremely dangerous to weld containers that have held flammable materials?

   _____

Information Sheet

BENCH GRINDER SAFETY

Á Inspect the grinder prior to use to ensure there are no cracks in the abrasive disc.
Á Check there are no flammables in the area of the grinder.
Á Use wheel dressing procedures when required.
Á Keep the tool rest within 1.5mm of the stone at all times. If there is too much room between the stone and the rest, your work could jam causing the stone to shatter. At the speed it is turning, you don't want that to happen.
Á If the stone has a flaw, it is most likely to fly apart as it speeds up, just after you start it. Always stand to the side when starting the grinder, just in case.
Á Only grind on the face of the stone, never on the side—it could explode in your face.
Á Work should be moved back and forth across the face of the stone to avoid creating a groove in the center.
Á Use moderate pressure when grinding. If you push too hard, you will stress the machine and the stone, and generate unnecessary heat in the material you are grinding.
Á Avoid grinding small pieces or, if necessary, hold them firmly in pliers or vice grips. Small pieces could easily be pulled out of your grasp and cause problems.
Á Do not grind either sheet metal or soft metals like brass or aluminum on the grinder. Sheet metal vibrates too much and can easily get caught, and non-ferrous metals such as aluminum can quickly plug up the stones.
Á Grinding generates a lot of heat in the metal being ground. Cool your material regularly and take care not to burn yourself when it is hot. If you are using the grinder to sharpen tools, be aware that too much heat can ruin the temper in tool steel—this is not good for your tools.
Á Full face shield, leather apron and hearing protection are required.

Name: _____ Date: _____

Test

BENCH GRINDER SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What is the maximum distance allowed between the tool rest and the stone on a grinder? _____

2. What could happen if you were to grind on the side of a grinding stone?

_____

_____

3. Where should you stand when starting up the bench grinder?

_____

_____

4. Why should you avoid using excessive pressure when working on the bench grinder?

_____

_____

5. Why is it especially dangerous to grind small pieces on the bench grinder?

_____

_____

6. What kind of materials should not be worked on the bench grinder?

_____

_____

7. Why is there a danger of burning yourself when using the bench grinder?

_____

8. What personal protective equipment do you need when operating a bench grinder?

_____

_____

_____

_____

_____

_____

Information Sheet

BUFFER/WIRE WHEEL SAFETY

Á The biggest danger on the buffer or wire wheel is having the wheel grab your work. This could happen if the wheel were to hook on a corner or the edge of your work. To prevent this from happening, hold your work so the wheel is spinning off the corners.
Á Hold your work against the wheel just below the middle point. If the wheel should grab it, it will throw it down and away from you.
Á Buffing can generate a fair amount of heat, so handle your work with care to avoid getting burnt.
Á Strands of wire from the wire wheel can come loose. Be sure to wear eye protection.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

BUFFER/WIRE WHEEL SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. How do you prevent the buffer or wire wheel from grabbing your work out of your hands?

2. Why should you hold your work just below the centre of the wheel?

3. Why is there a danger of burning yourself when using the buffer or wire wheel?

4. Why is eye protection especially important when using the wire wheel?

5. What does the acronym HEADS UP! stand for?

Information Sheet

DRILL PRESS SAFETY

Á Tie long hair back.
Á Remove all strings and/or jewelry that could get caught in the drill press.
Á The material you intend to drill must be held in the drill vice or be clamped to the drill table. This will prevent it from spinning around and hurting you if the drill bit were to catch as it went through.
Á Be sure to 'centre punch' hard materials like metals before you drill them. The punch mark will prevent the drill bit from slipping around as you try to start the hole.
Á Set appropriate drill speed for the drill bit.
Á Make sure the chuck key is out of the chuck every time you go to start the drill.
Á If you are drilling a series of holes or are in a rush to get onto the next job, slow down to make sure the bit is clear of the stock before you move it. If you do move the stock when the bit is still in the hole, you could break the bit.
Á Set up your operation to avoid drilling into the vice or table. Put some scrap wood under your work, or position it in the vice so that the bit will come through in the centre or at the side of the vice.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

DRILL PRESS SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. Why is it important to secure the material you plan to drill on the drill press?

2. How do you prevent the bit from slipping off target and possibly breaking when drilling hard materials like metal?

3. What should you check each time you are about to start the drill press?

4. What could happen if you move the stock before the bit is completely clear of the hole?

5. How can you avoid making unwanted holes in the drill press vice?

6. Why do you need to tie long hair back and remove jewelry and/or strings when working around the drill press?

Information Sheet

FOUNDRY SAFETY

Á Do not light the furnace unless you have permission. The gas used to heat it is very explosive and a serious accident could result from someone trying to light it if they didn't really know how.
Á Preheat cold metal before adding it to a pot of molten metal to reduce its moisture content. If you were to drop cold metal into molten metal, the intense heat could vaporize the moisture instantly and cause an explosion of molten metal.
Á Wear a mesh facemask, burn-proof gloves and leggings when pouring a cast. The molten metal you are working with will quickly melt or burn through standard safety gear so you need special protective clothing that can withstand extremely high heat.
Á Stand to the side as you pour a casting. Again, moisture is the problem. If steam gets trapped inside a tightly packed mold, the resulting pressure could blow the mold apart.
Á Put the flask on a bed of sand or fire bricks while you pour the casting. Concrete has moisture in it, so if you accidentally drop liquid metal on it, the concrete could fracture and send chips flying unpredictably.
Á Castings take a long time to cool down. Use extreme caution when opening up a recent casting to avoid burning yourself. Freshly poured castings must be marked "HOT."

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

FOUNDRY SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. Why is it dangerous to try lighting the furnace if you don't really know how and don't have permission?

2. What should you do to a piece of metal before adding it to a pot of molten metal?

3. What safety gear should be worn when casting?

4. Why should you stand to the side when pouring a casting?

5. What might happen to concrete if molten metal is dropped on it?

6. What do you need to be careful about when opening up a recent casting?

7. What does the acronym HEADS UP! stand for?

Information Sheet

METAL CUT OFF SAWS SAFETY

Á Make sure the stock is tightly clamped in place before starting your cut. If it isn't, the blade will grab it and roll it around.
Á Keep your hands clear of the path of the blade at all times. Some of these saws cut automatically; on others, you control the cut. In either case, keep your hands clear and out of danger.
Á Do not force the cut. There is often a temptation to speed things up by pushing on the saw but this could overload the machine or damage the blade.
Á Although these saws cut automatically, you should always watch the cut as it proceeds. The blade could twist or jam, the stock could twist free, or the saw could fail to stop when it should. Be there.
Á Take care in handling fresh cut pieces of metal—they could be sharp and hot. Cool and deburr them right away.
Á If metal chips or filings build up in the saw, turn it off and clean it with a brush—never use your hand. Metal slivers really hurt.
Á Wear eye and hearing protection.
Á Wear appropriate gloves when handling the stock.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

METAL CUT OFF SAWS SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What will happen if the stock is not tightly clamped in the metal cut off saw before you start your cut?

   _____

   _____

2. Keep your hands _____at all times.

3. What could happen if you try to force the cut while using a metal cut off saw?

   _____

   _____

4. Why do you need to keep an eye on the cut as it proceeds?

   _____

   _____

5. What makes freshly cut pieces of metal dangerous?

   _____

   _____

6. If filings build up on the machine, how should you clean them off?

   _____

   _____

7. What personal protective equipment is required when operating the metal cut off saw?

   _____

   _____

   _____

   _____

   _____

   _____

Information Sheet

METAL LATHE SAFETY

Á Make sure the stock is secure and that all locks are tight before turning on the lathe. Otherwise the piece of steel might shift or fly out when it starts to spin or when you start to cut it.
Á Never leave the chuck key in the chuck. It should either be in your hand, if you are using it, or on the tool rack. Leaving it in the chuck will lead to an accident.
Á Material that extends more than twice its diameter out of the chuck should be supported on the tailstock end. If unsupported, the stock could flex as it spins or as you cut, causing vibration, chatter and a hazardous situation.
Á Use extreme caution if your stock extends through the headstock end. Many accidents have resulted when an operator, while concentrating on the cut, failed to notice the end of the stock whip around. Others have been injured by trying to steady the protruding end (don't do this), or by bumping into it accidentally as they pass by.
Á Tuck in your shirt-tail to prevent it from getting caught in the feed and lead screws which are right by your hips.
Á Wear eye protection.
Á Wear appropriate gloves when handling stock, but not when operating the lathe.
Á Ensure the stock has completely stopped rotating before attempting to handle it.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

METAL LATHE SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What two things should you secure before starting the metal lathe?
   a. _____
   b. _____

2. Why should you never leave the chuck key in the lathe chuck?
   _____
   _____

3. Any material that extends more than _____ its diameter out of the chuck should be supported on the tailstock end.

4. Why is stock that sticks out of the headstock end of the lathe dangerous?
   _____
   _____

5. Why is it important to remove open coats and tuck in your shirt-tails when using the lathe?
   _____
   _____

6. What personal protective equipment is required when operating a metal lathe and handling the stock?
   _____
   _____
   _____
   _____
   _____
   _____

Information Sheet

OXY-ACETYLENE SAFETY

Á You must be trained and authorized before you are allowed to use the oxy-acetylene equipment.
Á Ensure acetylene cylinders are kept upright at all time.
Á When setting up oxy-acetylene equipment, never use grease or oil to lubricate the fittings. Oil and grease are very flammable in the presence of oxygen.
Á Vapours or fumes from solvents, fuels or other flammable liquids can be explosive. Never weld a container that has held flammables unless it has been steam cleaned or is filled with water or an inert gas.
Á Always watch for gas leaks by listening to or brushing the connections with soapy water.
Á Open the cylinders slowly, one half turn only at a time. This releases pressure gently into the system and lets you shut the cylinders off quickly if there is a problem at start up.
Á Always wear leather gloves and approved welding goggles. Make sure anyone who watches or helps also wears proper protective gear.
Á Make sure your work area has effective local ventilation. Galvanized metal, brass or bronze emit toxic fumes when heated. Respiratory protection may also be required.
Á Be aware of the location of the hoses are all times.
Á Purge with acetylene. Light the acetylene first with a striker (not matches), then add oxygen. This will ensure that there is no mixed gas in the lines that could burn back up inside.
Á Mark recently welded work "Hot" or guard it to prevent it from being contacted.
Á Make a habit of feeling for heat before you grab hold of anything. Vices, bricks, or tools can give a serious burn even though they may not look hot.
Á The oxy-acetylene flame burns at about 3000°C. Always watch where you put the tip and only set the torch down in a proper holder so it doesn't fall.
Á When finished, turn off the torch valves, turn off the cylinder valve at the cylinder, then go back to the torch and bleed both lines.

Name: _____ Date: _____

Test

OXY-ACETYLENE SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. What is the danger in using grease or oil to lubricate welding fittings?

   _____

   _____

2. Describe at least two ways of checking for leaks on gas welding equipment.
   a. _____
   b. _____

3. How far should you open the tank valves? _____

4. What protective equipment should always be worn when working with oxy-acetylene welding equipment?

   _____

5. What extra danger exists when welding brass, bronze or galvanized metal?

   _____

   _____

6. Why is it important to purge with acetylene before lighting the torches and adding oxygen?

   _____

   _____

7. In addition to the material you are welding, what else can get hot enough to burn you?

   _____

8. Which of the following is the correct lighting device for an oxy-acetylene torch?
   a. striker
   b. match
   c. cigarette lighter
   d. all of above

9. Why is it extremely dangerous to weld containers that have held flammable materials?

   _____

   _____

Information Sheet

RIGHT ANGLE GRINDER SAFETY

Á Inspect the grinder prior to use to ensure there are no cracks in the abrasive disc.
Á Check there are no flammables in the area before grinding.
Á Secure the stock you are going to grind so that it does not move around. Unless the material is large and very steady, you should put it in a vice or clamp it to a workbench to prevent the grinder from pushing it aside.
Á Grind with moderate pressure only. Excessive pressure generates excessive heat and puts unnecessary strain on the grinding disk, the motor and the operator.
Á Grinders shoot out a stream of cool sparks. Be conscious of where the sparks are going and take care to avoid endangering yourself and others.
Á Any time you are grinding, things will get hot. Make it a habit to test things for heat before you grab onto them.
Á Because the right angle grinder is very noisy, wear hearing protection.
Á Wear eye protection and flame resistant clothing.
Á Never remove the guard.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

RIGHT ANGLE GRINDER SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. Why is it important to secure the material you want to grind?

2. Why should you use only moderate pressure when working with the grinder?

3. How is the grinder dangerous to others nearby?

4. What should you do before picking up things that you have been grinding?

5. What personal protective equipment do you need to wear when operating a right angle grinder?

Information Sheet

AUTOMOTIVE SHOP SAFETY

Á Minimize the risk of tripping in a mechanical shop— keep parts and tools off the floor, leave the handles of floor jacks in an upright position, stand creepers up against the wall when not in use, etc.
Á Be aware of the power of gasoline and always handle it with care—minimize gasoline vapours (they are extremely flammable) by immediately wiping up spills and hanging the rags outside; keep all sparks and flames well away; do not use gasoline around hot engines and do not use it as a cleaning solvent.
Á Wipe up all spills right away, dispose of rags in identified fire safe containers, and keep tool handles and the like free of oil.
Á Because many of the supplies used in a mechanical shop are flammable, you should know where the fire extinguishers are and how to use them.
Á Many of the products and processes mechanics use contaminate the air with flammable vapours, toxic fumes or fine dust. Effective ventilation will reduce these hazards. Approved respiratory protection appropriate to the hazard must be worn when there is exposure to dusts, mists, fumes or vapours.
Á Wear goggles, appropriate gloves, shop coat and apron when handling solvents or other caustic chemicals.
Á Wear a face shield if there is risk of injury to the face (e.g., when charging a battery or connecting it to any power).
Á Wear hearing protection when exposed to loud noise or when you need to raise your voice to speak to others.
Á Brake and clutch lining may contain asbestos. Follow procedures for safe handling and disposal.

Name: _____ Date: _____

Test

AUTOMOTIVE SHOP SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. Air hoses and electrical extension cords present a tripping hazard. List four other potential tripping hazards:
   a. _____
   b. _____
   c. _____
   d. _____

2. Draw a connecting line to match the following situation/items with the correct procedure/equipment.

loud banging or grinding	goggles and approved gloves
caustic chemicals	fire safe containers
oily rags	outside fresh air
gasoline soaked rags	hearing protection

3. There are different types of fire _____ for different types of _____.

4. Where are the fire extinguishers located in your auto shop?

   _____

   _____

5. Circle the correct answer for the following true and false questions:
   a. Gasoline is a recommended cleaning solvent. T or F
   b. When working in areas with dust and fumes, you she wear approved breathing protection. T or F
   c. Hearing loss can result from working in noisy environments. T or F
   d. Potential danger with charging batteries suggests you should wear eye/face protection. T or F

6. What other personal protective equipment is required in an automotive shop?

   _____

   _____

   _____

Information Sheet

SAFETY AROUND VEHICLES

Á Before you begin any work on a vehicle, make sure it can't roll. Put the transmission in park for an automatic transmission, and neutral or low, as appropriate, for a standard transmission. Set the parking brake, remove the keys from ignition and then chock the wheels.
Á When positioning a jack, make sure it is stable. Place it under a solid part of the frame—something that won't crumple or slip as the vehicle is raised. Also chock two of the wheels that will remain on the ground just in case the vehicle shifts as it is raised.
Á Use approved jack stands to support any vehicle you are working underneath. Lifting jacks are less stable and can collapse.
Á Never start a vehicle unless you are 100% sure that the motion of the engine will not endanger anyone. Your friend may ask you to crank the engine while they are under the hood—double check to make sure that their hands are clear before you turn the key. And if you are under the hood, make sure your friend at the ignition knows never to crank it until they are sure you are clear.
Á Never move a vehicle unless you are 100% sure the motion of the vehicle will not endanger anyone—look around carefully, beep the horn, wait, and start moving slowly. Give anyone crouching by a wheel or bumper time to move to safety or shout before they get hurt. If the space is tight, get someone to stand outside the vehicle and direct you.
Á Only use a hoist if you are authorized to do so.
Á Place hoist pads under solid frame parts that will not shift as the vehicle is lifted (a few suspension parts can shift as the weight of the vehicle comes off the wheels). Check the hoist pads when the wheels are just a few inches off the ground to make sure they remain stable and secure. Get everyone out of the car and close the hood, trunk and all doors.
Á Do not use a hoist that is jerky, leaking oil or slowly settling. With a car hanging over your head, you want to make sure it is going to stay up there.

Name: _____ Date: _____

Test

SAFETY AROUND VEHICLES

Name: _____ Date: _____

Class: _____ Section: _____

1. How do you make sure a vehicle will not roll when you are working on it?

   _____

   _____

2. Why should you chock the wheels of a vehicle if you plan to jack it up?

   _____

   _____

3. When would you need to use jack stands?

   _____

   _____

4. Before starting any vehicle, what should you check?

   _____

   _____

5. How can you safeguard the people who may be near a vehicle you are about to move?

   _____

   _____

6. When lifting a vehicle on the hoist, what should you check when the wheels are just a few inches off the ground?

   _____

   _____

7. What symptoms might suggest that there is a problem with a hoist and indicate that you shouldn't use it until it is fixed?

   _____

   _____

Information Sheet

SAFETY AROUND ENGINES

Á Take off all rings and bracelets before doing any mechanical work. Jewelry can get caught up in machinery and cause an injury, or even create a short circuit between electrical parts leading to a burn.
Á Keep your hands away from all moving parts when working on an engine, i.e., belts, shafts, fans, blowers.
Á Be especially careful around engine fans. Some of the hazards to watch out for include: a) having your hand clipped, b) having something fire back at you if dropped in the area of the fan, c) an unexpected start up of an electric fan on a hot engine, and d) dangling items swinging into the fan.
Á Mechanics can easily get burnt on hot cylinders, exhaust parts, radiators, or engine coolant. Never open the radiator cap on a hot engine! Check the radiator hose—if you can feel pressure, don't open the radiator cap.
Á Engine exhaust contains carbon monoxide, a colourless and odourless gas that can kill you. So do not run an engine in an enclosed, indoor space unless the exhaust is vented to the outside.
Á Handle electrical parts with care so that you don't become part of the circuit. An ignition shock will hurt but not harm you. A shock from a battery, however, can be very dangerous.
Á Engine noise can cause permanent hearing loss. Don't run an engine without a muffler. And wear hearing protection when working around loud engine noise or in a noisy shop.
Á When working on a small engine, make sure it won't start if the crankshaft is accidentally moved. Disconnect all spark plug leads if the engine does not have a kill switch.
Á After repair and prior to start-up, ensure engine is clear and safe to start.

Hands are the most vulnerable part of the body.

Eyes and ears also need protection.

Ask when you are not sure!

Dress safely using the appropriate protection.

Safety devices must always be used as intended.

UP!

Name: _____ Date: _____

Test

SAFETY AROUND ENGINES

Name: _____ Date: _____

Class: _____ Section: _____

1. Name two ways jewelry is dangerous around engines.
   a. _____
   b. _____

2. What moving engine parts pose a danger to your hands?

   _____

   _____

3. Describe the special hazards of engine fans.

   _____

   _____

4. What engine parts are most likely to cause burns?

   _____

   _____

5. Why is it so important to vent the exhaust outside when working around running engines?

   _____

6. Which two engine systems can cause electric shock?
   a. _____
   b. _____

7. Why should you use hearing protection around loud engine or shop noise?

   _____

8. How can you prevent a small engine from starting accidentally?

   _____

   _____

Information Sheet

BATTERY HANDLING SAFETY

Á A lead/acid battery contains sulfuric acid that will eat your clothing and burn your skin. Protect yourself by wearing eye protection, a face shield if there is risk of injury to the face, appropriate gloves, shop coat and an apron. Clean the battery before you handle it; then handle it carefully. You can neutralize and clean the acid with a solution of baking soda and water. If you get acid on yourself, flush it off with lots of water.
Á The chemical reaction in a lead/acid battery produces hydrogen gas—a very explosive substance. Keep all sparks or flames away from batteries, especially if they are being charged.
Á When connecting a battery to a charger, attach the leads to the battery, then turn the charger on. To disconnect, turn the charger off; then unclip the leads. Wear a face shield when charging a battery or connecting it to any power.
Á When a battery is charging, you should monitor the temperature by putting your hand on the side of it every half-hour or so. If the battery gets really hot, it is defective and must be replaced; do not continue to charge it. Don't leave a battery charging when you can't monitor it.
Á When pulling a battery out of a vehicle, disconnect the ground lead first. This reduces the chances of accidentally causing a short circuit as you work around the battery.
Á Never attempt to charge or jump-start a frozen battery. The battery could explode.
Á Never attempt to charge or jump-start a maintenance free battery if the charge indicator shows that the battery's electrolytes are low—the battery could explode. It is time to replace it.

Name: _____ Date: _____

Test

BATTERY HANDLING SAFETY

Name: _____ Date: _____

Class: _____ Section: _____

1. How do you protect yourself from acid burns when working with automotive batteries?

_____

_____

2. Why is it important to keep all sparks or flames away from lead/acid batteries?

_____

_____

3. List all the personal, protective equipment required when charging or connecting a battery to power.

_____

_____

4. In what order should you connect and disconnect a battery from a charger?

Steps	Connect	Disconnect
a. hook up the leads		
b. unhook the leads		
c. turn on the charger		
d. turn off the charger		

5. What should you do if you are charging a battery and it starts to get hot?

_____

_____

6. When pulling a battery out of a vehicle, which lead should you disconnect first?

_____

7. What could happen if you try to charge or jump-start a frozen battery?

_____

8. What could happen if you try to charge a maintenance free battery that has low electrolyte?

_____

CLASS SAFETY INSTRUCTION RECORD

Course: _____ Block: _____

Student Name	Machine:				Machine:			
	Demo Date	Test Date	Make-up Date	Qualified Date	Demo Date	Test Date	Make-up Date	Qualified Date
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								
24.								
25.								

SAFETY PLEDGE

I, _____, certify that I was present for the demonstration of the _____ on _____, and that I understand the correct setup and use of this machine. I hereby pledge to practise the correct safety procedures for this machine, report any unsafe conditions, and ask for assistance if in any doubt.

Student's Signature _____ Date _____

SAFETY PLEDGE

I, _____, certify that I was present for the demonstration of the _____ on _____, and that I understand the correct setup and use of this machine. I hereby pledge to practise the correct safety procedures for this machine, report any unsafe conditions, and ask for assistance if in any doubt.

Student's Signature _____ Date _____

SAFETY PLEDGE

I, _____, certify that I was present for the demonstration of the _____ on _____, and that I understand the correct setup and use of this machine. I hereby pledge to practise the correct safety procedures for this machine, report any unsafe conditions, and ask for assistance if in any doubt.

Student's Signature _____ Date _____

MACHINE OPERATOR CARDS

HEADS UP! for Safety

QUALIFIED
Machine Operator

Student: _____ Date: _____

Machine	Teacher	Machine	Teacher

HEADS UP! for Safety

QUALIFIED
Machine Operator

Student: _____ Date: _____

Machine	Teacher	Machine	Teacher

HEADS UP! for Safety

QUALIFIED
Machine Operator

Student: _____ Date: _____

Machine	Teacher	Machine	Teacher

HEADS UP! for Safety

QUALIFIED
Machine Operator

Student: _____ Date: _____

Machine	Teacher	Machine	Teacher

HEADS UP! for Safety

QUALIFIED
Machine Operator

Student: _____ Date: _____

Machine	Teacher	Machine	Teacher

HEADS UP! for Safety

QUALIFIED
Machine Operator

Student: _____ Date: _____

Machine	Teacher	Machine	Teacher

HEADS UP! for Safety

QUALIFIED
Machine Operator

Student: _____ Date: _____

Machine	Teacher	Machine	Teacher

HEADS UP! for Safety

QUALIFIED
Machine Operator

Student: _____ Date: _____

Machine	Teacher	Machine	Teacher

STUDENT INCIDENT REPORT

Student: _____ Date of incident: _____

Course: _____ Period: _____ Time: _____

1. Describe, in detail, how the incident occurred: _____

_____

_____

_____

_____

2. What was the nature of the injury? _____
3. To whom did you report the incident? _____
4. Who witnessed the incident? _____
5. What First Aid treatment did you receive at the school? _____

_____

6. Were you treated by a doctor? _____
7. What is the name of your family doctor? _____
8. Upon reflection, how could this incident have been prevented? _____

_____

_____

_____

_____

Student's signature: _____ Date: _____

HEADS UP! for Safety

SHOP SAFETY INSPECTION CHECKLIST

General Condition of the Shop

Work Room				
Subject	Condition Required	Satisfactory	Unsatisfactory	Corrected by:
Floors	Clean, free of slipping/tripping hazards, free of oil, water, dirt, etc.			
Corners	Clean, uncluttered, no sharp edges			
Stairways	Clean, free of slipping/tripping hazards, good lighting, hand rails			
Exits	Sufficient, well-identified, unobstructed, clearly marked			
Walls	Clean, clear of objects that might fall			
Windows	Clean			
Ceiling	Clean, overhead sprinklers free of obstructions			
Lighting	Safe, sufficient, well-placed, all fixtures on and operating			

Air Quality				
Subject	Condition Required	Satisfactory	Unsatisfactory	Corrected by:
Air	Free from excessive dust, smoke, etc.			
Ventilation (e.g., small engine)	Adequate, proper for current activities			
Local exhaust for dust, vapour and fume	Provided where required			

Equipment				
Subject	Condition Required	Satisfactory	Unsatisfactory	Corrected by:
Ladders	Free of defects, no loose, broken or missing parts			
Machines, benches, etc.	Location conforms to good safety practices			

Storage Facilities				
Subject	Condition Required	Satisfactory	Unsatisfactory	Corrected by:
Storage units	Correctly labeled, free of slipping/tripping hazards			
Lockers	Clean, contain no fire hazards			
For tools and materials	Appropriate and adequate			
For waste and oil rags	Container with spring-loaded lid, emptied regularly			
For dangerous materials	Labeled storage provided outside the main building			
For flammable liquids	Safety cans provided			
For scrap	Adequate storage provided			

Emergency Preparedness				
Subject	Condition Required	Satisfactory	Unsatisfactory	Corrected by:
Emergency procedures	Posted and in place for all emergencies			
Emergency lighting	Provided where required			
Fire extinguishers	Appropriate, well-maintained—service date on tag is current, provided where required			

Name: _____ Date: _____

Housekeeping

Storage				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Tools	Stored in orderly and safe fashion in the areas provided			
Scrap	Stored promptly in the containers provided			
Workshop materials	Stored in an orderly and safe fashion			
Waste materials, oily rags	Stored promptly in designated, labeled, non-flammable containers			

Mezzanine				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Toe board, guard rail	Top rail is about 1 metre above the work surface			
Mid rail	Mid rail is between the top rail and the toe board			

Cleanliness				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Shop	Clean, uncluttered, free of refuse, oil, water, dirt, slipping and tripping hazards			
Work surfaces	Clean, uncluttered, free of refuse, oil, water, dirt, etc.			
Flammable liquids	Not used for manual cleaning			

Equipment

Required Procedures				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Machines locked out	While unattended, when the instructor is out of the room, and during maintenance and/or cleaning; Lockout procedures are located in proximity to the machines			

Safety				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Control switches	Easily available to operator at all times			
Guards	Used on all equipment, without exception			
Enclosure guards	All gears, moving belts, etc., protected by permanent guards			
Brushes	Used for cleaning equipment			
Non-skid areas	Provided on floor areas where machines are used			
Asbestos removal equip.	Provided for use on auto brakes; written procedures available			
Machines	Arranged to protect workers from other hazards			
Danger zones	Properly identified and guarded			

Maintenance				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Machines	Receive regular preventative maintenance; in safe working order			
Tools	Kept sharp, clean and in safe working order			
Hoisting devices	Maintained in safe working order			

Storage				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Tools, equipment, etc.	Adequate storage provided and used when tools, equipment, etc., not in use			

Electrical

Switches				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Master control switch	One master for all electrical installations			
Electrical switches	All switches are enclosed; proper lockouts available			
Machine switches	Within easy reach of the operator at all times			
Lock out switches	Individual lock out switches are provided for each machine			

Safety				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Control switches	Easily available to operator at all times			
CSA Code	All electrical motors and equipment comply with the Code			
Magnetic controls	All machines are provided with controls for overload and underload protection, and protection against inadvertent startup in the event of a power outage			
Electrical outlets and circuits	Properly identified			
Extension cords	Safe condition; not carrying excessive loads			
Temporary wiring	None evident			
Lock-out procedures	Instructions posted in appropriate area			

Hazardous Materials

Safety				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Chemical substances	Properly stored, labeled and handled			
Material Safety Data Sheets (MSDS)	Up-to-date and readily available			

Gas				
Subject	**Condition Required**	**Satisfactory**	**Unsatisfactory**	**Corrected by:**
Gas flow	Properly regulated to each appliance			
Cylinders	Upright, caps on and secured to prevent falling and/or rolling; pressure testing is valid and current; valve kept closed when empty or not in use; gas cylinders are correctly labeled; MSDS sheets are readily available; procedures for safe use, storage and handling are followed			
Insulation	Appliance properly insulated from all flammable materials (walls, benches, etc.)			
Lighting	Appliance properly adjusted to avoid problems when ignited			
Leaks	No leaks or gas odours anywhere in the shop			
Pipe connections	Piping is correctly labeled; gas hoses not in use where pipe connections are required			

Name: _____ Date: _____

First Aid

Safety Subject	Condition Required	Satisfactory	Unsatisfactory	Corrected by:
Eye wash station	Provided nearby, directions for use posted, testing conducted monthly			
Body wash station	Provided nearby when using acids or other corrosives			
First Aid cabinet	On site and adequately stocked			
First Aid attendant	Qualified personnel on site			

Personal Protection

Safety Subject	Condition Required	Satisfactory	Unsatisfactory	Corrected by:
Jewelry	Rings and other jewelry are removed before working in the shop			
Clothing and footwear	Personal clothing and footwear is suitable for the work being done and worn appropriately			
Eye protection	Goggles or protection shields are used where eye hazards exist			
Hearing protection	Hearing protection is worn when working around noisy equipment			
Respiratory protection	Respirators are selected according to the hazard; students using half or full-face respirators with cartridges have been properly fit-tested to ensure the respirator seals the face; respirators are worn when spraying materials hazardous to one's health (dust, toxic substances, etc.)			
Protective gloves	Proper type for the hazard, good condition			

Other

Subject	Condition Required	Satisfactory	Unsatisfactory	Corrected by:

PERSONAL SAFETY ASSESSMENT

Student: _____ Date: _____

No.	Skill set	Competency Level
1-a	**Respond to potential hazards using problem-solving strategies.**	
	Example:	
1-b	**Recognize the impact of their decisions on the safety of themselves and others, as well as on the environment.**	
	Example:	
1-c	**Demonstrate responsibility and acceptance for their decisions in work situations.**	
	Example:	
1-d	**Identify and follow recognized practises and principles that will keep themselves and others safe in a variety of situations.**	
	Example:	
1-e	**Participate in activities that promote a safe environment (school and/or community).**	
	Example:	

Competency Rating Scale	
4	Independent – Thorough and innovative; outstanding achievement
3	Capable – Needs minimal support; shows consistent achievement
2	Developing – Needs frequent support; shows partial achievement
1	Beginning – Needs continual support; shows minimal achievement

Source: Adapted from the *WCB WorkSafe Manual*

CLASS SAFETY ASSESSMENT

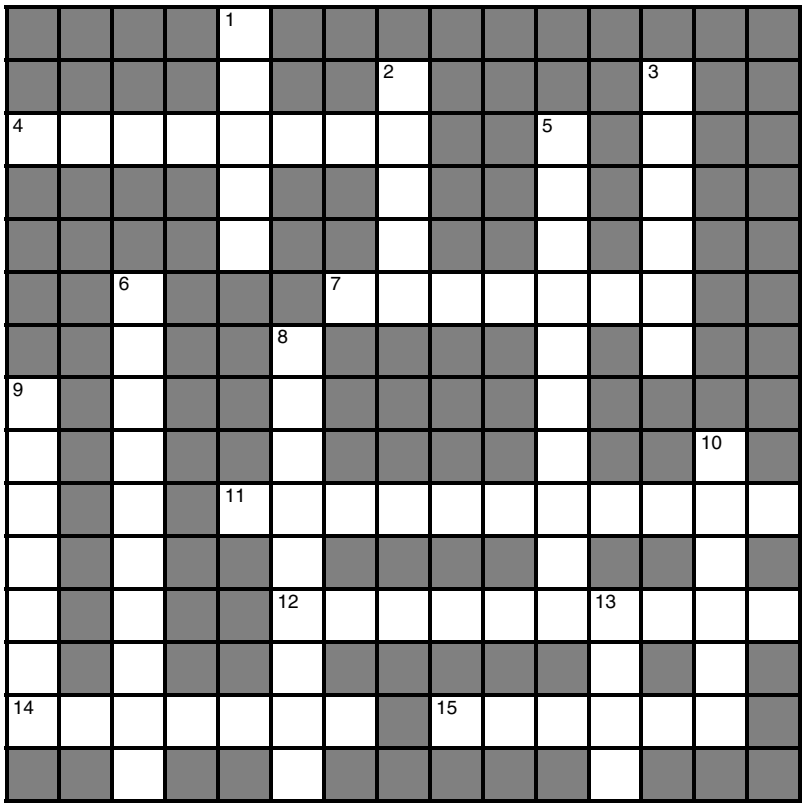
Course: _____ Block: _____

Student Name	1-a Respond to potential hazards	1-b Recognize the impact of their decisions	1-c Demonstrate responsibility and acceptance for their decisions	1-d Identify and follow recognized practises and principles	1-e Participate in activities that promote a safe environment	Avg. Rating
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						
21.						
22.						
23.						
24.						
25.						

Competency Rating Scale	
4	Independent – Thorough and innovative; outstanding achievement
3	Capable – Needs minimal support; shows consistent achievement
2	Developing – Needs frequent support; shows partial achievement
1	Beginning – Needs continual support; shows minimal achievement

HEADS UP! for Safety

BAND SAW CROSSWORD PUZZLE



Across

4 Only one of these at a time. (8)
7 A relaxed blade needs some of this. (7)
11 Keeps the blade from wandering. (5,6)
12 Don't use the band saw without this. (10)
14 Don't make adjustments until blade has __. (7)
15 Hands should never be __ with the blade (2,4)

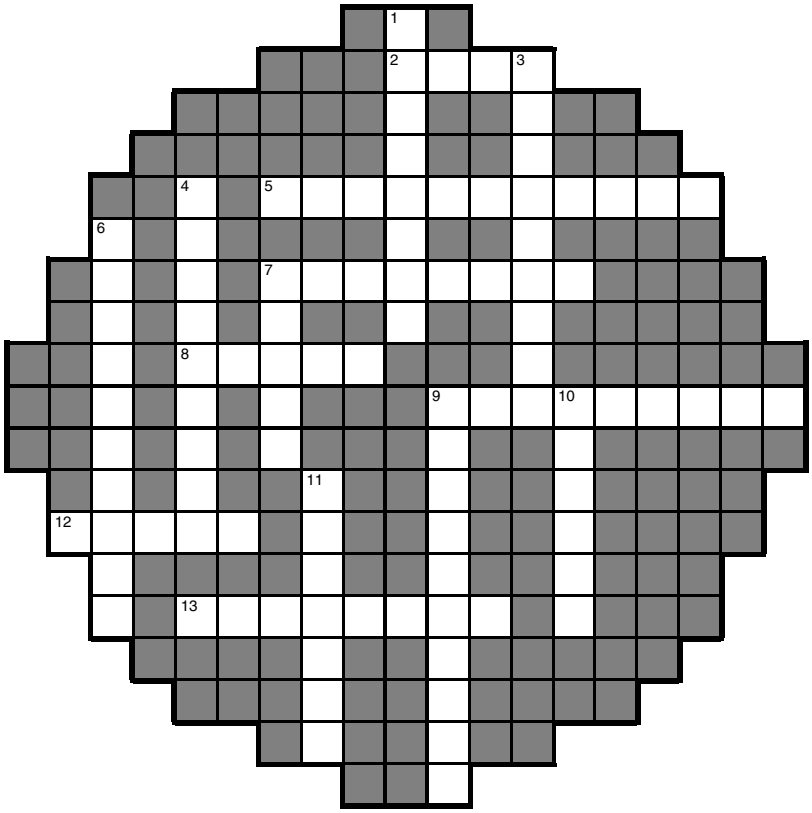
Down

1 This covers for you. (5)
2 Step on this before stepping away. (5)
3 Not a good idea to reach here. (6)
5 These give you a way out when you're in trouble. (6,4)
6 Your eyes deserve this. (10)
8 No cutting until blade moves like this. (4,5)
9 These can disappear very quickly! (7)
10 Don't do this to small pieces while blade is moving. (6)
13 Backing out of a cut can cause the blade to __ off the wheels. (4)

Name: _____ Date: _____

HEADS UP! for Safety

TABLE SAW CROSSWORD PUZZLE



Across

2 In relation to the blade, the stock should be here before you release pressure. (4)
5 No one should operate the table saw without this. (11)
7 Cutting this way may cost you. (8)
8 These should always to be well away from the blade. (5)
9 This allows you to apply pressure from a distance (4,5)
12 This covers a lot of teeth. (5)
13 This will get you where it hurts - don't let it! (4,4)

Down

1 This keeps the wood from binding on the blade. (8)
3 The blade shouldn't be much higher than the __ of the stock. (9)
4 Never do this to the blade. (5,4)
6 This supports your work when cross-cutting. (5,5)
7 To rip stock, this guides your work. (5)
9 The gift of sight depends on this. (9)
10 To support long pieces, you should have one of these. (6)
11 You must do this to the saw before changing the blade. (4,3)

Additional Resources

Following is a list of some of the websites available to assist you in the development of your shop programs:

American Association of Vocational Instructional Materials	www.aavim.com
Automotive Lift Institute	www.autolift.org
BC Safety Council	www.safetycouncil.bc.ca
BC Technology Education Association	www.bctf.bc.ca/psas/bctea
Canadian Centre for Occupational Health and Safety	www.ccohs.ca
Canadian Standards Association	www.csa.ca
Schools Protection Program	www.bcspp.org
Workers' Compensation Board	www.worksafebc.com
Industrial Accident Prevention Association	www.iapa.on.ca
Occupational Health and Safety Administration (US Department of Labour)	www.osha.gov

WCB Resources

A wide range of information and materials are available from the WCB. The following list of stickers, posters and publications are suitable for industrial education workshop safety. Complete the order form and fax or send it to:

Publications and Videos
Workers' Compensation Board
PO Box 5350 Stn Terminal
Vancouver, BC V6B 5L5

Phone: 604 276-3068
Fax: 604 279-7406
Toll-free: 1 800 66 1-2112, local 3068
Web: http: //www.worksafebc.com

WCB Stickers - 5 X 6 inches:

Sticker	Message	Order No.	Price
	**Danger Area Stay Alert**	PS 1	$0.30
	**Get Authority Before Operating**	PS 3	$0.30

Sticker	Message	Order No.	Price
	**Put Them Away**	PS 8	$0.30
	**Keep Aisle Clear**	PS 9	$0.30
	**Keep Guard On**	PS 20	$0.30
	**Lift with the Knees**	PS 22	$0.30
	**Wipe It Up**	PS 23	$0.30
	**Wear Them**	PS 24	$0.30
	**Keep this Door Closed**	PS 25	$0.30
	**Pinch Point Danger**	PS 40	$0.30
	**Keep Hands Off End of Board – Use Push Stick**	PS 41	$0.30
	**Wear Hearing Protection**	PS 42	$0.30
	**Tripping Hazard – Watch Your Step**	PS 45	$0.30
	**Eliminate a Hazard – Prevent an Accident**	PS 57	$0.30

WCB Posters – 17.5 x 23 inches:

Poster	Message	Order No.	Price
	**Which would you rather get around on? (A Bicycle or a Wheelchair?)**	9805	$0.35
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