Skilled Trades Helper

A partnership project of Prince Edward Learning Centre, Quinte Adult Day School and Literacy Link Eastern Ontario

Funded by the National Literacy Secretariat (HRSDC) and the East Central Ontario Training Board
Prepare to be a Skilled Trades Helper

This is the ideal course for someone interested in becoming a Skilled Trades Helper. Whether it is roofing, framing a house or road construction, this course will prepare you for the worksite.

Modules of study include:

1. Before You Begin
   - What Is a Skilled Trades Helper?
   - What Employers Want in a Skilled Trades Helper
   - Communicating with Others
   - Timesheets

2. Equipment and Materials
   - Ladders
   - Tool Safety
   - Construction Machines
   - Blueprints and Drawings

3. Numeracy
   - Measurement
   - Basic Geometry
   - Fractions and Decimals
   - Circles
   - 3,4,5 Rule
   - Calculations at work
   - Multiplication

4. Health and Safety
   - General Information
   - Personal Protective Equipment
   - Risk Management
   - Slips, Trips, and Falls
   - Noise
   - Lock Out and Tag Out

396 pages
LBS 2 required
Skilled Trades Helper Essential Skills Training

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Skilled Trades Helper Essential Skills Training
Written by: Lori Farrington (PELC), John Mark Robertson (QADS)
Project Manager: Doug Noyes, LLEO Network

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What is a Skilled Trades Helper?

Construction trades helpers and labourers assist skilled trades persons and perform labouring activities at construction sites. They are employed by construction companies and trade and labour contractors.

(HRSDC Essential Skills Profiles - Construction Trades Helpers and Labourers NOC 7611)
http://www15.hrdc-drhc.gc.ca/English/profiles/115.asp

Other trades helpers and labourers, not classified on the HRSDC website, assist skilled trades persons. They perform labouring activities in the following areas:

- installation, maintenance, and repair of:
  - industrial machinery
  - refrigeration
  - heating and air conditioning equipment
- maintenance and repair of transportation and heavy equipment
- installation and repair of telecommunication and power cables
- in other repair and service work settings.

They are employed by a wide variety of manufacturing, utility, and service companies.

(HRSDC Essential Skills Profiles - Other Trades Helpers and Labourers NOC 7612)
http://www15.hrdc-drhc.gc.ca/English/profiles/115.asp

These modules focus on Construction Trades Helpers and Labourers. We will also refer to them as skilled trades helpers. There is a lot to know about working on a construction site. These modules will touch on information that falls into these categories:

- Expectations
- Health & Safety
- Numeracy
- Equipment & Materials
- Oral Communications
- Thinking Skills

As a skilled trades helper, you might be
asked to:

• carry loads of wood or materials
• clean work site areas
• build items using a variety of basic tools

You might also need to:

• read work orders
• read and follow safety procedures
• use maps to locate work sites
• complete time sheets

Skilled trades helpers need to have a general knowledge of work sites, tools, equipment, measurement, and basic carpentry skills. The work is neither glamorous nor easy, but it brings a real sense of satisfaction when a job is well done. You may have days that are physically exhausting. You may have days when you are asked to do the same job over and over. You will also have days where you learn something new and feel good about it. You’ll have days when your boss tells you that you are doing a good job.

This course is designed to give you a general overview of the basics of the skilled trades helper occupation. Some of the information you may already know. Work through these areas to make sure you know it or to refresh your skills.

There is always the chance that you might learn something new. If you are working in a group setting, there is always a chance you might help someone else learn something new too!

If there are areas that you are more interested in than others, do some research on your own. There is a lot of information out there that is not included in these modules. If you are interested, your instructor can help you find more information. Good luck and enjoy learning about skilled trades helpers!
Understanding Your Role on the Jobsite

Some of the employer’s expectations are going to be clear because they will be written down in an Employee Handbook or in a Memo. However, others will not be written down. It is up to you to find out what the boss expects.

On a job site, you are going to be working with other people. Employers want workers who work well with others and have high self-esteem and confidence.

When you first start working with a crew, there will probably be some kind of “initiation period”. They want to see that you are a hard worker and serious about learning the trade. It is part of workplace culture to “test” new workers. You want to make a good impression, so it is important that you are serious and concentrate on learning the job. If you make a good impression on the others, including the foreman, you will create good working relationships with others. It will also affect how successful you will be in your training.

The way the employer sees it, you are there to help them make money. It is important for you as well because if the company is making money, you will be able to keep your job.
You are responsible for communicating clearly with your supervisor and co-workers and for understanding things that are communicated to you. You will probably work with people who don’t speak English as a first language or who have other barriers to communication, so it is important to make a strong effort to communicate and understand well. Lack of communication or understanding can cause problems such as accidents.

 Employers also want people who can solve problems and make decisions. They also value people who can think critically. If you are able to suggest different and better ways of getting the job done and if you can plan and manage your time effectively, then you are showing these abilities to the employer.

 On the job, you are expected to act professionally. This means keeping up-to-date on changes in the industry and having the proper tools to do the job.
What is a Skilled Trades Helper?

Learning Activity

1. According to the reading, skilled trades helpers are also called “construction trades helpers and labourers”. What do these people do?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. Who employs skilled trades helpers?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. What might you be asked to do if you are working as a skilled trades helper? (List as many duties as you can think of.)

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
4. What is your definition of a skilled trades helper?
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

5. What would you like to get out of this course? What is your goal? What kinds of things would you like to learn?

I am hoping to get the following out of this course:
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

My goal is to ___________________________________________________________________
_________________________________________________________________
_________________________________________________________________

I would like to learn ___________________________________________________________________
_________________________________________________________________
_________________________________________________________________
Other Trades People on the Job Site

from: Steps to Employment in Ontario
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http://209.121.217.200/manuals.html

Construction Trades

Construction trades in Ontario are divided into two kinds. Some have compulsory certification and others have voluntary certification.

Compulsory certification means that a trades person must have a certificate in order to work in Ontario. Construction trades with compulsory certification are: electrician, hoisting engineer (mobile and tower crane operators), plumber, refrigeration and air conditioning mechanic, sheet metal worker, steamfitter.

Voluntary certification means that you don’t need a certificate to work in this trade in Ontario. However, you can become certified if you want to present yourself more professionally to prospective employers and clients. Construction trades with voluntary certification are: brick and stone mason, cement mason, construction boilermaker, construction millwright, general carpenter, glazier, ironworker, lather, construction linesperson, painter (commercial and residential), plasterer, sprinkler, and fire protection installer.

Construction Labourers

Construction labourers work for construction companies, trade and labour contractors, and manufacturing, utility, and service companies. They assist skilled tradespeople. There is no certification required for this occupation.

Main Duties

- move, load, and unload materials
erect and dismantle structures

• mix, pour, spread, and rake materials

• install, operate, maintain, and repair equipment and machinery

• oil and grease equipment

• tend and feed machines such as mixers and compressors

• direct traffic near construction sites

• mix fertilizers, herbicides, and pesticides

• assist in land surveying by holding and moving stakes and rods

Labour Market Information

122,000 persons were employed in these occupations in 1996, an increase of 6.7% from 1986. 88% of these workers are construction trades helpers and labourers. 9% of workers in these occupations work part-time. 27% of workers in these occupations are self-employed and this has been increasing.

Working Conditions

Average earnings of year-round, full-time workers in these occupation in 1995 were $27,800. These earnings are among the lowest for occupations in trades, transport, and equipment operation. Shortage of work is high because the work is mostly seasonal.
Construction Trades

Learning Activity 1

1. Use these words to complete the sentences.

- equipment
- herbicides and pesticides
- materials
- mixers and compressors
- traffic near construction sites

- equipment and machinery
- holding and moving stakes and rods
- materials
- structures

**Construction labourers ...**

A) ... move, load, and unload ________________________________

B) ... erect and dismantle ________________________________

C) ... mix, pour, spread, and rake ________________________________

D) ... install, operate, maintain, and repair ________________________________

E) ... oil and grease ________________________________

F) ... tend and feed machines such as ________________________________

G) ... direct ________________________________

H) ... mix fertilizers, ________________________________

I) ... assist in land surveying by ________________________________

2. Which of the main duties can you do? (Use a sheet of blank paper.)

I can .... / I know how to... / I am able to ... / I have experience ...
Carpenters

What does a carpenter do?

Carpenters construct, erect, install, maintain, and repair structures and components of structures made of wood, wood-substitutes, and other materials. They are employed by construction companies, carpentry contractors, maintenance departments of factories, plants, and other establishments or they may be self-employed.

Main Duties

- Read and interpret blueprints, drawings, and sketches to determine specifications and calculate requirements.
- Prepare cost estimates for clients.
- Supervise apprentices and other construction workers.
- Build foundations, install floor beams, lay subflooring, and erect walls and roof systems.
- Fit and install trim items such as doors, stairs, molding, and hardware.
- Maintain, repair, and renovate houses and wooden structures in mills, hospitals, industrial plants, and other establishments.
- Measure, cut, shape, assemble, and join materials made of wood, wood substitutes, and other materials.
- Use building codes to prepare layouts, using measuring tools.

Job Titles

- Apprentice carpenter
- Carpenter
- Finish carpenter
- Journeyman/woman carpenter
- Maintenance carpenter
- Renovation carpenter
- Rough carpenter
Training

Carpentry is a skilled trade. Training to become a carpenter is available through an apprenticeship program offered by the United Brotherhood of Carpenters and Joiners of America. Ontario Community colleges have courses for skilled trades that you can take before you enter into an apprenticeship agreement with an employer.

Employment Requirements

Some secondary school education is usually required. Completion of three to four-year apprenticeship program or a combination of over four years of work experience in the trade and some high school, college, or industry courses in carpentry is usually required to be eligible for trade certification. Trade certification is voluntary in Ontario.

Working Conditions

The average yearly earnings of full-time carpenters is $31,000. The average hourly wage for a unionized carpenter is $33.00/hour. Union carpenters receive good wages and benefits, including a medical and dental plan as well as a pension plan.
Carpenters

Learning Activity 2

1. Complete the sentences.

Carpenters read ____________________________________________________

Carpenters build ____________________________________________________

Carpenters erect ____________________________________________________

Carpenters install ____________________________________________________

2. What kind of tools do you think carpenters use? (List 5 tools.)

__________________________________________________________________
__________________________________________________________________

3. Name four kinds of structures and buildings that carpenters build.

__________________________________________________________________
__________________________________________________________________

4. What three benefit plans can unionized carpenters get?

__________________________________________________________________
__________________________________________________________________
5. What is the average yearly earning of a unionized carpenter?

6. What is the average hourly wage?
Cement Masons and Finishers

What do cement masons and finishers do?

Cement masons and finishers make sure that cement forms have been properly built. They spread the concrete by pushing or pulling a screen or template over the surface texture, and they install fixtures such as anchor bolts, steel plates, and door sills. They finish vertical surfaces by wetting the concrete and rubbing it with abrasive stone. Cement masons make expansion joints and edge the concrete, using edging tools, rulers, jointers, and straight edges. They remove rough or defective spots with chisels, hammers, and grinders, and then they patch them with fresh cement.

Training

Training for cement mixers and finishers is available through an apprenticeship program offered by the Operative Plasterers, Cement Masons and Restoration Steeple Jacks of the United States and Canada. Apprenticeship is also possible through employers who are willing to train new workers. Certification for this trade is voluntary.

Working Conditions

Cement masons and finishers are required on almost every kind of construction job. They work both outdoors in bad weather conditions and indoors. The work is fast-paced and strenuous. This job exposes workers to water, noise, vibrations, and situations requiring attention to safety. The work requires some artistic ability and great attention to detail. The wage range for this occupation during the first six months of 1998 in the Greater Toronto Area was $21.30 to $26.30 per hour. The union rate is $28.47 per hour.
Labour Market Outlook

In the future, there will be an increasing demand for cement masons and finishers skilled in the operation of computer-controlled equipment. Higher knowledge of material properties will be required. Work in this trade will change with the introduction of new methods, machines, and tools for measuring, placing, and finishing concrete. In addition, the need for super-flat floors and tighter tolerances in formed construction will raise skill levels for the job. Replacement technologies will also have a negative impact on the demand for cement masons and finishers. Employment prospects vary with the seasons and with economic conditions. Employment for concrete finishers is expected to grow over the next few years.

Job Search Methods

Most apprenticeship positions are never advertised or are only broadcast through informal channels such as word-of-mouth. Entry to apprenticeship requires a job offer. In the traditional route, the job seeker searches for companies that hire apprentices in that trade and applies directly to the employer, union, or joint industry committee for an apprenticeship opening. One approach could be enrollment in a public or private program that provides the in-school portion of training. This is followed by apprenticeship with an employer during which the candidate learns the practical or on-the-job skills.
Cement Masons and Finishers

Learning Activity 3

1. Complete the sentences. What do cement finishers do?
   A) Cement finishers spread _________________________________________
   __________________________________________________________________

   B) Cement finishers install _________________________________________
   __________________________________________________________________

   C) Cement finishers finish _________________________________________
   __________________________________________________________________

2. Name seven tools that cement finishers use?
   __________________________________________________________________
   __________________________________________________________________

3. How can you get training to be a cement finisher? ____________________

4. Is it mandatory to have a certificate in Ontario to be a cement finisher? ____
5. Employment prospects vary with the: (two things)
   A) _______________________________________________________________
   B) _______________________________________________________________

6. What kinds of workers will have the best opportunities in the future?
   ________________________________________________________________

7. Circle one. Cement masons and finishers work:
   outside    inside    both

8. What organization offers training for this field?
   ________________________________________________________________
Industrial Painters

What do industrial painters do?

Industrial painters prepare and paint surfaces in new and old construction. The preparation may involve the removal of old paint, using blowtorches, liquid paint remover, and scrapers. Then the surfaces are ready for a specialized ready-mix paint using brushes, rollers, or spray guns. In some cases, the industrial painter may be required to mix different paints to make more decorative colours.

Training

Training to become an industrial painter is available through an apprenticeship program offered through the International Brotherhood of Painters and Allied Trades, or through private employers.

Working Conditions

The work performed by the journeyperson is both inside and outside, with the latter being seasonal. This is not a career for people who are bothered by the smell of paint. Nor is it a job for those who are afraid of heights. Working 40 hours per week is standard, although one may have to work some overtime to complete the job.

Unionized Work

Unionized industrial painters belong to the International Brotherhood of Painters and Allied Trades. As such, you will be working under the protection of a union contract with insurance, pension, and health and welfare benefits.
Industrial Painters

Learning Activity 4

1. Industrial painters prepare and paint surfaces in

__________________________________________________________________

2. How do they prepare surfaces?

__________________________________________________________________

3. Name three tools that industrial painters use?

__________________________________________________________________

4. What organization offers training?

__________________________________________________________________

5. What are the standard working hours per week?

__________________________________________________________________

6. Does the journeyperson do both inside and outside work? What affects outside work?

__________________________________________________________________
Plumbers

What do plumbers do?

Plumbers install, repair, and maintain pipes, fixtures, and other plumbing equipment used for water distribution and waste water disposal in residential, commercial, and industrial buildings. They are employed in maintenance departments of factories, plants, and similar establishments, by plumbing contractors or they may be self-employed.

Main Duties

- Read blueprints, drawings, and specifications to determine layout of plumbing system, water supply network, and waste & drainage system.
- Install, repair, and maintain domestic, commercial, or industrial plumbing fixtures and systems.
- Locate and mark floor positions for pipe connections, passage holes, and fixtures in walls and floors.
- Cut openings in walls and floors to accommodate pipe and pipe fittings.
- Measure, cut, bend, and thread pipes using hand and power tools or machines.
- Join pipes using couplings, clamps, screws, bolts, cement, soldering, brazing, and welding equipment.
- Test pipes for leaks using air and water pressure gauges.
Salary

The average yearly salary is about $34,924.

Employment Requirements

Some secondary school courses are usually required. Completion of a four to five-year apprenticeship program or a combination of over five years work experience in the trade and some high school, college, or industry courses in plumbing are usually required to be eligible for trade certification. Trade certification is compulsory in Ontario.

Training

Training to become a plumber is available through a union apprenticeship program offered by the United Association of Journeypersons and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada, the Union is known as “The U.A.”
Plumbers

Learning Activity 5

1. Vocabulary Match-up

Draw a line from the word to its meaning.

install an instrument to measure water pressure
repair sinks, toilets, etc.
maintain to keep something in good condition
waste water dirty water (from toilet or sink)
plant to put in (a toilet, sink, pipe, etc.)
establishment a place that produces something
fixtures a place (plant, factory, building, etc.)
leak to fix something
gauge when water comes out of a pipe (e.g.) that it shouldn’t

2. Complete the sentences.

Plumbers cut openings in walls to accommodate __________ and __________.

Plumbers test pipes for leaks using ______ and ________ gauges.

Plumbers join pipes using ____________, ____________, ____________,
__________, ____________, ____________, ____________.

__________.
Plumbers read blueprints, drawings, and specifications to determine layout and plumbing system, ______________ supply network, and ______________ and ______________ system.

Plumbers install, repair, and maintain ______________, commercial, or ______________ plumbing fixtures.

Plumbers measure, cut, bend, and thread pipes using ______________ and ______________ tools.

Plumbers locate and mark positions for pipe connections, ______________ holes, and fixtures in ______________ and ______________.
Roofers and Shinglers

What do roofers and shinglers do?

Roofers install, repair, or replace flat roofs and shingles, shakes, or other roofing tiles on sloped roofs. Shinglers install and replace shingles, tiles, and similar coverings on sloped roofs. They are employed by roofing contractors, or they may be self-employed.

Main Duties

- Install sheet metal flashings.
- Install and repair metal roofs using hand and power tools.
- Set up scaffolding to provide safe access to roofs.
- Apply waterproof coatings to concrete or other masonry surfaces below or above ground level.
Install, repair or replace single-ply roofing systems with waterproof sheet materials such as modified plastics, elastomeric, or other asphaltic compositions.

Install, repair or replace shingles, shakes, and other roofing tiles on sloped roofs of buildings.

Install, repair, or replace built-up roofing systems with materials such as asphalt-saturated felts and hot asphalt and gravel.

Install or replace asphalt shingles, wood shingles and shakes, and masonry or baked-clay roofing tiles on sloped roofs of buildings.

**Employment Requirements**

Some secondary school education is required. For roofers, completion of a two to three year apprenticeship program or over three years of work experience in the trade, are usually required to be eligible for trade certification, which is voluntary. Shinglers require one to two years of on-the-job training.
Roofers and Shinglers

Learning Activity 6

1. Complete the sentences.

Roofers and shinglers can install built-up roofing systems using materials such as ____________________________________________________________________________

Roofers and shinglers can replace single-ply roofing systems using ____________
__________________________________________________________________________

Roofers and shinglers can repair shingles, shakes, and other roofing tiles on _____
__________________________________________________________________________

Roofers and shinglers can install sheet metal _____________________________
__________________________________________________________________________

Roofers and shinglers can apply waterproof coatings to _____________________
__________________________________________________________________________

Roofers and shinglers can install and repair metal roofs using ________________
__________________________________________________________________________

Roofers and shinglers can set up scaffolding to _______________________________
__________________________________________________________________________
Roofers and shinglers can install shingles and masonry or baked clay roofing tiles to ________________________________________________________________

2. Who employs roofers and shinglers?

__________________________________________________________________

3. Is trade certification mandatory? ________________________________
Terrazzo, Tile, and Marble Craftspeople

What does a terrazzo, tile, and marble craftsperson do?

This craftsperson cuts and installs terrazzo, tile, and marble. This includes the installation of materials for floors, walls, ceilings, and swimming pools. If you work as a terrazzo, tile, and marble craftsperson, you must examine project blueprints and specifications as per the contractor’s requirements before starting the work. You have to do the layout, measure, and mark the work area. Once that is done, the terrazzo, tile, and marble craftsperson assembles the proper materials and mixes the required compounds to begin the installation.

Main Duties

- Mix, lay, and polish surfaces.
- Install tile strips.
- Remove and replace cracked or damaged tiles.
- Prepare, measure, and mark surface to be covered.
- Build underbeds and install anchor bolts, wires, and brackets.
- Mix, apply, and spread mortar, cement, mastic, glue, or other adhesives using a hand trowel.
- Set tiles in position and apply pressure to affix tiles to base.
Align and straighten tile using levels, squares, and straight edges.

Cut and fit tiles around obstacles and openings using hand and power cutting tools.

Pack grout into joints between tiles and remove excess grout.

Lay and set mosaic tiles to create decorative wall, mural, and floor designs.

**Employment Requirements**

Some secondary school education is required. Completion of a three-year apprenticeship program or a combination of over three years of work experience in the trade and some highschool, college, or industry courses in tile setting is usually required to be eligible for trade certification. Trade certification is not compulsory in Ontario.

**Working Conditions**

Work performed by the journeyperson can be either inside and/or outside. Some out-of-town work can be involved, therefore being flexible is considered an asset. Most of the work is done at ground level or heights, which can be hard on the back and knees. The average yearly income is $28,325 and the hourly wage for this occupation ranges from $17 to $25 per hour (union rate).

**Job Search Methods**

Union hiring halls and networking have proven to be the most successful methods. Tilessetters are employed by special trade, building, and general contractors. Those who are self-employed usually contract their services for smaller renovation projects.
Terrazzo, Tile, and Marble Craftspeople

Learning Activity 7

1. Complete the sentences.

A terrazzo, tile, and marble craftsperson can prepare, measure, and mark ______
________________________________________________________________________

A terrazzo, tile, and marble craftsperson can build _________________________

A terrazzo, tile, and marble craftsperson can mix, apply, and spread __________
________________________________________________________________________

A terrazzo, tile, and marble craftsperson can set tiles _______________________

A terrazzo, tile, and marble craftsperson can align and straighten tile using _____
________________________________________________________________________

A terrazzo, tile, and marble craftsperson can cut and fit tiles around __________
________________________________________________________________________

A terrazzo, tile, and marble craftsperson can pack grout into _________________
A terrazzo, tile, and marble craftsperson can install _________________________

A terrazzo, tile, and marble craftsperson can lay and set mosaic tiles to create _________________________

A terrazzo, tile, and marble craftsperson can mix, lay, and polish _________________________

A terrazzo, tile, and marble craftsperson can remove and replace _________________________

2. What are the three main things that a terrazzo, tile, and marble craftsperson does?

____________________________________________________________________

____________________________________________________________________

3. How can a person get training in this trade?

____________________________________________________________________

4. What parts of the body is this work hard on?

____________________________________________________________________

5. Who employs tile setters?  _______________________________________

____________________________________________________________________
What Employers Want in a Skilled Trades Helper

While preparing this training package, we talked to many employers in the construction field. These contractors came from both large and small companies.

While they agree that skills and knowledge are important, they also agree that a lot of that information can be learned on the job.

The skills that they stressed most were:

- show up on time
- follow instructions
- ask questions when needed
- be willing to learn
- work hard
- never use alcohol or drugs on the job

Human Resources and Skills Development Canada (HRSDC) list the three most important essential skills for trades helpers and labourers as:

- numeracy
- significant use of memory
- working with others

(http://www15.hrdc-drhc.gc.ca/English/profiles/115.asp)
Show Up on Time

One of the biggest complaints employers have is workers not showing up on time, or not showing up at all. The best thing you can do for yourself as an employed person is to show up on time, if not 15 minutes early, everyday. Lateness sends a message to your employer or supervisor that you are not committed to the job, that you are inconsiderate, and that you have poor time management skills. You are not giving 100%. Employers look at all these things and think that if you can’t manage to get to work on time, then you can’t manage to work well. It might not be true, but it will cross your employer’s mind. It tells them that you don’t really care that you are employed. Remember, there are a lot of people standing in line behind you waiting for their chance to show your employer how dedicated they are, if only they were given the chance.

If you have trouble getting to work on time, try these tricks to get you up and out the door:

- Set your alarm clock 20 minutes ahead. Don’t allow yourself to say “I know I have that extra 20 minutes, so I’ll just watch the news/sit and relax/walk the dog”.

- If you are a person that hits the snooze button several times, set your alarm earlier, so that you start hitting the button earlier. After 4 or 5 times, you might be ready to get up.

- Buy an alarm clock that doesn’t have a snooze button so that you don’t have that option.
- Set the alarm clock on the other side of the room so that the only way to turn it off, is to get out of bed. Don’t allow yourself to get back into bed.

- Prepare for your day the night before: make your lunch, set your clothes out, have the coffee pot ready to turn on.

- Create a morning routine and stick to it. Don’t allow yourself to get sidetracked. Focus on getting ready and getting out the door.

- Go to bed at a time that allows you to get 8 hours of sleep.

- Don’t drink alcohol on week nights. It disrupts sleep.

- Don’t drink coffee in the evenings. It disrupts sleep.

- Find a friend who will give you a wake up call for the first few weeks, until you get into a pattern.

Recognize that lateness is a bad habit.

With hard work and dedication, you can change this bad habit.

It takes a concentrated effort, but it can be done.

It’s worth it!
Follow Written Instructions

Written Instructions

It is important to be able to read simple instructions or directions. Your employer may leave you with a list of things to do. You’ll need to read and follow this list. You may be required to read MSDS (Material Safety Data Sheets) on dangerous products and chemicals. You may also be asked to read directions to assemble something.

Learning a basic vocabulary of words used in construction is a good idea. That way you will be familiar with words that are generally only used within the construction business.

Assembly Required

Reading directions in order to assemble something is a little more difficult. Often they tell you what should be done and how you should do it.

Follow these helpful tips:

- Read all of the directions before starting, that way there are no surprises.

- The directions are usually written in a step-by-step format. Read step 1. Complete that step. Then move on to step 2, etc.

- Don’t be overwhelmed by the number of steps involved. Take one step at a time and work your way through the list.

- Use a pencil to check off when you’ve completed a step. This will help you
focus on what needs to be done next.

- Don’t try to assemble something without reading the instructions. Remember the saying, “If all else fails, read the instructions.” It is usually muttered by someone who has failed to assemble something without reading the instructions. “Time is money” is another saying. Your employer is paying you to assemble the item. In the long run, the fastest way to do that is to read the instructions.

- Look at the diagrams that come with the instructions. Often this helps to “see” the process.

- Circle words like cut, measure, snip, fold, attach. These are words that tell you specifically what to do and you should pay close attention to them.

Always ask questions to find an answer when there is something you don’t understand!
Follow Verbal Instructions

Verbal Instructions

Verbal instructions are different. You hear the information once and then it is gone. It involves several skills: taking in the information, processing (what is he telling me to do?), understanding, and memorizing.

Taking in the Information

Hearing is something you will want to protect. Hearing loss is only noticeable once the damage is done, and the damage is irreversible. Wear your hearing protection!

If you are working in an area where there is noise and your supervisor is giving you instructions and you can’t hear him, don’t be afraid to say, “Excuse me, Joe. I can’t quite hear you with the hammering going on. Can we step over there where it’s less noisy. I want to be sure to hear everything you’re asking me to do.”

A tip for hearing people in a noisy environment is to watch their lips while they speak. You might not be able to read lips, but it helps to hear them.

Processing and Understanding

What exactly is he asking me to do? It helps to ask clarifying questions like “Do you want me to use the 2x4's over there or the ones that are piled out back?” Mirror the information back to the person. This means to repeat the instructions. “You want me to build a sawhorse out of the 2x4's out back. Gotcha.”

You process the information in your mind until you understand it.
Memorizing

When given verbal instructions, you only get one, maybe two, chances to hear the information. You have to process, understand, and memorize all of it quite quickly. That’s why a lot of carpenters and workers carry small notebooks in their back pockets. Make short notes for yourself. Draw simple sketches to help you remember. There is nothing wrong with making notes for yourself. It shows your boss that you want to get it right, and know what you need in order to do it properly.

Some people have a lot of problems with processing and understanding verbal instructions. If you are one of those people, don’t be afraid to ask your boss to make quick lists for you. Carry around a small notebook. When he starts to list off things he wants you to do today, pull out your notebook and pencil and ask him to quickly jot them down. If you are a valuable employee (hard working, show up on time, get the job done), he’s probably not going to mind making a few notes for you. Don’t be embarrassed. Understanding our differences and weaknesses and learning how to effectively work around them is the key to success.

“I have one guy on my crew who’s not so good at remembering stuff I tell him to do, but he’s a good worker...one of the best on my crew. I don’t mind helping him out by writing down a list of things for him to do because I know that he’ll get them all done by the end of the day, and they’ll be done well too!”

- Joe, Supervisor
A Note on Notetaking

At work, you will often have important conversations with your boss or your co-workers. They might say things that you need to remember. Also, you might get an important phone call and need to take a message for someone else. You need to be able to get the message, the caller’s name and phone number, and other important details.

When we listen, we often forget a lot of what is said. A good way to remember important things is to make some notes. Here are a few tips for taking more detailed notes:

- Don’t wait too long before you write down ideas. You might forget important details and have to scramble to catch up. Have a pen and paper handy at all times.

- Write down only the most important ideas. Don’t try to write down every single word.

- Develop a format for taking notes. You might put boxes or circles around important names or phone numbers. You might use letters or numbers to list important ideas. If you use a format all the time, it will help you to remember information.

Ask Questions When Needed

Asking questions isn’t a bad thing. A lot of people don’t ask questions when they need to or when they should. They may be worried about looking ‘stupid’. They may be worried that others will think they don’t know what they are doing. They may be embarrassed to talk in groups so they don’t ask when they should. Asking questions is a good way to learn!

Not asking a question when you don’t understand something can be dangerous to you and the people you work with. It can also be time consuming when you have to repeat something, and can end up costing your employer money.

Know When to Ask Questions

Asking questions is an important part of the working world. Knowing when to ask questions and how to phrase those questions is a skill you can work on. One of the hardest things to learn about asking questions is when to interrupt someone to ask a question and when to wait.

Generally, it’s best not to interrupt someone unless they are giving a detailed and lengthy description of something and you don’t understand and aren’t able to follow what they are saying. If you wait until they finish talking to ask the question, knowing that they will have to repeat a 5 minute talk, then it is best to interrupt them. Don’t allow them to go on talking when you are lost. If you just need something clarified, then don’t interrupt them.

If you are still able to follow the conversation but have questions, jot them down in your notebook. That way you won’t forget them and can ask when the speaker is finished talking. Sometimes we try so hard to remember our question that we don’t listen to the speaker and we miss important information. Listen before asking. This means that the speaker may provide answers to your questions further on in his talk. We’ve all heard someone ask a question only to be told “I’ll get to that in a minute” or “I’ll be talking about that in a few minutes”. Wait for the speaker to finish their talk, then ask your clarifying questions.
Know How to Ask Questions

“I know what I want to ask...I just don’t know how to ask it.”

One of the most important things to think about when phrasing your question is...‘get to the point’. Make your questions as direct as possible. You don’t want the speaker to begin his answer to you with “I’m not really sure what you are asking.”

What to Say

Look at the question you want answered. Begin your sentence with phrases like:

- “Can you re-phrase...?”
- “I don’t understand what you meant by...?”
- “I’ve never... before. Can you show me how to ...?”
- “Can you repeat that?”
- “Could you write that down for me?”
- “What did you mean by...?”
- “How do I...?”

Paraphrasing and Clarifying

This means mirroring the information back to the speaker in order to make sure you understand exactly what they want you to do.

“So, what you’re asking me...?”
“So, what you’re saying is...?”
“So, what I need to do is...?”

This will let you and the speaker know that you understand the instructions.
Be Willing to Learn

In an entry level skilled trades helper position, employers don’t expect you to come with all the skills of a master carpenter, but they do want you to come with a willingness to learn.

How do you show willingness to learn?

**Volunteer** to help with jobs that you’ve never done before so that you can watch and learn something new.

**Ask questions.**
“How do you know when to...?”
“Why does the ...?”
“How much do I ...?”

**Read more about it.** There are many books, magazines, websites, organizations, and associations dedicated to woodworking, construction, safety, tools, equipment, and anything else related to skilled trades. The information is at your fingertips.

**Take courses or training.** Keep upgrading your skills. If there is something you’d like to learn about, ask someone to show you or ask where you could find the information. Your co-workers are a valuable resource in helping you learn more. Don’t be afraid to ask them for help, advice, or information.

**Volunteer for charitable organizations** like Habitat for Humanity. A lot of trades people volunteer their time and energy to projects like these. You never know who you’ll meet, what you’ll learn, and what opportunities may arise.
Work Hard

Employers pay you to work. That’s the bottom line. They don’t pay you to stand around looking for something to do, but rather to dig in and do whatever it takes to get the job done.

There is a difference between hard work and working hard.

Working in the skilled trades field is hard work. In the summer, it’s dirty, hot, sweaty work. In the winter, it’s cold, uncomfortable, sweaty work. Your muscles hurt. You push, pull, carry, drag, dig, pound, and scrape. Your body is a tool to get the job done.

Working hard means that you take your job seriously and you give 100% all the time. You arrive on time and start work immediately. You work until you are given a break. You don’t extend your breaks longer than they are supposed to be. You get back to work and give it your all. You work hard right up until the whistle blows at the end of the day.

Anticipate What Needs to be Done Next

Employers want you to anticipate what needs to be done. If you finish the task you are given, look around for something to do. If you are unsure as to whether or not your boss wants you to do it, just quickly ask... “I see the boards over there need to be stacked. I’ll move onto that if it’s alright with you.” Offering suggestions like this will make your employer’s job easier. They don’t have to stop and think about what to assign you next.
Never Use Alcohol or Drugs on the Job

It goes without saying that drugs are illegal substances and will not be tolerated on the job. Not only that, but your safety and the safety of others is at risk. Drugs are a good way to get yourself fired!

taken in part from: Canadian Centre for Occupational Health & Safety (CCOHS)
Guidelines for a Construction Site Policy on Alcohol and Drugs (unless otherwise stated)
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A typical contractor’s policy is as follows:

1. No person under the influence of, or carrying, alcoholic beverages is to enter, or knowingly be permitted to enter, the construction project.

2. No person under the influence of, or carrying, illicit drugs is to enter, or knowingly be permitted to enter, the construction project.

3. The use of alcohol and other drugs (not prescribed by a physician) on a job or during work hours will result in disciplinary action.

To be effective, the policy must be consistently and vigorously applied.

For large sites, this may mean having a control point at the site gate supervised by a site security person.

For smaller sites with no security, this will probably be best carried out by the contractor’s site supervisor.

When a person is identified as having a problem, the employer and his/her representative should be contacted immediately.
What Employers Want in a Skilled Trades Helper

Learning Activity

1. What skills did the employers in the construction field stress?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Did the list above surprise you? Explain.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. What do you think? Are their skills you would add to the list?

________________________________________________________________________
________________________________________________________________________

4. According to HRSDC, what are the three most important essential skills for trades helpers and labourers?

________________________________________________________________________
________________________________________________________________________
5. What messages does showing up late send to your employer about you?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

6. What 3 tricks do you think would be most helpful for getting out of bed in the morning?

1. ________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. ________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. ________________________________________________________________
__________________________________________________________________
__________________________________________________________________

7. How is the skill of following written instructions used in the skilled trades helper occupation?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
8. In your opinion, what are (is) the most important tips to remember when reading directions? Explain why.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

9. What skills are involved in following verbal instructions?

1. ________________________________________________________________

2. ________________________________________________________________

3. ________________________________________________________________

4. ________________________________________________________________

10. True or False?

T   F   Following verbal instructions is the same as following written ones.

T   F   Hearing loss is only noticeable once the damage is done, and then the damage is irreversible.

T   F   If your boss talks to you when there is a lot of noise around, he must not really expect you to follow his instructions because he knows you can’t really hear him.
T F Clarifying questions are asked to make sure you understand what is being said. They are asked to make things clearer.

T F Memorizing has nothing to do with following instructions.

T F Its okay to make notes for yourself when you are being given instructions.

11. Asking questions is a very important skill. What are some of the reasons why people might not ask questions?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

12. Your boss asks you to “grab that load of wood over there and pile it out back”. You look around and see the wood he’s talking about but are not sure where he wants it piled ‘out back’. How would you ask him? What would you say?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
13. What does paraphrasing or mirroring mean?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

Give examples below.

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Paraphrasing or mirroring</th>
</tr>
</thead>
<tbody>
<tr>
<td>You need to get 40 pieces from the pile, no better make that 50, and cut 20 of them to 3 feet. Then give them all to Mike.</td>
<td>Take 50, cut 20 to 3 feet, and give them to Mike. Got it.</td>
</tr>
<tr>
<td>Run into town and pick me up a gallon of red, two gallons of white, 2 lbs of finishing nails, and charge it to the company. Better make that two gallons of red.</td>
<td></td>
</tr>
<tr>
<td>Clean up around the table saw, take the scraps to the dumpster, and then I need you to move that pile of lumber so that the electricians can get in there.</td>
<td></td>
</tr>
</tbody>
</table>
14. List five ways an employee shows people he is willing to learn.

1. ________________________________________________________________

2. ________________________________________________________________

3. ________________________________________________________________

4. ________________________________________________________________

5. ________________________________________________________________

15. Explain, in your own words, the difference between hard work and working hard.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

16. Why would employers want you to anticipate what needs to be done?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
17. What three things are usually listed in a typical constructor policy on alcohol and drugs?

1. ________________________________________________________________

2. ________________________________________________________________

3. ________________________________________________________________

18. You are working for a construction company. You are in the office when someone calls for your boss, Joe, who is not at work right now. You have to take a message. Write out the message you would give to your boss. Here is the conversation:

You: Hello. Skyhigh Construction Company. Can I help you?

Caller: May I speak to Joe, please?

You: I’m sorry. Joe isn’t here right now. Can I take a message?

Caller: This is Jack Smith from Wilson Brickyard. We haven’t been able to finish filling your order because one of our machines broke down. We should be able to get the stuff to you by next Thursday. Can you just let Joe know that? If he has any questions, he can call me at 548-8492 or on my pager at 878-8726.

You: Ok. I will give him the message. Thanks for calling.
19. Work with a partner or your instructor. Have your partner read this list of instructions to you. Follow the instructions as they are read to you.

* This activity is best done with a large group of people. Your instructor may choose to do this activity as a group exercise. Talk to your instructor before proceeding.

Instructions:

- Fold a piece of paper in half, like a greeting card.
- On the front of the card, write your birthday.
- Under that, write the numbers 1-19 from left to right.
- Open the card up.
- On the left side, draw a line from the top left corner to the bottom right corner.
- To the left of the line, draw a heart.
- To the right of the line, draw a diamond.
- On the back of the card, sign your name in the top left corner.
- Write today’s date in the bottom right corner.

**Discussion**
When you have completed this activity, discuss with your partner or group the following:

Did you have problems following the instructions? What was different between your card and everyone else’s card (if you did this activity in a group setting)? What does this activity show us about following verbal instructions?
Communicating with Others

Your Speaking Voice

When people listen to you speak, they might make up their minds about what kind of person you are because of the way you talk. It is important to think about how you say things. Here are some things to think about:

- Speak clearly. Don’t run your words together.
- Don’t speak too fast or too slow.
- Don’t speak too loud or too soft.
- Try to pronounce words the right way.

Your voice tells people how you feel. If your voice sounds sad or angry, listeners will know this. *How* you say something is just as important as *what* you say.

Using the Right Words

People notice how you use words. When you use words correctly, people respect what you say. When you talk with your friends, you can be more relaxed, but on the job, you need to be careful of the words you use.

Some things that you should avoid are:

- bad grammar
- slang
- swearing
Communicating with Others

Learning Activity #1

1. Rewrite the following sentences using the correct words:

   • He plays real good. ________________________________.

   • I ain’t going. ________________________________.

   • You could of made it. ________________________________.

   • No way can I do that. ________________________________.

   • He goes, “ ….” ________________________________.

   • I got to … ________________________________.

   • Huh? ________________________________.

2. Try to rewrite the following sentences as if you were talking to your boss:

   • He decided to bag that idea. ________________________________.

   • You’re a cool dude, Mr. Smith. ________________________________.

   • Run that by me again. ________________________________.

   • Cathy used to be a real jock, but now she’s a couch potato.

                           ________________________________.
Co-workers

Whenever you start a new job, you need to learn a new workplace “culture”. This is the way that people talk and act on the job. If you pay attention to your co-workers and boss, you will figure out how to act. Be careful not to pick up other workers bad habits. If you think they are doing, saying, or acting in a way that is unprofessional, you’re probably right. Don’t follow their example. Give yourself some time to fit in and don’t be upset if you don’t understand everything right away.

Don’t be afraid to ask questions. This is how you will learn to do your job better. Try not to ask just “yes’ and “no’ questions. There might be times or situations when its more appropriate to ask this: “Could you tell me or show me how you want me to do this?” When your co-worker or boss is talking to you, listen carefully.

If you are criticized for your job performance, don’t take it personally. This is how you will learn your job. If someone criticizes you but doesn’t give you any advice on how to do the job better, ask them how you could do better. You can say, “How could I do this better next time?”

Also, if you are giving criticism, make sure you are positive and give constructive advice on how the person can improve their performance. Instead of just saying, “You did a bad job”, you can say, “Next time, you might try doing (offer suggestion). That way, you will avoid the same problem”.

Always remember that you are working as a part of a team. Be a team player by giving your ideas and suggestions to others. There might be co-workers that you don’t like. That is okay, however you do need to respect them as a co-worker. Try to look at their strong points and ignore the things about them that bother you.

Look after the space where you are working and the tools that you use. This shows that you are serious about your work and have respect for others.
Effective Listening

Everybody thinks that they know how to listen. It’s easy, right?

However, there is a difference between listening and hearing. Are we really listening and understanding what the other person is saying? OR are we only hearing the words someone says?

Listening is a learned skill and it is the most important of all of our communication skills. It takes practice to be an effective listener.

Listening can be affected by:

- what is going on around us
- what is going on in our own minds

If we are in a noisy place or if we are angry or hungry, we can’t listen as well.

To be a good listener, we need to know some of the barriers that might get in the way of our understanding the message. We need to be aware of situations when we are not really listening.

Here are some things that can tell us if we are not really listening:

- daydreaming
- slouching in the chair
- looking at our watch, the floor or the ceiling
- playing with an object such as a pencil or a ball
- staring into space
- drumming our fingers on the table
- crossing our legs or bouncing or tapping our foot
- turning slightly away from the other person or crossing your arms across your chest
- yawning, rolling your eyes or showing other signs of boredom
- not looking at the speaker
Becoming aware of your ‘bad’ listening habits, is the first step toward developing and improving your ‘good’ listening skills. Here are some techniques you can use to overcome some of the barriers we covered earlier. To improve your listening habits, you MUST practice!!

1. **Be Prepared to Listen**

   a) **Learn everything you can about the speaker, the topic and the situation before you have the conversation:** This allows you to make predictions about what might be said. Keep in mind that your predictions might not be right, so you need to be open-minded.

   b) **Remove all possible distractions:** Try to remove internal distractions. Have something to eat so you are not thinking of food. Try to talk in a quiet place, if possible.

   c) **Have a specific purpose in mind:** What do you want to get out of the conversation? You need a reason to listen.

2. **Focusing Attention**

   Pay attention for non-verbal clues (facial expressions, gestures). These can be an important part of the speaker’s message, and it really shows that you are paying attention.

   Some ways that you can focus your attention are:

   a) **Paraphrasing:** This means that you repeat what the speaker’s message is, *in your own words*. You can check the ideas that you have heard and show the speaker that you are listening. Some phrases you can use are:

   ```
   “What I heard you say was…”
   “You seem to be saying…”
   “It sounds as if you…”
   ```
b) **Taking Notes:** Concentrate on the main ideas and evidence. Use key words and don’t write down whole sentences. Put what they say in your own words. You can use the notes to check your understanding of what the speaker said.

c) **Repeating:** For example, if someone is introduced to you, focus on the name and repeat it right away.

   “This is Bill”.
   “Nice to meet you, Bill”.

Say their name several times during the conversation. The more you repeat the name and look at the person, the better your memory will be.

d) **Stay Alert Physically:** Sit or stand up straight with your eyes on the speaker if you really want to understand their message. Do this for as long as you need to understand the main idea, then relax. You can do it again each time a new idea comes up.

* **Facial Expression in Communication**

We depend on other people’s facial expressions more than any other nonverbal clue to make sure our communication is successful. By observing our conversation partner’s face, we might be able to figure out:

- Whether the other person is enjoying the interaction or not.
- How interested the other person is in what we are saying.
- How involved the other person is in the conversation.
- Whether the other person is understanding what we are saying.

Whenever you are communicating with another person, it is very important to pay attention to the other’s facial expressions. This will help guide the conversation and keep things working smoothly.
Communicating with Others

Learning Activity #2

1. How can our listening be negatively affected?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

2. What are some signs that we are not listening well?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

3. What are some ways that we can remove barriers or distractions to listening?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
4. Other than the speaker’s words, what can help us to understand their message?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
Tough Situations

Communicating with others may be difficult. Asking for help and saying ‘no’ are two examples. However, sometimes we have to ask for help or say no so that we can stay safe and do our job well.

Tips for Asking Your Supervisor Questions

• Be polite and respectful.
• Try not to put your supervisor on the spot.
• Depersonalize your question and don’t blame others. For example, you can ask a question such as, “What would you suggest in this situation?”
• Try saying “I” instead of “you”.
• Watch your body language. Don’t cross your arms because it makes you look defensive and don’t point your finger.
• Make a positive suggestion to solve the problem if you can.
• State the safety issue clearly and briefly. Don’t bring in other issues such as pay or time off.
• End on a positive note. Let the supervisor know that you want to do the best job that you can but that this task is new to you and you want to do it safely.

If you are given a task that you believe is unsafe, it is your right to refuse to do that work. You should express your concern to your supervisor if you think you don’t have the proper health and safety training.
Communicating with Others

Learning Activity #3

1. List three of the tips listed above that would work best for you and why?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. Name three situations where you could apply some of these suggestions?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
Problem Solving

Life and work are often seen as a series of problems to be solved. How do we do this?

Let’s look at a problem that might happen in the workplace and how we might solve it.

Situation

Your employer has asked you to work on a machine or drive a lift truck and you have not had any health and safety training to do this job.

If you are a new or inexperienced worker, you might panic. What should you do? Here is a formula you can use for working through problems and decisions. At the end, there will be a suggested answer.

Step 1:
Identify the problem: What is it?

Step 2:
Clarify the goals and prioritize: Which goal is most important?

Step 3:
Create options: What are the different ways we can solve the problem?

Step 4:
Evaluate the options: What are the good/bad points of each option?

Step 5:
Look at the predicted results of each option and compare with the goals: If we do this, what will happen? Is this what we want?

Step 6:
Choose the option with the consequences most closely matching the goals: Which choice gets us to where we want to be?
Remember, any problem can be handled this way. Take time and think carefully. It will save you time and trouble in the end.

Let’s look at how we would use these steps to solve the problem we discussed above.

**Step 1:**
Problem: You don’t feel safe and you might feel uncomfortable asking the supervisor to help, or admitting you can’t do the job.

**Step 2:**
You want to stay safe and you want to get the job done right.

**Step 3:**
(a) You can go ahead and do the job without further information.
(b) You can express your concerns to the employer and get further help.
(c) You can speak to the workplace health and safety person about what you should do.

**Step 4 and Step 5:** What is good and bad about each option?

<table>
<thead>
<tr>
<th>Option</th>
<th>Good Points</th>
<th>Bad Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go ahead with job</td>
<td>• You don’t disturb the supervisor.</td>
<td>• You have a good chance of having an accident and getting hurt.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• You are putting yourself and your co-workers in danger.</td>
</tr>
<tr>
<td>Express concerns to employer and request further information</td>
<td>• You will get the information you need to do the job safely.</td>
<td>• Employer might get upset and tell you to go and do the job anyway.</td>
</tr>
<tr>
<td></td>
<td>• You will become more confident.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Your employer will see you as someone who is serious about the job.</td>
<td></td>
</tr>
</tbody>
</table>
Ask workplace health and safety representative for information

- You will be able to do the job safely
- You will gain an ally (someone who will support you).
- You will be speaking up for co-workers who have similar concerns but are too afraid to speak up.
- Employer might get upset.

Step 6:
Our main goal is to stay safe and do the job as well as possible. Therefore, the best choice would be to ask the employer for further information and, if that doesn’t work, go to the workplace health and safety person with your concerns. Remember, you can’t be fired for refusing to do work you think is unsafe.
Problem Solving

Learning Activity #1

Solve the following problem using the steps you’re just learned.

“A co-worker of yours exercised his right to refuse unsafe work when your boss asked him to move several skids of materials by hand. Most of the materials weigh more than the safe lifting weight. The materials have yet to be moved but you overheard your employer say that he was angry about the situation. Therefore, the issue has NOT been resolved at this point.”

Write down the steps that you could take to help your co-worker and your boss resolve this issue.
Timesheet

One of the most important forms you may have to fill in will be your timesheet. This form could be a daily timesheet if you are working on different sites for the company. If you work on one site for a long period of time, then the form will be a weekly timesheet. The timesheet is very important as the payroll department will calculate your wages from your timesheet.

Depending on your job, you may have a system where you may have to use a pay card that you will clock in and out with.

There may be a time clock device at the entrance to the construction site. You will punch the card into a slot beside the clock and your time will automatically be registered on the card. With this system a timesheet is not necessary, as all the details are on the card. It is advisable to keep a written record of your hours as a precaution in case your card is lost.
Here is an example of a Timesheet:

<table>
<thead>
<tr>
<th></th>
<th></th>
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Learning Activity

1. Create a time sheet for yourself. Use it to record your attendance in this training program. Get used to writing your times down. Record when you take your breaks and how long they are, including lunch. This will help you get used to having to record your own times.
LADDERS

90 cm (3 ft.)

Tie-off

90 cm (3 ft.)

Tie-off

Rungs apart:
30 cm (12 in)

1/4 H to 1/3 H

Construction Safety Association of Ontario
- Use the right ladder for the job.
- Set the ladder one foot out for every three or four feet up.
- Secure the top and bottom of the ladder.
- Clean off your boot soles before climbing.
- Maintain 3-point contact while climbing—two hands and one foot or two feet and one hand at all times.
- Face the ladder.
- Keep your body between the side rails.

- Keep ladders away from powerlines.
- Don’t lean out beyond the side rails.
- Don’t carry tools or equipment in your hands while climbing.
- On an extension ladder, stand no higher than the fourth rung from the top.
- On a stepladder, stand no higher than the second step from the top.
- Never straddle the space between a ladder and another point.
Ladder Safety Tips

Learning Activity

1. Look at page 1 of the Safety Tips reading. In your own words, explain what the four small pictures on the right side of the page mean.

   Picture 1
   
   Picture 2
   
   Picture 3
   
   Picture 4

2. The general rule is: Set the ladder one foot out for every 3 or 4 feet up. If the ladder is 8 feet, how many feet out from the wall should it be?
3. Draw a line to connect the word to the correct sentence.

power lines  | Keep your body between the ____________________.

ladder      | On ___________ ladder, stand no higher than the fourth rung from the top.

an extension| Keep ladders away from ____________.

straddle    | Never __________ the space between a ladder and another point.

side rails  | On ____________, stand no higher than the second step from the top.

a stepladder| Use the right __________ for the job.
Extension Ladders

* An extension ladder is a ladder whose length can be extended.

What should you do to ensure safety when using extension ladders?

- Place ladders on a firm, level surface and ensure the footing is secure.

- Erect extension ladders so that the upper section rests on (e.g., in front of) the bottom section. This means the bottom section “faces” a wall or other supporting surface (see figures below).

- Place the ladder feet so the horizontal distance between the feet and the top support is 1/4 of the working length of the ladder. The ladder will be leaning at a 75° angle from the ground.

- Raise and lower ladders from the ground. Ensure that locking ladder hooks are secure before climbing.

- Erect ladders so that a minimum of 1m (3 ft) extends above a landing platform. Tie the top at support points.

- Where a ladder cannot be tied off at the top, station a person at the foot to prevent it from slipping. This method is only effective for ladders up to 5 m (16 ft) long. The person at the foot of the ladder should face the ladder with a hand on each side rail and with one foot resting on the bottom rung.
Leave all tie-off devices in place until they must be removed before taking the ladder down.

Maintain the minimum overlap of sections as shown on a ladder label. Refer to safety regulations.

What should you avoid when using extension ladders?

- Do not use ladders near electrical wire. If you are carrying a ladder near electrical wires and walk into one of those wires, you could be electrocuted. The ladder would ‘conduct’ the electricity from the wire, down through the ladder and into your body.

- Do not set up or take a ladder down when it is extended.

- Do not overextend. Maintain minimum overlap of sections.

- Do not climb higher than the fourth rung from the top of a ladder.

- Do not use ladders on ice, snow, or other slippery surfaces without securing ladders’ feet.

- Do not extend top section of a ladder from above or by “bouncing” on a ladder.

- Do not leave ladders unattended.

What should you do to avoid overexertion while setting up an extension ladder?

When setting up an extension ladder, use the following method to avoid straining muscles or losing control of a ladder. With ladders weighing more that 25 kg (55 lb), or where conditions complicate the task, have two persons set up a ladder, step by step, as follows:

- Lay a ladder on the ground close to intended location.
• Brace ladder base using helpers’ feet.

• Grasp the top rung with both hands, raise the top end over your head, and walk toward the base of a ladder. Grasp the centre of the rungs to maintain stability.

• Move the erect ladder to the desired location. Lean it forward against the resting point.

One person can erect a short ladder, step by step as follows:

• Place the bottom of the ladder firmly against the base of a building or stationary object.

• Lift the top of ladder, and pull upwards to raise the ladder to a vertical position.

• Transfer the ladder to its required position when it is erect.

• Keep the ladder upright and close to the body with a firm grip.
Extension Ladders

Learning Activity

1. Erect extension ladders so that the upper section rests on the bottom section. This means that the ___________ faces a wall or other supporting surface.

2. Read the following scenario.

Mike set the ladder up securely, following all the safety precautions. He climbed onto the roof and began working. While on the roof, one of his co-workers, Daniel, checked to be sure that the ladder was securely footed. While he was doing this, he pulled up on it. In the process, Daniel unknowingly disconnected the ladder-rung clamps from the "engaged" position. When Mike attempted to climb down the ladder, it began to slide downwards and a fast rate of speed. Mike landed on the bottom and was injured. He had to have ankle surgery and will be off work for quite a while.

Daniel was correct in checking the footing. It is always a good idea to check the safety of equipment more than once. However, what did Daniel fail to do that resulted in this accident?

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3. What is the minimum number of metres that should extend above the building you are climbing onto? How many feet is that?

__________________________________________________________________

4. If a ladder cannot be tied off at the top, you need to ask someone to assist you. How should they hold the ladder?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

5. When do you remove the tie-off devices?

__________________________________________________________________

6. Why should you not use ladders near electrical wire?

__________________________________________________________________

7. Explain the process for two people putting up a ladder.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
8. Explain the process for one person putting up a short ladder.
What should you know about portable ladders before using them?

Falls from portable ladders are a major source of serious injury. Be aware of the hazards and take proper precautions to prevent falling.

What should you do before using a portable ladder?

- Inspect the ladder before and after each use.
- Reject and tag any ladders that have defects. Have faulty ladders repaired or thrown out.
- Use a ladder designed for your task. Consider the strength, type, length, and the Canadian Standards Association (CSA) approval.
- Get help when handling a heavy or long ladder.
- Keep ladders away from electrical wires.
- Tie off ladders at the top and secure bottom to prevent them from slipping.
- Set up barricades and warning signs when using a ladder in a doorway or passageway.
- Before mounting a ladder, clean your boot soles if they are muddy or slippery. Avoid climbing with wet soles. Ensure that footwear is in good condition.
Face the ladder when going up or down and when working from it.

Keep the centre of your body within the side rails.

Refer to safety regulations for specific measurement requirements.

What should you avoid when using a portable ladder?

- Do not use a ladder in a horizontal position as a scaffold plank or runway.
- Do not carry objects in your hands while on a ladder. Hoist materials or attach tools to a belt.
- Do not work from the top three rungs. The higher a person goes on a ladder, the greater the possibility that the ladder will slip out at the base.
- Do not use items such as a chair, barrel, or box as a makeshift ladder.
- Do not use a portable ladder when other equipment is available. Replace a ladder with a fixed stairway or scaffold.
- Do not join two short ladders to make a longer ladder. Side rails are not strong enough to support the extra load.
- Do not paint wooden ladders. Defects may be hidden by the paint. Wood preservatives or clear coatings may be used.

How should you set up the ladder?

- Place the ladder feet 1/4 of the ladder’s working length away from the base of the structure. Working length is from the foot of the ladder to the top support point. For example, for every 4 feet high, the base of the ladder should be out 1 ft; that means one horizontal foot from the support point).
• Extend the ladder at least 1 m (3 ft) above the landing platform.

• Place the ladder on a firm, level footing. Use a ladder with slip-resistant feet or secure blocking, or have someone hold the ladder.

• Rest both side rails on the top support and secure ladder to prevent slipping.

What should you know about climbing portable ladders?

• Check for overhead electrical wires before setting up a ladder.

• Clear area around base and top of the ladder of debris, tools, and other objects.

• Tie off yourself with a safety harness when working 3 m (10 ft) or more off the ground or when working with both hands.

• Ensure that only one person is on a single-width ladder. Only one person is allowed on each side of a double-width ladder.

• Maintain three-point contact by keeping two hands and one foot, or two feet and one hand on the ladder at all times.

• Grasp the rungs when climbing a ladder, not the side rails. If your foot slips on a ladder, holding onto rungs is easier than holding onto the side rails.

• Wear protective footwear with slip-resistant soles and heels.

• Ensure that all electrical equipment used during ladder work is in good condition and properly grounded.
- Rest frequently to avoid arm fatigue (tiredness) and disorientation (confusion) when the work requires you to look up and reach above your head.

- Drape your arms over a rung and rest your head against another rung or side rail if you become dizzy or panicky. Climb down slowly.

### What should you avoid when climbing portable ladders?

- Do not use a ladder in passageways, doorways, driveways, or other locations where a person or vehicle can hit it. Set up suitable barricades or lock the doors shut.

- Do not place a ladder against flexible or moveable surfaces.

- Do not straddle the space between a ladder and another object.

- Do not erect ladders on boxes, carts, tables, scaffold, or other unstable surfaces.

- Do not use ladders on ice.

- Do not stand a ladder on any of its rungs. Ladders must rest on both side rails.

- Do not allow anyone to stand under a ladder.

- Do not overreach from a ladder; move as required.

- Do not use any type of ladder near electrical wires.
Securing Portable Ladders

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How do you secure portable ladders?

- Rest the top of the ladder against a solid surface that can withstand the load.

- Attach a ladder stay across the back of a ladder where a surface cannot stand the load. Extend the stay across a window for firm support against the building walls or window frame.

- Guard or fence off the area around a ladder erected (put up) in an area where persons have access.

- Secure the ladder firmly at the top to prevent it from slipping sideways or the foot from skipping outwards.

- Station a person at the foot of a ladder when it is not possible to tie at the top or secure it at the foot. This is effective only for ladders up to 5 m (16 ft) long.

- Ensure that the person at the foot of the ladder faces the ladder with a hand on each side rail and one foot resting on the bottom rung.

- Attach hooks on top of ladder rails where the ladder is to be used at a constant height.

- Do not rest a ladder on any rung. Only the side rails are designed for this purpose.
- Secure the base of a ladder to prevent accidental movement. Securing a ladder at the foot does not prevent a side slip at the top.

- Use ladders equipped with non-slip feet. Otherwise nail a cleat to the floor or anchor the feet or bottom of the side rails.
Portable Ladders

Learning Activity

1. Why is it important to learn about portable ladders?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

2. What does CSA stand for? Why would you want their approval?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

3. Why is it important to have clean boots when climbing ladders?
   ________________________________________________________________

4. Why are you not suppose to work from the top three rungs? The higher a person works, what might happen?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
5. Why do they suggest you don’t paint your wooden ladder?

__________________________________________________________________
__________________________________________________________________

6. If your ladder’s working length is 8 feet, how far out from the wall should the foot of the ladder be?

__________________________________________________________________

7. How many metres should the ladder be from the landing platform?

__________________________________________________________________

8. What is 3-point contact?

__________________________________________________________________
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9. Pick one of the rules in the section on what you should avoid when climbing portable ladders. Why is this rule important? What could happen if you ignore this rule?

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10. “Attach a ladder stay across the back of a ladder where a surface cannot stand the load.” Look at the graphic showing a ladder stay. Describe in your own words what a stay is and what its purpose is. Use the internet to find more information about ladder stays. Write that information below.

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11. Why do you need to secure a ladder at the top?

__________________________________________________________________

12. If you cannot secure a ladder at the top, what is the next best thing?

__________________________________________________________________
Step Ladders

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What should you do when using a stepladder?

● Use a stepladder that is about 1 m (3 ft) shorter than the highest point you have to reach.

● Open the stepladder lock spreaders and shelf fully. Push down firmly on the shelf and lock spreaders.

● Check stability. Ensure that all ladder feet are on a firm, level, and non-slippery surface.

● Place a stepladder at right angles to the work, with either the front or back of the steps facing the work.

● Keep the stepladder close to the work.

● Avoid pushing or pulling stepladders from the side. Repeated sideways movement can make ladders wobbly since they are weaker or less stable in those directions.

● Face the stepladder when climbing up or down. Keep your body centered between side rails. You have climbed too high if your knees are above the top of the stepladder or if you cannot maintain a handhold on the ladder.

● Maintain a firm grip. Use both hands when climbing.
What should you avoid when using a stepladder?

- Do not overreach. Move a stepladder when needed.
- Do not “shift” or “walk” a stepladder when standing on it.
- Do not stand, climb, or sit on the stepladder top or pail shelf.
- Do not overload. Stepladders are meant for one person.
Do not use a stepladder as a brace or as a support for a work platform or plank.

Do not climb a stepladder that is leaning against a wall. Use a straight ladder instead.

Do not use stepladders on slippery surfaces.

Do not use stepladders on soft ground where one leg may sink farther into the ground than others.

Do not place stepladders on boxes, unstable bases, or on scaffolds to gain additional height.

Do not climb the back of a stepladder.

Do not push or pull stepladders sideways.

Do not use ladders in passageways, doorways, driveways, or other locations where a person or vehicle can hit it. Set up suitable barriers or lock doors shut.
Step Ladders

Learning Activity

1. Why should you avoid pushing or pulling stepladders from the side? What happens over time? Why?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. When do you know you’ve climbed too high on a stepladder?

__________________________________________________________________

3. In your opinion, what are the 3 most important rules to remember when working with step ladders?
Safety Tips

GETTING ON or OFF LADDERS

Keep area at top and bottom of ladder clear of debris and tools.

Construction Safety Association of Ontario
WARNING
Many ladder accidents occur when personnel are getting on or off the ladder.

Place both hands firmly on rungs before stepping onto a ladder.

Use 3-point contact when climbing up or down a ladder. That means two hands and one foot or two feet and one hand on the ladder at all times.

Clean mud and snow off your boots before climbing a ladder.
Getting On or Off Ladders Safety Tips

Learning Activity

1. In your own words, why is it important to keep the area at the top and bottom of the ladder clear of debris and tools?

__________________________________________________________________
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2. WARNING: Many ladder accidents happen when personnel are

________________________ __________________________ .

3. Explain, in your own words, what 3-point contact means.

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Ladder Inspection

from: Canadian Centre for Occupational Health & Safety (CCOHS)
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When should you inspect ladders?

- Immediately after buying one.
- Before each use.
- Before using them again after they have been dropped or have fallen.

What should you look for when inspecting any ladder?

- Missing or loose steps or rungs. (They are loose if you can move them by hand.)
- Damaged or worn non-slip feet.
- Loose nails, rivets, screws, bolts, or nuts.
- Loose or faulty spreaders, locks, and other metal parts in poor repair.
- Rot, decay, or warped rails in wooden ladders.
- Cracks and exposed fibreglass in fibreglass ladders.
- Cracked, split, worn, or broken rails, braces, steps or rungs.
- Sharp edges on rails and rungs.
- Rough or splintered surfaces.
• Corrosion, rust, oxidization, and excessive wear, especially on the treads.

• Twisted or distorted rails. Check ladders for distortion by sighting along the rails. Using a twisted or bowed ladder is hazardous. (Sighting a ladder means looking down the rails and seeing if they are straight, twisted, or bowed.)

• Missing identification labels.

What other things should I look for when inspecting stepladders?

• Wobble.

• Loose or bent hinges and hinge spreaders.

• Broken stop on a hinge spreader.

What should you look for when inspecting extension ladders?

• Loose, broken, or missing extension locks.

• Defective locks that do not seat properly when ladder is extended.

• Sufficient lubrication of working parts.

• Defective cords, chains, and ropes.

• Missing or defective pads or sleeves.
What should you do after inspecting any ladder?

- Tag any defective ladders and take them out of service.
- Clean the fibreglass on ladders every three months. Spray lightly with a clear lacquer or paste wax.
- Protect wooden ladders with a clear sealer or wood preservative.
- Replace worn or frayed ropes on extension ladders.
- Lubricate pulleys on extension ladders regularly.

What are some things you should not do after inspecting ladders?

- Do not make temporary or makeshift repairs.
- Do not try to straighten or use bent or bowed ladders.
Ladder Inspection

Learning Activity

1. List 3 times when you should inspect ladders.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. What does ‘sighting ladder rails’ mean? What are you looking for?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. In your own words, list 8 things to look for when inspecting ladders.

_____________________________  ______________________________
_____________________________  ______________________________
_____________________________  ______________________________
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_____________________________  ______________________________

4. What shouldn’t you do after inspecting ladders?

__________________________________________________________________
Storage and Handling of Ladders

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What is the proper way to store ladders?

- Return ladders to storage area after use.
- Store ladders where they are protected from the weather.
- Support ladders horizontally on racks. To prevent sagging, support ladders every 2 m (6 ft).
- Keep ladders clean and free of foreign materials.
- Ensure that storage areas are easy to reach.
- Keep wooden ladders in a well-ventilated location, away from dampness and excessive heat.
- Avoid long overhangs beyond support points when transporting ladders on vehicles.
- Pad racks on vehicles with soft material to reduce wear and road shocks.
- Tie ladders to each support point to reduce damage.
- Mark ladders which overhang vehicles with a red or orange flag.
- Grasp ladders near the centre when carrying them.
Use caution when carrying ladders through passageways, doorways, or any place where your view is obstructed.

Use a partner to help carry long or heavy ladders.

Ensure that you and your partner are on the same side when carrying a ladder. Stay in step. Work out in advance any hand or voice signals to coordinate stopping or changing direction.

What should you avoid when storing ladders?

Do not hang ladders from rails or rungs. (Rails are the side pieces that you hold onto. Rungs are the foot pieces that you step on.)

Do not store materials on ladders.

Do not expose fibreglass ladders to excessive temperatures (above 93°C or 200°F).

Do not hold the front of ladders at head level when carrying them.

Do not expose plastic-reinforced ladders to excessive sunlight. Ultraviolet light may cause the plastic resins to degrade. If the strength of the ladder is questionable, replace the ladder.
Storage and Handling of Ladders

Learning Activity

1. To prevent sagging, support ladders every ________ metres (______ feet).

2. In your opinion, why should you store ladders in a well-ventilated location, away from excessive heat?

__________________________________________________________________
__________________________________________________________________

3. What colour flag should you tie onto a ladder that is overhanging the back of your truck?

__________________________________________________________________

4. In your opinion, why should you take extra care when carrying ladders through passageways, doorways, or any place where your view is obstructed? What could happen?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

5. Explain how you and a partner should carry a ladder.

__________________________________________________________________
Hand Tool Basic Safety

from: Canadian Centre for Occupational Health & Safety (CCOHS)
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What are some basic tips when using hand tools?

● Select the right tool for the job. Using the wrong tool increases the chance of having an accident.

● Get properly trained in the safe use of hand tools.

● Use good quality tools.

● Keep tools in good condition at all times.

● Check tools for defects before use. Replace or repair defective tools.

● Keep cutting tools sharp and cover sharp edges with suitable covering to protect the tool and to prevent injuries from accidental contact.

● Replace cracked, splintered, or broken handles on files, hammers, screwdrivers, or sledges.

● Pull on a wrench or pliers. Never push unless you hold with your palm open.

● Point sharp tools (eg., saws, chisels, knives) laying on benches away from aisles. Handles should not extend over the edge of the bench top.

● Maintain tools carefully. Keep them clean and dry. Store them properly after each use.

● Carry tools in a sturdy tool box to and from the worksite.
• Wear safety glasses or goggles and well-fitting gloves.

• Keep the work environment clean and tidy to avoid clutter which may cause accidents.

**What should I avoid when using hand tools?**

• Do not use tools for jobs they are not designed to do. For example, do not use a slot screwdriver as a chisel, pry bar, wedge, or punch. Do not use a wrench as a hammer.

• Do not apply excessive (too much) force or pressure on tools.

• Do not cut towards yourself when using cutting tools.

• Do not wear bulky gloves to operate hand tools.

• Do not throw tools. Hand them, handle first, directly to other workers.

• Do not carry tools in a way that interferes with using both hands on a ladder, while climbing on a structure, or when doing any hazardous work. If working on a ladder or scaffold, tools should be raised and lowered using a bucket and hand line.

• Do not carry a sharp tool in your pocket.
Hand Tool Basic Safety

Learning Activity

1. In your opinion, what is the danger of having cracked, splintered, or broken handles on tools such as hammers or screwdrivers?

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

2. How can clutter cause accidents?

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

3. Keep tools in _________ _________ at all times.

Point sharp tools laying on benches _______ _______ _______

Check tools for _______________ before use.

Never push on wrenches unless ____________________________

_______________________________________________________________________________________
4. Read the following paragraph. List the things that John did wrong.

John worked as a Skilled Trades Helper. John liked to wear big, bulky gloves when he was working and carried his tools around in a plastic bag. John’s days were very busy. He liked working with the other guys.

“Hey John. Could you bring me a screwdriver?”, yelled his boss, Mr. Jones.

“Sure thing boss,” John replied as he tossed the screwdriver through the air towards Mr. Jones. It landed at Mr. Jones’ feet.

“Hey John, could you bring me up a box of nails?”, yelled his buddy Tom from the roof of the house they were working on.

“Sure thing Tom,” he replied as he grabbed the heavy box of nails in both hands and started up the ladder.

John enjoyed building things. This afternoon he worked on building a shelf. He found that the room he was working in was so messy and unorganized that he couldn’t even find his hammer! He chuckled as he grabbed a wrench to pound the nails in. “I’d loose my head in this mess, if it weren’t attached!” laughed John.

**Things John did that were unsafe:**

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________
Electric Tools - Basic Safety

from: Canadian Centre for Occupational Health & Safety (CCOHS)

When and how should you inspect powered hand tools?

- Inspect tools for any damage prior to each use.
- Check the handle and body casing of the tool for cracks or other damage.
- If the tool has second handles, check to see that they installed properly.
- Inspect cords for defects. Check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
- Check for damaged switches.
- Inspect the plug for cracks and for missing, loose, or faulty prongs.

What should you do if you find a tool defective?

- Remove it from service, and tag it clearly “Out of service for repair”.
- Replace the tool immediately. Do not use defective tools “temporarily”.
- Have tools repaired by a qualified person - do not attempt your own repairs.
What should you do before using powered hand tools?

- Make sure that you have been properly trained to use the tool safely. Read the operator's manual. Operate the tool according to the instructions.

- Make sure that the power tool has the correct guard, shield, or other attachment that the manufacturer recommends.

- Prevent shocks. Make sure that the tools are properly grounded using a three-prong plug. They also need to be double-insulated. This will protect users from an electrical shock.

- Use only the kind of battery that the tool manufacturer specifies for the battery-powered tool that you are using.

- Recharge a battery-powered tool only with a charger that is specifically intended for the battery in that tool.

- Remove the battery from the tool or ensure that the tool is switched off or locked off before changing accessories, making adjustments, or storing the tool.

- Store a battery pack safely so that no metal parts, nails, screws, wrenches and so on can come in contact with the battery terminals; this could result in shorting the battery and possibly cause sparks, fires, or burns.

What should you do while using powered hand tools?

- Wear or use personal protective equipment (PPE) or clothing that is appropriate for the work you are doing; this may include items such as safety glasses or goggles, hearing protection, dust mask, gloves, safety boots or shoes, or rubber boots.
Switch off the tools before connecting them to a power supply.

If a power cord feels more than comfortably warm or if a tool is sparking excessively, have it checked by an electrician or other qualified person.

Disconnect the power supply before making adjustments or changing accessories.

Remove any wrenches and adjusting tools before turning on a tool.

Inspect the cord for fraying or damage before each use.

During use, keep power cords clear of tools and the path that the tool will take.

Use clamps, a vice, or other devices to hold and support the piece being worked on, when practical to do so. This will allow you to use both hands for better control of the tool and will help prevent injuries if a tool jams or binds in a work piece.

Use only approved extension cords that have the proper wire size for the length of cord and power requirements of the electric tool that you are using. This will prevent the cord from overheating.

For outdoor work, use outdoor extension cords marked “W-A” or “W”.

Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.

Eliminate octopus connections. If more than one receptacle plug is needed, use a power bar.

Pull the plug, not the cord when unplugging a tool. Pulling the cord causes wear and may adversely affect the wiring to the plug - an electrical shock to the operator may result.
Follow good housekeeping procedures - keep the work area free of clutter and debris that could be tripping or slipping hazards.

Keep power cords away from heat, water, oil, sharp edges, and moving parts. They can damage the insulation and cause a shock.

Store tools in a dry, secure location when they are not being used.

What should you avoid when using powered tools?

Avoid accidental starting by making sure the tool is turned off before you plug it in. Also do not walk around with a plugged-in tool with your finger touching the switch.

Do not bypass the ON/OFF switch and operate the tools by connecting and disconnecting the power cord.

Do not disconnect the power supply of the tool by pulling or jerking the cord from the outlet.

Do not leave a running tool unattended. Do not leave it until it has been turned off, has stopped running completely, and has been unplugged.

Do not use electric tools in wet conditions or damp locations unless tool is connected to a ground fault circuit interrupter (GFCI).

Do not expose electric power tools to rain or wet conditions; wet tools increase the likelihood for getting an electric shock.
• Do not use light duty power cords.

• Do not carry electrical tools by the power cord.

• Do not connect or splice extension cords together to make a longer connection. The extended extension cord may not be able to provide enough current or power safely.

• Do not tie power cords in knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.

• Never break off the third prong on a plug. Replace broken 3-prong plugs and make sure the third prong is properly grounded.

• Never use extension cords as permanent wiring. Use extension cords only as a temporary power supply to an area that does not have a power outlet.

• Do not walk on or allow vehicles or other moving equipment to pass over unprotected power cords. Cords should be put in conduits or protected by placing planks on each side of them.

• Do not bush away sawdust, shavings, or turnings while the tool is running. Never use compressed air for cleaning surfaces or removing sawdust, metal turnings, etc.

• Do not operate tools in an area containing explosive vapours or gases.

• Do not clean tools with flammable or toxic solvents.

• Do not surprise or touch anyone who is operating a tool. Startling a tool operator could end up causing an accident or injury.
Electric Tools - Basic Safety

Learning Activity

1. In your own opinion, why is it important to inspect power tools before you use them?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

2. Why is it important to check cords for defects, not just the tool itself?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

3. If you remove a tool from service, what should you write on it (tag it)?

____________________________________________________________________________________

____________________________________________________________________________________
4. One of the rules is “Do not attempt your own repairs.” Why is this rule important?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

5. True or False?

T  F  You can use a battery charger for any tool you have.

T  F  Only use the safety guards on the tool it was built for.

T  F  Always wear your PPE when using electric tools.

T  F  Instead of turning each tool on and off again, you can just unplug it.

T  F  If a tool is sparking or feels unusually warm, stop using it, and just put it on the shelf.

T  F  Do not use a tool in wet conditions.

T  F  Do not walk around with a tool with your finger on the switch.

T  F  Its ok to tie your extension cord into knots.
6. In your own words, explain what is meant by octopus connections.

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

7. Wet tools increase the likelihood for getting an ____________________

8. Why is it important to remember to not surprise or touch anyone who is using a tool?

______________________________________________________________

______________________________________________________________

______________________________________________________________
Wrenches

What kinds of wrenches are there?

Wrenches are made in various shapes and sizes and are used for gripping, fastening, turning, tightening, and loosening things like pipes, pipe fittings, nuts, and bolts.

There are basically two major kinds of wrenches:

- pipe wrenches used in plumbing for gripping round (cylindrical) things
- general use wrenches used on nuts and bolts that have flat, parallel surfaces e.g., square or hexagonal (hex)

Wrenches may be adjustable to fit different sized pipes, nuts, and bolts or they may be a fixed size.

What are some examples of adjustable wrenches?

Adjustable wrenches include:

- Pipe wrenches
- Crescent (TM) wrenches which have adjustable jaws set at a 30 degree angle from the handle. Although Crescent is a trade name, it is widely used to refer to any regular adjustable wrench with an angled jaw regardless of who manufactured it. This is often referred to as just an ‘adjustable wrench’.

from: Canadian Centre for Occupational Health & Safety (CCOHS)
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What are some examples of fixed-size wrenches?

Fixed-sized wrenches include:

- **Open ended wrenches** that have “jaws” with parallel sides or tines that fit snugly on nuts and bolts.

- **Closed end or box wrenches** that have a loop at the end with notches on the inside that allow the wrench to fit either square or hex nuts or both (depending on the number of notches or points).

- **Combination wrenches** that have both an open end and a closed end on either end of the wrench; usually they fit the same size nut or bolt.

- **Socket wrenches** are like closed end wrenches except they are cylindrical in shape. They can fit over a nut in a recessed hole that would be inaccessible with open or closed ended wrenches. These have an offset handle at right angles to the nut being tightened or loosened. Usually the handle is a ratchet-type handle that allows the user to turn the socket continuously in one direction by moving the handle back and forth without having to take the socket off the nut.

- **Torque wrenches**, one type of socket wrench, have a built-in spring-loaded indicator that shows how much torque is being applied (i.e., shows how hard the nut is being tightened).

- **Nut drivers**, another type of socket wrench, are sockets that can be snapped on or permanently fixed to a screwdriver-type handle.
Allen wrenches or Allen keys are hexagon-shaped (six-sided) metal shafts that are bent into an L-shape for leverage. Hex drivers are “straight Allen wrenches” that have a screwdriver-type handle. These differ from the other wrenches since they fit inside a recessed hexagonal hole in screw heads instead of around a nut or bolt.

Metric wrench sizes are expressed as whole numbers (e.g., 8, 10, 14, 32) that correspond to the sizes in millimetres. Non-metric sizes used widely in the U.S. are also called S.A.E. (Society of Automotive Engineers) sizes and are expressed as fractions of an inch; e.g., 1/4, 1/2, 3/4, 1 1/4. Since both metric and S.A.E. fasteners (nuts, bolts, etc.) are used in Canada, users must select the correct type and size of wrench to prevent injuries and damage to equipment in case of slippage when force is applied to the wrench.

What are general safety tips when using wrenches?

- Use the correct wrench for the job: pipe wrenches for pipes, plumbing fittings, and general use wrenches for nuts and bolts.
- Discard any damaged wrenches (e.g., open ended wrenches with spread jaws or box wrenches with broken or damaged points).
- Select the correct jaw size to avoid slippage.
- Wear safety glasses or a face shield where there is a likely hazard of flying particles or falling debris.
- Position your body in a way that will prevent you from losing balance and hurting yourself if the wrench slips or something (e.g., a bolt) suddenly breaks.
- Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.
• Ensure that the jaw of an open ended wrench is in full contact (fully seated, "flat", not tilted) with the nut or bolt before applying pressure.

• Face an adjustable wrench "forward", adjust tightly, and turn the wrench so pressure is against the permanent or fixed jaw.

Permanent Jaw

Moveable Jaw

Direction of Pull

• Ensure that the teeth of a pipe wrench are sharp and free of oil and debris and that the pipe or fitting is clean to prevent unexpected slippage and possible injuries.

• Apply a small amount of pressure to a ratchet wrench initially to ensure that the ratchet wheel (or gear) is engaged with the pawl (a catch fitting in the gear) for direction you are applying pressure.

• Pull on a wrench using a slow, steady pull; do not use fast, jerky movements.

• Stand aside when work is done with wrenches overhead.

• Make sure adjustable wrenches do not "slide" open during use.

• Keep tools well maintained (cleaned and oiled).

• Clean and place tools and wrenches in a tool box, rack, or tool belt after use.
What should I avoid doing when using wrenches?

- Do not push on a wrench. Losing your balance is more likely if the wrench slips.
- Do not use a wrench that has a bent handle or is damaged.
- Do not use worn adjustable wrenches. Inspect the knurl, jaw, and pin for wear.
- Do not pull on an adjustable wrench that is loosely adjusted.
- Do not use pipe wrenches on nuts or bolts.
- Do not use pipe wrenches for lifting or bending pipes.
- Do not use a wrench on moving machinery.
- Do not use the wrong tools for the job. Never use pliers instead of a wrench or a wrench as a hammer.
- Do not use a make-shift wrench.
- Do not insert a shim in a wrench for better fit.
- Do not strike a wrench (except a “strike face” wrench) with a hammer, or similar object, to gain more force.
- Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length.
- Do not expose a wrench to excessive heat (like from a blow torch) that could affect the temper of the metal and ruin the tool.
**Wrenches**

**Learning Activity**

1. Pipe wrenches are used for __________________________________________
   ________________________________________________________________

2. General use wrenches are used on _________________________________

3. Wrenches are either adjustable or ______________.

4. List 2 kinds of adjustable wrenches.
   ________________________________________________________________

5. Circle the correct size.

   Metric wrench sizes are written as: whole numbers fractions of an inch

   Non-metric sizes are written as: whole numbers fractions of an inch

6. Why is it important to position your body when using a wrench?
   ________________________________________________________________
   ________________________________________________________________
7. Fill in the following chart:

<table>
<thead>
<tr>
<th>name of fixed-size wrench</th>
<th>description of wrench</th>
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</tbody>
</table>

8. Pick 2 of the tips listed in the ‘what should I avoid doing when using wrenches’ section. List them on the next page. Why are they important? What could happen if the tip wasn’t followed? Add any other information you think is relevant.
Tip # 1: __________________________________________________________

Reasons why it is important: ________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

Tip # 2: __________________________________________________________

Reasons why it is important: ________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________
Tin Snips

from: Canadian Centre for Occupational Health & Safety (CCOHS)
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What are some safety tips to know when using tin snips?

Tin snips are made in various shapes and sizes for various tasks. The handle can be like those on scissors with finger and thumb holes or like plier handles. Models are available for cutting in straight lines, in curves to the left, or curves to the right.

- **Universal** snips can cut in both straight and wide curves.
- **Straight** snips and duckbill snips (flat blade, "perpendicular" to the handle, with pointed tips) are designed to cut in straight lines; some duckbill snips are designed for cutting curved lines.
- **Hawk's bill** snips (with crescent-shaped jaws) are used for cutting tight circles.
- **Aviation** snips have compound leverage that reduces the effort required for cutting.
- **Offset** snips have jaws that are set at an angle from the handle.
DO

- Select the right size and type of snips for the job. Check the manufacturer's specifications about the intended use of the snips (e.g., type of cut - straight, wide curve, tight curve, right or left, and maximum thickness and kind of metal or other material that can be cut).

- Only use snips that are sharp and in good condition.

- Wear safety glasses or a face shield and protective gloves when working with snips. Small pieces of metal may go flying in the air and cut edges of metal are sharp.

**Left cut snips** are for making cuts to the left and straight cuts.

**Right cut snips** are for making cuts to the right and straight cuts.

**Offset snips** permit you to keep your hands safely above the cut while cutting directly through the centre of a large sheet.
Use snips for cutting soft sheet metal only. Hard or hardened metal should be cut with cutting tools designed for that purpose. Tin snips are not designed to cut wire!

Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.

Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.

Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.

Keep the nut and the pivot bolt properly adjusted at all times.

Oil the pivot bolt on the snips occasionally.

What should I avoid doing?

Do not try to cut sharp curves with straight cut snips.

Do not cut sheet metal thicker than the manufacturer's recommended upper limit (e.g., cuts up to 16 gauge cold rolled steel or 18 gauge stainless steel).

Do not extend the length of handles to gain greater leverage.

Do not hammer or use your foot to exert extra pressure on the cutting edges.

Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.

Do not attempt to re-sharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.
Tin Snips

Learning Activity

1. Tin snips are made in various ______________ and ______________ for various ______________. The ______________ can be like those of scissors with ______________ and ______________ holes or like ______________ handles. Models are available for ______________ in straight lines, in ______________ to the left, or curves to the ______________.

2. Fill in the following chart.

<table>
<thead>
<tr>
<th>Name of snip</th>
<th>Something about this snip</th>
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<tbody>
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</table>
3. Write 3 things that I should DO if I am going to use tin snips.

______________________________________________________________

______________________________________________________________

______________________________________________________________

4. Left snips are for ___________________________________________

________________________________________________________________

________________________________________________________________

5. Right snips are for ___________________________________________

________________________________________________________________

________________________________________________________________

6. Offset snips are for ___________________________________________

________________________________________________________________
7. True or False?

<p>| | | |</p>
<table>
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<tbody>
<tr>
<td>T</td>
<td>F</td>
<td>Use any snip to cut any metal. It doesn’t matter.</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>If you need more leverage, you can extend the handles.</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>Use ordinary hand pressure for cutting.</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>If your snips become dull, sharpen them with scissor sharpeners.</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>Avoid springing the blades.</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>Cut so that the waste is on the right if you are right-handed.</td>
</tr>
</tbody>
</table>
What are some general safety tips to know when using screwdrivers?

Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.

- Use a slot screwdriver with a blade tip width that is the same as the width of slotted screw head.
- Use a vise or clamp to hold the stock in if the piece is small or moves easily.
- Wear safety glasses or face shield that is appropriate for the hazards of the work you are doing.
- Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.
- Shut off electricity before beginning work on electrical equipment (lock out, de-energize, and tag out).
- If work must be carried out on “live” equipment, use screwdrivers that have insulated handles designed for electrical work and a non-conducting shaft. Remember, most plastic handles are designed for grip and comfort.
- Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).
Use a screw-holding screwdriver (with screw-holding clips or magnetic blades) to get screws started in awkward, hard-to-reach areas. Square-tipped screwdrivers (e.g., Robertson) that hold screws with recessed square holes are also useful in such situations.

Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.

Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.

**What should I avoid doing?**

- Do not run with a screwdriver in your hand.
- Do not lean or push on a screwdriver with any more force than necessary to keep contact with the screw. A screw properly piloted and fitted will draw itself into the right position when turned. Keep the shank directly over the screw being driven.
- Do not hold the stock in one hand while using the screwdriver with the other. If the screwdriver slips out of the slot you may cut your hand.
- Do not hammer screws which cannot be turned.
- Do not grind the tip to fit all sizes of screw heads.
- Do not try to use the screw drivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-flutted spline screw heads).
- Do not use defective screwdrivers (i.e., ones with rounded or damaged edges or tips; split or broken handle; or bent shaft).
Do not use screwdriver for prying, punching, chiselling, scoring, scraping, or stirring paint.

Do not use pliers on the handle of a screwdriver for extra turning power. A wrench should only be used on the square screwdriver shank designed for that purpose.

Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.

Do not use a screwdriver to check if an electrical circuit is live. Use a suitable metre or other circuit testing device.

Do not carry screwdrivers in your pockets.

**Screwdriver Basics**

(*not from CCOHS)*

**Pilot Holes**

Pilot holes are holes that are drilled into your work before you put a screw in. It is a good idea to drill pilot holes before putting a screw in to avoid having your wood split. There are also drill bits that will pilot hole and make a counterbore hole. That means that your screw will sink below the level of the wood and can be filled in with wood putty or a wood button. Use a drill slightly narrower than the screw’s thread.

**Tips**

Power screwdrivers and drills save wear and tear on your wrist. They are used with interchangeable bits. If you choose the wrong one you may strip the screw head or damage the tip or blade of your screwdriver.
Three Kinds of Screwdrivers

Flat Slot

This is a basic screwdriver. It comes in different sizes. It is not used as much as it once was, but it’s a good idea to have a few sizes in your toolbox. It is important to have the right size for the slot. If you don’t, it will slip. You could injure yourself or strip the screw head.

Philips

This screwdriver is good to use as it doesn’t slip easily. It comes in various sizes.

Robertson

These come in various sizes. The different sizes come with different coloured handles: red, green, and black. It is important to choose the right size, otherwise you might strip the corners on the screw, making it rounded, and harder to work with.
Screws

Screw Heads

The most common type of screw heads are flat, round, and pan.

**Flat**
- most common
- can be counter sunk

**Round**
- used when countersinking is not needed

**Pan**
- similar to the round but the top is flat

**Screw Sizes - #6 x 1" - What does that mean?**

#6 tells you the size of the shank. The larger the number, the bigger the shank. The most common sizes are #6, #8, and #10. 1" tells you the length of the screw.
Screwdrivers

Learning Activity

1. Pick one safety tip to remember when using a screwdriver. Explain the tip. Include why the tip is important and what could happen if the tip were ignored.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2. What is the purpose of storing screwdrivers in a rack or partitioned pouch?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

3. Why is it important to not expose a screwdriver to excessive heat?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
4. Circle the correct word in italics.

    Pilot holes are drilled into your work before / after you put your screw in.

5. Fill in the following table.

<table>
<thead>
<tr>
<th>Name of screwdriver</th>
<th>List 2 things about this screwdriver</th>
<th>Draw the blade tip</th>
<th>Draw the blade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

6. What are the 3 kinds of screw heads?

1. ___________________________________________________________

2. ___________________________________________________________

3. ___________________________________________________________

7. Explain what is meant by these screw measurements? #8, 2"
Handsaw

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What should I know about handsaws?

Saws are made in various shapes and sizes and for many uses. Use the correct saw for the job.

- Wear safety glasses or a face shield.

- Select a saw of proper shape and size for the wood stock being used.

- Check the wood being cut for nails, knots, and other objects that may damage or buckle the saw.

- Start the cut by placing your hand beside the cut mark with your thumb upright and pressing against blade. Start cut carefully and slowly to prevent blade from jumping. Pull upward until blade bites the wood. Start with partial cut, then set saw at proper angle.

- Apply pressure on downstroke only.
Hold stock being cut firmly in place.

Use a helper, a supporting bench, or vise to support long stock if required.

Protect teeth of saw when not in use.

Keep saw blades clean.

What should I know about using a hacksaw?

Select correct blade for material being cut.

Secure blade with the teeth pointing forward.

Keep blade rigid, and frame properly aligned.

Cut using strong, steady strokes, directed away from yourself.

Use entire length of blade in each cutting stroke.

Use light machine oil on the blade to keep it from overheating and breaking.

Cut harder materials more slowly than soft materials.

Clamp thin, flat pieces requiring edge cutting.

Keep saw blades clean and lightly oiled.
Handsaw

Learning Activity

1. Put the following in order.

   ______  Pull upwards until blade bites the wood.

   ______  Start cut carefully and slowly to prevent blade from jumping.

   ______  Start with partial cut, then set saw at proper angle.

   ______  Start the cut by placing your hand beside the cut mark with your thumb upright and pressing against the blade.

2. What does it mean when the blade “bites” the wood?

   __________________________________________________________
   __________________________________________________________

3. True or False?

   T  F  Apply pressure on the upstroke only.

   T  F  Use any saw for any job.

   T  F  If you put enough pressure on the saw, you can just cut through the nails that are in the wood.
4. The following should be done with your instructor.

Explain and demonstrate the proper way to hold and cut a piece of wood.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Demonstrated</th>
<th>Had some difficulty</th>
<th>Re-tested and demonstrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wore appropriate PPE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explained about using pressure on downstroke only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Began the cut properly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Able to cut the wood</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pliers

from: Canadian Centre for Occupational Health & Safety (CCOHS)

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What are some safety tips to know when using?

Pliers are made in various shapes and sizes and for many uses. Some are used for gripping something round like a pipe or rod, some are used for twisting wires, and others are designed to be used for a combination of tasks including cutting wire. There are also tools that are used just for cutting wires, called wire cutters. Use the correct pliers or cutters for the job.

DO:

• Wear safety glasses or a face shield where there is a hazard from flying particles, pieces of wire, etc.

• Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.

Choose pliers or wire cutters that have a grip span of 6 cm- 9 cm (2½- 3”). To prevent your palm or fingers from being pinched when the tools are closed.
Use adjustable pliers that allow you to grip the workpiece firmly while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).

Use tools only if they are in good condition.

Make sure that the cutting edges are sharp. Dull and worn down cutting edges require more force to cut.

Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.

Pull on the pliers; do not push away from you when applying pressure. If the tool slips unexpectedly, you may lose your balance or hit your hand against equipment or something else hard that could result in an injury.

What should I avoid doing?

Do not use pliers as a hammer.

Do not hammer on pliers or wire cutters to cut wires or bolts.

Do not use pliers on nuts and bolts; use a wrench.
Pliers

Learning Activity

1. Pliers are used for many things. List 3 things pliers are used for:

__________________        __________________        __________________

2. Why do you need to wear safety glasses or a face shield when using pliers?

______________________________________________________________

______________________________________________________________

3. Why is it important to make sure the cutting edges are sharp?

______________________________________________________________

______________________________________________________________

4. A drop of oil on the hinge will ________________________________ .

5. Never _______ the cutting tool from side to side or _______ wire back and forth against the cutting edge.
Clamps

What are some general safety tips to know when using clamps?

Clamps are versatile tools that serve to temporarily hold work securely in place. They are used for many applications including carpentry, woodworking, furniture making, welding, construction, and metal working.

Clamp styles include C-clamps, bar clamps, pipe clamps, and handscrews. Bar clamps have adjustable arms that are easily widened or narrowed to fit the work piece and, therefore, require fewer turns of the screw spindle, compared to a C-clamp, to hold the piece tightly.

DO

- Wear safety glasses or a face shield.
- Select the proper clamp style and size by matching the work-holding requirements of the job with the following clamp features:
  - strength and weight (e.g., consider rail size and nominal clamping pressure)
  - opening (length of reach)
  - throat depth (depth of reach)
  - ease of adjustment
  - clamping surfaces (material used and size)
- Ensure that the swivel at the end of the screw turns freely before using.
- Dispose of clamps with bent frames; replace bent spindles, if possible.
● Ensure that the pressure plate and anvil parts of the clamp are in full contact with the workpiece before tightening.

● Use pads with C-clamps to avoid marking the work.

● Remove clamps as soon as the job is finished. Clamps serve only as temporary devices for holding work securely in place.

● Keep all moving parts of clamps lightly oiled and keep tools clean to prevent slippage. Also make sure there is no dirt or oil on any part that will come into contact with the work.

● Store C-clamps by clamping them on a rack, not in a drawer.

What should I avoid doing?

● Do not use extra large clamps just for the sake of their large throats. Instead, use, deep-throat clamps.

● Do not use any clamps that have a bent frame or a bent spindle.

● Do not use wrenches, pipes, hammers, or pliers to tighten clamps. Use wrenches only on clamps especially designed for wrenches.

● Do not hoist or pull with C-clamps. Use special lifting clamps.

● Do not use C-clamps to construct scaffolds or platforms for workers.
Clamps

Learning Activity

1. What are clamps designed to do for a woodworker?

________________________________________________________________________

2. Clamps are used in what kinds of jobs?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. What are the 4 different kinds of clamps?

__________________________________________  _____________________________
________________________________________________________________________
________________________________________________________________________

4. What do you need to consider when choosing the right clamp for the job?

________________________________________________________________________
________________________________________________________________________
5. How can you avoid marking the wood when using a clamp?

6. True or False?

T  F  Clamps are permanent holding devices.
T  F  Store clamps on a rack.
T  F  Do not hoist or pull with C-clamps.
T  F  Clamps are great for building scaffolding.
T  F  Dispose of clamps with bent frames.
Hammers

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What are some safety tips to know when using a hammer?

Hammers and other striking tools are widely used and often abused. Hammers are made for specific purposes in various types and sizes, and with striking surfaces of varying hardness. For example, hammers are used for general carpentry, framing, nail pulling, cabinet making, assembling furniture, upholstering, finishing, riveting, bending or shaping metal, striking masonry drill and steel chisels, and so on. Hammers are designed according to the intended purpose.

- Select a hammer that is comfortable for you and that is the proper size and weight for the job. Misuse can cause the striking face to chip, possibly causing a serious injury.

- Choose a hammer with a striking face diameter approximately 12 mm (0.5 inch) larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).

- Ensure that the head of the hammer is firmly attached to the handle.

- Replace loose, cracked, or splintered handles.

- Discard any hammer with a mushroomed or chipped face or with cracks in the claw or eye sections.

- Wear safety glasses or a face shield.

- Strike a hammer blow squarely with the striking face parallel to the surface being struck. Always avoid glancing blows and over and under strikes. Hammers with beveled faces are less likely to chip or spall (splinter or chip).
Look behind and above you before swinging the hammer.

Watch the object you are hitting.

Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.

What should I avoid doing?

Do not use a hammer with a loose or damaged handle.

Do not use handles that are rough, cracked, broken, splintered, sharp-edged, or loosely attached to head.
• Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.

• Do not use a hammer for any purpose for which it was not designed or intended.

• Do not use one hammer to strike another hammer, other hard metal objects, stones, or concrete.

• Do not redress, grind, weld, or reheat-treat a hammer head.

• Do not strike with the side or cheek of the hammer.
Types of Hammers
(*not from CCOHS)

**Claw Hammer**

- heavy enough to drive large nails with ease
- claw designed to take out large nails

If you think you’ll be removing a lot of nails, choose a hammer with a steel shaft. Pulling nails puts a lot of strain on the shaft.

**Ball-peen Hammer**

- “engineer’s hammer” or “machinist’s hammer”
- best hammer to use for metal
- steel head is harder than a claw hammer which means it’s less likely to chip

**Pin Hammer (Continental pattern)**

- lightweight
- used to drive small nails, tacks, staples

Most carpenters use a 16 oz. hammer, but will often have a 20 oz. and a 22 oz. as well.
How to Hammer a Nail

- make sure the nail is aimed in the right direction
- hold the nail between your thumb and forefinger
- keep your eye on the nail
- lightly tap the nail until it is set in the wood
- let go of the nail once it is set in the wood
- lightly tap a few more times to make sure it is set
- hammer until the nail is in

How to fix a dent

If you miss the nail and put a dent or a ‘bruise’ in the wood, you can fix it by soaking the dent with water. This will make the wood swell. Wait for it to dry. Lightly sand the area.

Using a nail punch

A nail punch is a square tipped punch used to drive nails below the surface of the wood. You can also use it to finish hammering a nail in, if you are worried about denting the wood.
Hammers

Learning Activity

1. What kinds of things are hammers used for?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

2. What two things should you remember when picking out a hammer?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

3. What is the difference between a glancing blow and a square blow?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
4. Why should you look behind and above you before swinging a hammer?

______________________________________________________________________________________________

______________________________________________________________________________________________

5. List 3 types of hammers.

___________________________________  ______________________  _________________________

6. Fill in the following chart.

<table>
<thead>
<tr>
<th>Name of Hammer</th>
<th>Quick sketch of hammer</th>
<th>Description or Qualities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. Number the following into the proper sequence or order.

_______ hammer until the nail is in

_______ lightly tap a few more times to make sure it is set

_______ make sure the nail is aimed in the right direction

_______ lightly tap the nail until it is set in the wood

_______ hold the nail between your thumb and forefinger

_______ keep your eye on the nail

_______ let go of the nail once it is set in the wood

8. In your own words, explain how you might try to fix a hammer dent or bruise in the wood.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

9. What is a nail punch? What is it used for?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Level & Plumb

Level means true horizontal (or even with the horizon). Plumb means true vertical.

The tools used to measure level and plumb are:

Level

A level has small vials inside of it that when turned, an air bubble moves from side to side or up and down. When true level or plumb is found, the air bubble will be in the middle of the vial. There are electronic levels that have sensors to show true level or plumb.

Plumb Bob

A plumb bob is a old and simple tool that works on the principle of gravity. It is made up of a string and a heavy weight that is pointed on the bottom.
What should you do before using a table saw?

A table saw can be dangerous if not used properly.

- Read the owner’s manual carefully.
- Make sure you understand instructions before attempting to use any tool or machine.
- Learn the applications and limitations before use.

What safety procedures should you follow when using a table saw?

- Wear safety glasses or a face shield.
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the wood working area.
- Read and understand the section on kickback. Kickback is when the wood can be violently thrown back toward the operator.
- Choose proper blades for the type of work being done.
- Keep blades clean, sharp, and properly set so that they will cut freely without having to force the work piece against the blade.
Use the guards provided with the saw. Keep them in place and in working condition.

Make sure that the fence is locked in position after the desired width has been set.

Hold the work piece firmly down on the table against the fence when pushing the wood through.

Make sure that there is enough support to hold a work piece. Use extension tables or roller supports at the side or the back for larger pieces. If an assistant is at the back (out feed) end of the saw, an extension table should be in place so the back edge is about 1.2 m (4 ft) from the saw blade. The assistant should wait for the work piece to reach the edge of the extension table and should not reach toward the saw blade.

Feed stock into the blade against the direction of its rotation.

Move the rip fence out of the way when cross cutting. Never use it as a cut off gauge.
- Use a push stick when ripping narrow or short stock (e.g. when the fence is set less than about 15 cm (6 in) from the blade; when the piece is less than 30 cm (12 in) long or when the last 30 cm (12 in) of a longer piece is being cut.). Refer to ripping applications in the manufacturers instruction manual.

- Keep hands out of the line of a saw blade.

- Keep the body and face to one side of the saw blade out of the line of a possible kickback.

- Provide adequate support to the rear of a saw table for wide or long stock.

- Be careful when waxing, cleaning, or servicing the table.

- Shut off and unplug (or lock out) a saw before doing any work on the saw.

- Keep area clean and clutter free.

- Operate machines in a non-congested, well lit area.

- Use the proper sawdust exhaust systems required by operation.
What should you avoid when working with a table saw?

Do not saw freehand. Always hold the stock firmly against the mitre gauge or a rip fence to position and guide the cut.

- Do not reach around and over moving blades.
- Do not feed the work piece faster than the saw can accept.
- Do not leave a saw running unattended. Turn off the power and make sure the machine has stopped running before leaving the area.

Notice the woman in this graphic. She is making dangerous cuts because she is not using the fence. She is sawing freehand. This is an accident waiting to happen.
Table Saw

Learning Activity

1. What is kickback?

2. What is the purpose of an extension table or roller supports?

3. When should you use a push stick?
4. Re-read the following tips. Why are they important? What might happen?

- Do not reach around and over moving blades.
- Do not feed the work piece faster than the saw can accept.
- Do not leave a saw running unattended. Turn off the power and make sure the machine has stopped running before leaving the area.

5. Work with your instructor. Have your instructor test your knowledge and initial the following chart.

<table>
<thead>
<tr>
<th>Parts of Table Saw</th>
<th>able to identify</th>
<th>had some difficulty</th>
<th>re-tested and able to identify</th>
</tr>
</thead>
<tbody>
<tr>
<td>direction of travel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>anti-kick guard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>start/stop controls</td>
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<td></td>
</tr>
</tbody>
</table>
How do you select the proper bit or attachment?

- Follow manufacturers instructions when selecting and using a bit or attachment, especially with unfamiliar drills or work.

- Select the bit or attachment suitable for the size of the drill and the work being done.

- Make sure that the bit or attachments are properly seated (positioned) and tightened in the chuck.

- Use only bits and attachments that turn true. Turning true means turning accurately, in correct position, balanced, and level.

- Use the auxiliary (second) handle for larger work or continuous operation.

What should you do when working with powered hand drills?

- Wear safety glasses or a face shield.

- Keep drill air vents clear to maintain adequate ventilation.

- Keep drill bits sharp always.

- Keep all cords clear of the cutting area during use. Inspect for frays or...
damage before each use.

- Disconnect power supply before changing or adjusting bit or attachments.

- Tighten the chuck securely. Remove chuck key before starting drill.

- Secure workpiece being drilled to prevent movement.

- Slow the rate of feed just before breaking through the surface.

- Drill a small "pilot" hole before drilling large holes.

**What should you do when working with small pieces?**

- Clamp wood so work will not twist or spin.

- Do not drill with one hand while holding the material with the other.
What should you avoid when working with powered hand drills?

- Do not use a bent drill bit.
- Do not exceed the manufacturer’s recommended maximum drilling capacities.
- Do not use a hole saw cutter without the pilot drill.
- Do not use high speed steel (HSS) bits without cooling or using lubrication.
- Do not attempt to free a jammed bit by starting and stopping the drill. Unplug the drill and then remove the bit from the workpiece.
- Do not reach under or around stock being drilled.
- Do not overreach. Always keep proper footing and balance.
- Do not raise or lower the drill by its power cord.
The Power Drill

The power drill is probably the most widely used tool in construction. It is invaluable to the woodworker. Drills are either **electric** or **cordless**.

The Chuck

Drill bits are held in place in the ‘chuck’. Most chucks have 3 jaws that tighten toward the centre. Some drills use a chuck key to change the bits. It fits into grooves on the chuck, and when turned either tightens or loosens the 3 jaws around the drill bit. Other drills don’t require a key. They are called ‘chuckless keys’. There is a collar on the drill that you turn to tighten or loosen the chuck. This is much handier, and there is no worry of losing the chuck key!
Drills

**Learning Activity**

1. Label the following picture.

![Drill Image]

2. Use the internet to print off a picture of a drill and a chuck.

3. “Use only bits and attachments that turn true.” Explain what this mean.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
4. Read the two tips for ‘what should you do when working with small pieces’. Why are these tips important? What could happen? What are the risks?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

5. Demonstrate to your instructor that you can safely use a drill.

<table>
<thead>
<tr>
<th>Date</th>
<th>able to use drill safely</th>
<th>had some difficulty</th>
<th>re-tested and able to use safely</th>
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<tbody>
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Sanders

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What should you do before using sanders?

Sanders can be very dangerous if not used properly.

● Read the owner’s manual carefully.

● Make sure you understand instructions before attempting to use any tool or machine.

● Learn the applications and limitations before use.

What safety procedures should you follow when using sanders?

● Wear goggles when operating sanders.

● Wear hearing protection that is suitable for the level of frequency of the noise you are exposed to in the woodworking area.

● Wear respiratory protection (e.g. dust masks) where required during sanding operations and clean up.

● Keep hands away from the abrasive surface.

● Hold small or thin pieces of stock in a jig or holding device to prevent injuries to the fingers or hands.

● Inspect abrasive belts before using them. Replace belts that are excessively worn or frayed in spots.
- Sand on the downward side of a disc sander so that the wood is driven onto the table by the machine's rotation.

- Install abrasive belts that are the same width as the pulley drum.

- Adjust abrasive belt tension to keep the belt running the same speed as the pulley-drum.

**What should you avoid when using a sander?**

- Do not sand small or thin hand-held work pieces.

- Do not wear loose clothing, or jewellery while using revolving power tools. Tie back long hair or wear appropriate hair protection. These measures will prevent hair, clothing, or jewellery (like dangling neck chains) from being caught and pulled by the sander belts and pulleys that are in motion.

- Do not operate sanders without the exhaust system operating.

- Do not operate sanders unless adequately guarded.
Sanders

Learning Activity

1. In your opinion, why do you think that safety goggles are recommended rather than safety glasses?
   ________________________________________________________________
   ________________________________________________________________

2. What other kinds of safety equipment are required?
   ________________________________________________________________

3. Why do you need to hold small pieces of wood in a jig or holding device?
   ________________________________________________________________
   ________________________________________________________________

4. Why should you not wear loose clothing, jewelry, or have long, loose hair around a sander?
   ________________________________________________________________
   ________________________________________________________________
5. Explain why you should hold the wood you are sanding on the downward side of the disc sander. Use the diagram below to help explain.
What should you do to work safely with belt sanders?

- Wear safety glasses or a face shield.
- Wear a dust respirator for dusty operations.
- Make sure the sander is switched "OFF" before connecting the power supply.
- Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector.
- Inspect sanding belts before using them. Replace belts that are excessively worn or frayed.
- Secure the sanding belt in the direction shown on the belt and the machine.
- Keep hands away from a sanding belt.
- Use two hands to operate sanders - one on a trigger switch and the other on a front handle knob.
- Keep all cords clear of sanding area during use.
- Clean dust from a motor and vents at regular intervals.
What should you avoid while working with belt sanders?

- Do not use a sander without an exhaust system or a dust collector present that is in good working order. Empty the collector when 1/4 full. The dust created when sanding can be a fire and explosion hazard. Proper ventilation is essential.

- Do not exert excessive pressure on a moving sander. The weight of the sander supplies adequate pressure for the job.

- Do not work on unsecured stock unless it is heavy enough to stay in place. Clamp the stock into place or use a “stop block” to prevent movement.

- Do not overreach. Always keep proper footing and balance.

- Do not cover the air vents of the sander.
Belt Sanders

Learning Activity

1. Label the following diagram of a belt sander.

2. In your opinion why is it important to wear dust masks and have a dust collector system?

3. Why should you not put excessive (a lot) of pressure on a moving sander?
What should you do before you start cutting with a router?

- Wear eye protection or a face shield and appropriate hearing protection when required.

- Disconnect the power supply before making any adjustments or changing bits.

- Ensure that the bit is securely mounted in the chuck and the base is tight.

- Put the base of the router on the work, template, or guide. Make sure that the bit can rotate freely before switching on the motor.

- Secure stock. Never rely on yourself or a second person to support or hold the material. Sudden torque or kickback from the router can cause damage and injury.

- Before using a router, check stock thoroughly for staples, nails, screws, or other foreign objects.

- Keep all cords clear of cutting area.
What should you do to work with a router safely?

- Hold both hands on router handles always, until a motor has stopped. Do not set the router down until exposed router bit has stopped turning.

- Do not overreach. Keep proper footing and balance.

- When inside routing, start the motor with the bit above the stock. When the router reaches full power, lower bit to required depth.

- When routing outside edges, guide the router counter clockwise around the work.

- When routing bevels, moldings, and other edge work, make sure the router bit is in contact with the stock to the left of a starting point and is pointed in the correct cutting direction.

- Feed the router bit into the material at a firm, controlled speed.

- With softwood, you can sometimes move the router as fast as it can go.

- With hardwood, knotty, and twisted wood, or with larger bits, cutting may be very slow.

- The sound of the motor can indicate safe cutting speeds. When the router is fed into the material too slowly, the motor makes a high-pitched whine. When the router is pushed too hard, the motor makes a low growling noise. When the type of wood or size of the bit requires going slow, make two or more passes to prevent the router from burning out or kicking back.

- To decide the depth of cut and how many passes to make, test the router on scrap lumber similar to the work.
Routers

Learning Activity

1. Use the internet to find and print pictures of various router bits. List the names of 6 different kinds you find here.

____________________________  _______________________________
____________________________  _______________________________
____________________________  _______________________________

2. Make sure the router bit can turn __________ before turning it on.

3. Why should you disconnect the power supply before changing the bit?

______________________________________________________________
______________________________________________________________
______________________________________________________________

4. Is it ok to have someone else hold your piece of wood for you while you router it? Why or why not?

______________________________________________________________
______________________________________________________________
______________________________________________________________
5. Fill in the following chart:

<table>
<thead>
<tr>
<th>Kind of wood</th>
<th>Speed of cutting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Softwood</td>
<td></td>
</tr>
<tr>
<td>Hardwood, knotty, or twisted pine</td>
<td></td>
</tr>
</tbody>
</table>

6. When the wood is fed into the router too slowly, the motor _____________________________

7. When the router is pushed too hard, the motor _____________________________
Band Saws

from: Canadian Centre for Occupational Health & Safety (CCOHS)
Material & Graphics reprinted, cited, or adapted, with permission, from Canadian Centre for Occupational Health & Safety (CCOHS), 135 Hunter Street East, Hamilton, ON L8N 1M5; Tel: (905) 573-4400; Toll free 1-800-263-8466; Fax: (905) 572-4500; e-mail: inquiries@ccohs.ca

What should you do before using a band saw?

A band saw can be dangerous if not used properly.

- Read the owner’s manual carefully.
- Make sure you understand the instructions before attempting to use any tool or machine.
- Securely anchor the band saw to the floor (or a work bench of appropriate height) to reduce vibration.

What safety procedures should you follow when using a band saw?

- Wear safety glasses or a face shield.
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the woodworking area.
- Make sure all guards are in place and properly adjusted. Ensure all band wheels are enclosed.
- Adjust blade guard height to about 3 mm or 1/8 inch above the top of the material being cut.
- Ensure the blade is under proper tension. A band saw equipped with automatic tension control is desirable.
- Use band saw blades that are sharp, properly set, and otherwise suitable for the job (e.g. the right tooth pitch, tooth form, blade width).

- Hold stock firmly and flat on the table to prevent the stock from turning and drawing your fingers against the blade. Keep hands braced against the table.

- Use a push stick when you remove cut pieces from between the fence and saw blade or when your hands are close to the blade. Keep your hands on either side of the blade - not in line with the cutting line and the blade.

- Make release (relief) cuts before tight curves when doing intricate scroll-type work.

- Keep the floor around a band saw clean and free of obstructions or clutter.

- Keep the machine properly oiled and serviced.

- Provide adequate lighting at the machine table. A light fixture with a flexible connection can provide essential lighting.
What should you avoid when working with a band saw?

- Do not use excessive force when pushing the wood past the blade.

- Do not back the stock away from the blade while the saw is in motion if the work piece binds or pinches on the blade.

- Do not stop a band saw by thrusting stock against the cutting edge or the side of the blade immediately after the power has been shut off.

- Do not remove sawdust or cutting from the table by hand or with compressed air. Use a stick or brush.

- Do not leave a saw running unattended. Turn off the power and make sure the machine has stopped running before leaving the area.
Band Saws

Learning Activity

1. Why should you secure a saw to the floor?
   ________________________________________________________________

2. How much space should there be between the piece of wood you are cutting and the blade guard?
   ________________________________________________________________

3. How and why would you use a push stick when operating a band saw?
   ________________________________________________________________
Circular Saws

from: Canadian Centre for Occupational Health & Safety (CCOHS)

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What should you do before you start cutting with a circular saw?

- Wear safety glasses or a face shield.
- Wear an approved respirator or dust mask when exposed to harmful or nuisance dusts.
- Use appropriate hearing protection equipment in noisy areas.
- Check the retracting lower blade guard to make certain it works freely.
- Ensure that the blade that you have selected is sharp enough to do the job. Sharp blades work better and are safer.
- Check the saw for proper blade rotation.
- Set the depth of the blade, while the saw is unplugged, and lock it at a depth so that the lowest tooth does not extend more than about 0.3 cm or 1/8" beneath the wood.
- Keep all cords clear of cutting area.
- Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.

![Circular Saw Diagram](image)

**Trigger Switch**

**Safety Switch**

**Motor Housing**

**Lever for Retracting Lower Blade Guard**

**Retracting Lower Blade Guard**

**Electrical Cord**

**Bevel Cutting Angle Adjustment Knob**

**Handle**

**Front Clamp Screw**

**Main Shoe**

**Cutting Depth Adjustment Knob**

© LLEO 2004, Skilled Trades Helper Essential Skills Training
What should you do to work safely with a circular saw?

- Check the retracting lower blade guard frequently to make certain it works freely. It should enclose the teeth as completely as possible, and cover the unused portion of the blade when cutting.
- Check that the retracting lower blade guard has returned to its starting position before laying down the saw.
- Keep upper and retracting lower blade guard clean and free of sawdust.
- Disconnect power supply before adjusting or changing the blade.
- Allow the saw to reach full power before starting to cut.
- Use two hands to operate saws - one on a trigger switch and the other on a front knob handle.
- Keep a motor free from accumulation of dust and chips.
- Select the correct blade for stock being cut and allow it to cut steadily.
- Do not force it.
- Secure work being cut to avoid movement.

What should you avoid when cutting with a circular saw?

- Do not hold or force the retracting lower guard in the open position.
- Do not place hand under the shoe or guard of the saw.
- Do not over tighten the blade-locking nut.
- Do not twist the saw to change, cut, or check alignment.
- Do not use a saw that vibrates or appears unsafe in any way.
- Do not force the saw during cutting.
- Do not cut materials without first checking for obstructions or other objects such as nails and screws.
- Do not carry the saw with a finger on the trigger switch.
- Do not overreach. Keep proper footing and balance.
- Do not rip stock without using a wedge or guide clamped or nailed to the stock.
Circular Saws

Learning Activity

1. Explain why you need to check if the blade is sharp.

________________________________________________________________________

________________________________________________________________________

2. Circular saws are designed for ___________ handed operation. ________

handed people should be extra careful when using the saw.

3. Setting the depth of the blade: The saw should be _________________.

Lock it at a depth so that the lowest tooth does not extend more than about

________ cm or _______ inches below the wood.

4. List the safety equipment you need to use to safely operate a circular saw.

____________________    ____________________ ___________________

5. True or False?

T    F  Keep motor free of dust.

T    F  Its ok to force the saw to make the cut.

T    F  Hold onto wood with one hand, and cut the wood with the other.
T  F  Do not carry the saw with a finger on the trigger switch.
T  F  Do not over tighten the blade-locking nut.
T  F  Do not place your hand under the shoe or guard.

6. Label the following diagram.

* graphic adapted from Canadian Centre for Occupational Health & Safety (CCOHS), www.ccohs.ca

lever for retracting lower blade guard  shoe
main shoe  electrical cord
motor housing  handle
front clamp screw  trigger switch
retracting lower blade guard  safety switch
bevel cutting angle adjustment knob
7. Work with your instructor. Have your instructor test your knowledge and initial the following chart.

<table>
<thead>
<tr>
<th>Parts of Circular Saw</th>
<th>able to identify</th>
<th>had some difficulty</th>
<th>re-tested and able to identify</th>
</tr>
</thead>
<tbody>
<tr>
<td>safety switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>trigger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>motor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>knob for bevel cuts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>knob for cutting depth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lever for retracting lower blade guard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>front clamp screw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>electrical cord</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>handle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lower blade guard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>main shoe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shoe</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Safety Tips

CIRCULAR SAWS — Pocket Cuts

Before switching on the saw:

1) Tilt saw forward.
2) Rest front of shoe on wood.
3) Retract lower guard.
4) Lower saw until front teeth almost touch wood.
5) Release guard to rest on wood.

Then:

6) Switch on the saw.
7) Keep saw tilted forward and push it down and forward with even pressure, gradually lowering it until shoe rests flat on wood.

Remember — hold the saw firmly to keep it from backing up.

Construction Safety Association of Ontario
When making any cut with a circular saw, wear the right protective equipment.

**Hard Hat and Safety Boots**
Mandatory for everyone on a construction project.

**Eye Protection**
Should be worn at all times on a construction project. For cutting, the minimum protection is spectacles with side shields. Much more effective are eyecup or cover goggles.

**Respiratory Protection**
A disposable dust mask is adequate protection against dust from cutting most woods. For exotic woods or specialized materials such as some floor and ceiling products, a half-face mask respirator may be required.

**Hearing Protection**
Should be worn by anyone operating circular saws or other power tools in confined spaces or for prolonged periods of time.

*Construction Safety Association of Ontario*
21 Voyager Court South, Etobicoke, Ontario M9W 5M7
(416) 674-2726  1-800-781-2726  FAX: (416) 674-8866
www.csao.org  info@csao.org
Pocket cuts are interior cuts. When you cut a hole out of something from the inside, this is called a pocket cut.

1. According to the reading, put the following steps in order.

   _____ Lower saw until front teeth **almost** touch wood.
   _____ Keep saw tilted forward and push it down and forward with even pressure, gradually lowering it until shoe rests flat on wood.
   _____ Tilt saw forward.
   _____ Release guard to rest on wood.
   _____ Switch on the saw.
   _____ Rest front of shoe on wood.
   _____ Retract lower guard.
2. List the right personal protective equipment (PPE) to wear when using a circular saw. Beside the PPE, state why you need to use it.

<table>
<thead>
<tr>
<th>PPE</th>
<th>Why do I need to use it?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Mitre Saws

from: Canadian Centre for Occupational Health & Safety (CCOHS)
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A mitre saw is like a circular saw on a stand. Its cutting edge is brought down to cut the wood. It chops the wood, so it is often called a chop saw. The blade can be turned to cut angles or tilted to cut bevelled edges. It is a handy cutting tool.

*not from CCOHS

Mitre saws can be dangerous if not used properly.
Read the owner’s manual carefully.

Make sure you know and understand the instructions before attempting to use any tool or machine.

Learn the applications and limitations before use.

**What safety precautions should you follow when using a mitre saw?**

- Wear safety glasses or a face shield. If work is dusty, use a respirator or dust mask.
- Wear appropriate hearing protection.
- Attach the saw firmly on a work bench or other rigid frame and operate saw at waist height.
- The saw can also be taken to remote locations by mounting it on a piece of plywood, 13 mm (½ inch) or thicker. This must be clamped to a waist high work surface in the job site with large “C” clamps.
- Keep one hand on the trigger switch and handle and use the other hand to hold the stock against the fence.
- Keep hands out of the path of the blade.
- Keep guard in place and in working order.
- Remove adjusting keys and wrenches.
- Use a crosscut or combination blade.
- Ensure that the blade rotates in the correct direction.
- Keep blade tight, clean, sharp, and properly set so that it cuts freely and easily.

- Allow motor to reach full speed before cutting.

- Follow instructions for lubricating and changing accessories.

- Keep the work area clean. Cluttered areas and benches invite accidents.

- Keep the work area well lit.

- Reduce the risk of unintentional startup. Make sure saw switch is in OFF position before plugging in.

- Unplug tools before servicing and when not in use.

- Check for damage. Repair or replace damaged parts.

- Keep motor air slots clean and free of wood chips.

- Use only the accessories designed for the specific saw and job.

What should you avoid when using a mitre saw?

- Do not operate the saw on the ground.

- Do not cut pieces smaller than 20 cm (8 inches) in length.

- Do not cut “free hand”. The stock should lie solidly on the table against the fence.

- Do not reach around or behind the saw blade.

- Do not take your hand away from the trigger switch and handle until the blade is fully covered by the lower blade guard.
- Do not overreach. Keep proper footing and balance at all times.

- Do not force the saw. The saw cuts better and more safely at the rate for which it was designed.

- Do not leave the saw until it has stopped completely. Turn the power off and unplug the saw.

- Do not use electric tools in damp or wet locations.

- Do not operate electric tools near flammable liquids or in gaseous or explosive atmospheres. Sparks may ignite fumes.
Mitre Saws

Learning Activity

1. Use one hand to hold the ______________ and the other hand to hold the __________ against the fence.

2. How can you avoid unintentional start-up?

____________________________________________________________________________

____________________________________________________________________________

3. Why is it important to never operate electric tools near flammable liquids?

____________________________________________________________________________

____________________________________________________________________________

4. Explain the “free hand” rule.

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________
Push Blocks / Push Sticks

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When should you use push sticks?

Push sticks or push blocks should be used when operating standard woodworking machinery, including table saws, radial arm saws, jointer/planers and shapers. These sticks protect the hand while allowing good hand control of the stock as it is pushed through the cutting head or blade. Push blocks for jointer/planers and shapers should be either two blocks or ones with two-handed positioning.

What are some features of a push block?

Hold-down push blocks should:

- Be rigid
- Enable the operator to protect both hands.
- Allow the operator to exert a firm and steady pressure on the work piece.

The following are samples of push blocks.

Simple push sticks are useful on a table saw when distance between the blade and fence is narrow.
Old Paint Brush Handles

Double-handed hold-down push block

Inset Heel (stop)

Frontal push block

Side push block

Use of two push blocks on single application.
Push Blocks / Push Sticks

Learning Activity

1. What tools should you use a push stick with?

__________________________________________________________________
__________________________________________________________________

2. In your own words, describe what a push stick is and why it should be used.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. What is the difference in a frontal push block and a side push block?

__________________________________________________________________
__________________________________________________________________
Radial Arm Saw

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A radial arm saw is a saw that allows you to raise, lower, tilt, swing, and adjust the cutting direction of the blade, making it a very handy tool.

* not from CCOHS

What should you do before using a radial arm saw?

A table saw can be dangerous if not used properly.

- Read the owner’s manual carefully.
- Make sure you understand instructions before attempting to use any tool or machine.
- Learn the applications and limitation before use.
What safety procedures should you follow when using a radial arm saw?

- Wear safety glasses or a face shield.
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the area.
- Feed stock (wood) against the direction of the blade (the blade should move downward when viewed by the operator), or move the blade into the wood.
- Only use saw blades rated at or above the speed arbour. (An arbour is the attachment from motor to blade.)
- Use only the accessories designed for that specific saw and application.
- Ensure the guard consists of two parts:
  1. Upper hood type that covers arbour.
  2. Lower guard that rides on the stock, adjusting automatically to the thickness being cut.
- Stand on the handle side when cross cutting. Pull the head with the hand nearest the handle and maneuver the stock with the other hand.
- Make sure the hand holding the stock is never in line with the blade.
- Return the cutting head completely to the back of the saw table after each cut. The saw should be designed so that the blade will not move forward under its own weight or if the machine is vibrating.
- When ripping, make sure that the overall length (both infeed and outfeed) is twice the length of the longest pieces of lumber.
When ripping, make sure that the stock is fed against the direction of the blade (from the side where the saw blade rotates upward toward the operator). The blade should extend slightly into the table. The motor head must be locked at the correct height and angle.

Clamp stock to the table on one side of the saw blade, when making mitre, bevel, or compound mitre cuts. Clamping prevents the wood from sliding along the fence during the cut.

Turn off the saw when making any adjustments or changes to the set up.

Make measurements by placing the wood to be cut against the stop gauge. When you need to measure with a tape measure or ruler, turn off the saw until the measuring is complete.

What should you avoid when working with a radial arm saw?

- Do not use radial arm saws for ripping unless the spreader (riving knife) and anti-kickback devices are provided and properly adjusted.
- Do not take your hand away from the operating handle unless the cutting head is behind the fence.
- Do not remove the stock from a saw table until the blade has been returned to its “resting” position at the back of the saw table. Use a stick or brush to remove scrap from the saw table.
- Do not cut “free hand”. Use the back guide or fence, or other device to keep the workpiece from moving.
- Do not use cracked or dull blades.
- Do not leave a running saw unattended - leave only after the saw has been turned off and it has come to a complete stop.
Radial Arm Saw

Learning Activity

1. Label the following diagram.

2. List the PPE needed to use this piece of equipment.

_______________________ ________________________
3. Explain about the feed stock and the direction the blade should move in.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

4. Make sure the hand holding the stock is ____________ in line with the ____________.

Return the cutting head completely to the ___________________ of the saw table after each cut.

Stand on the ____________ side when cross cutting.

5. Why should you clamp stock to the table when making mitre, bevel, or compound mitre cuts?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
What are pneumatic tools?

- Pneumatic tools are powered by compressed air. Common types of these air-powered hand tools that are used in industry include buffers, nailing and stapling guns, grinders, drills, jack hammers, chipping hammers, riveting guns, sanders, and wrenches.

How do you use pneumatic tools safely?

- Review the manufacturer's instructions before using a tool.
- Wear safety glasses or a face shield and, where necessary, safety shoes or boots and hearing protection.
- Post warning signs where pneumatic tools are used. Set up screens or shields in areas where nearby workers may be exposed to flying fragments, chips, dust, and excessive noise.
- Ensure that the compressed air supplied to the tool is clean and dry. Dust, moisture, and corrosive fumes can damage a tool. An in-line regulator filter and lubricator increases tool life.
- Keep tools clean and lubricated, and maintain them according to the manufacturer’s instructions.
- Use only the attachments that the manufacturer recommends for the tools you are using.
- Be careful to prevent hands, feet, or body from injury in case the machine slips or the tool breaks.
How should you handle air hoses?

- Use the proper hose and fittings of the correct diameter.
- Check hoses regularly for cuts, bulges, and abrasions. Tag and replace, if defective.
- Blow out the air line before connecting a tool. Hold the hose firmly and blow away from yourself and others.
- Do not operate the tool at a pressure above the manufacturer's rating.
- Turn off the air pressure to the hose when not in use or when changing power tools.
- Do not carry a pneumatic tool by its hose.
- Avoid creating trip hazards caused by hoses laid across walkways or curled underfoot.
- Do not use compressed air to blow debris or to clean dirt from clothes.

What should you avoid with a compressed air?

- Cleaning with compressed air is dangerous. You should not use compressed air for cleaning.
Pneumatic Tools - Basic Safety

Learning Activity

1. Pneumatic tools are powered by ________________________________

2. Common types of pneumatic tools are:

   _______________________________          _______________________________
   _______________________________          _______________________________
   _______________________________          _______________________________

3. Why is it important to post warning signs if using pneumatic tools?

   ____________________________________________________________________
   ____________________________________________________________________

4. If you find a hose has a cut or abrasion in it, what should you do?

   ____________________________________________________________________

5. In your own opinion, why should you not use compressed air to blow debris or to clean dirt from your clothes? What could happen?

   ____________________________________________________________________
   ____________________________________________________________________
What general safety principles should you follow when using pneumatic and stapling tools?

- Permit only experienced and trained persons to operate pneumatic nailing and stapling tools.

- Wear safety glasses or face a shield and, where necessary, use hearing protection.

- Inspect a tool before connecting it to air supply:
  - Check tool safety mechanisms.
  - Tighten securely all screws and cylinder caps.

- Check correct air supply and pressure before connecting a tool.

- Check that the tool is connected correctly and securely to the air supply hose and that is in good working order, with the safety mechanism operative, before using.

- Always handle a tool as if it is loaded with fasteners (nails, staples, etc.). Do not assume it is empty.

- Disconnect a tool from air supply when the tool is unattended and during cleaning or adjustment. Before clearing a blockage, be sure that depressing the trigger exhausts all air from the tool.
Use only fasteners recommended by the manufacturer.

Permit only properly trained people to carry out tool maintenance.

**What should you avoid when using pneumatic nailing and stapling tools?**

- Do not point the tool toward yourself or anyone else whether it contains fasteners or not.
- Do not operate at a pressure above the manufacturer’s rating.
- Do not depress the trigger unless the nose piece of tool is directed onto a safe work surface.
- Do not carry a tool with the trigger depressed.
- Do not load a tool with fasteners while the trigger is depressed.
- Do not overreach. Keep proper footing and balance.
- Do not use compressed air to blow debris or to clean dirt from clothes.
Pneumatic Nailing and Stapling Tools

Learning Activity

1. When you are inspecting a tool before connecting it to an air supply, what two things should you check?

__________________________________________________________________
__________________________________________________________________

2. Always handle a tool as if it were loaded. Why? What could happen? Explain.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
Construction Machines on the Job Site

There are a lot of people on construction sites, doing lots of different kinds of jobs. Some of those jobs involve large pieces of machinery and equipment. Without these pieces of machinery, these jobs would be a lot harder, take a lot more manpower, and take a lot longer to complete.

These machines can be very dangerous. Extreme caution must be used when operating one. The drivers of these machines need special training to operate them. But it is not just the drivers who need to be careful, it is everyone on the job site. Always be aware of what these machines are doing and where they are going. The driver will keep the machine as safe as possible; you need to keep yourself safe.

It is important to know what these machines do so that you can anticipate their movements. Knowing if a certain machine swings or swivels or has an arm that moves up and down, will help you to stay out of the way and stay safe. It is important to know that trucks and machines make beeping noises when they are in reverse. If you hear this, you know that a machine is backing up and you need to get out of the way.

Stay safe! Know these machines, what they do, and always be aware of where they are on the job site.
Bulldozer

A bulldozer pushes rocks, earth, mud, etc. They are also used to level the ground. Bulldozers come in different styles and sizes. They are made to do different types of jobs.

Loader

The loader is used to carry things like rocks and dirt. It then dumps the load into dump trucks. There are different types of wheel loaders, designed to do work in different conditions. The bucket can also be replaced with other equipment.
Excavator

The excavator can dig, level, and load materials. To *excavate* is to dig out and leave a hole. A backhoe is an excavator.

Dump Truck

They are used to carry things like dirt and rocks. The back part of the truck lifts up and dumps the load.

Concrete Mixer

This carries concrete to the job site. The tank on the back of the truck rolls continuously to keep the cement from hardening.

Cranes

Cranes are very useful for lifting things that are very heavy. They can lift things up very high.
Construction Machines on the Job Site

Learning Activity

1. Use the internet to find pictures of various machines that you might find on a construction site. Print out pictures of all the machines you find. Find one or two that are not listed here. List them below and write something about what kinds of jobs they do.

Machine: _____________________________
What it does: ______________________________________________________
__________________________________________________________________

Machine: _____________________________
What it does: ______________________________________________________
__________________________________________________________________

2. In your own words, why is it important to know what these machines do and where they are working on a job site? What could happen?
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
3. The reading told you about six different kinds of machines you might find on a construction site. Use that information to fill in the sections below.

Machine: _____________________________
What it does: ______________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

Machine: _____________________________
What it does: ______________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

Machine: _____________________________
What it does: ______________________________________________________
__________________________________________________________________
__________________________________________________________________
Machine: _____________________________

What it does: ______________________________________________________
__________________________________________________________________

Machine: _____________________________

What it does: ______________________________________________________
__________________________________________________________________
Blueprints and Drawings

Blueprints

Blueprints are drawings. They are drawn by the architect. Blueprints provide information and details about the construction. People working in the trades use blueprints as a ‘map’ to guide them in their work.

They are called blueprints because, when they are printed, they are blue in colour.

Each blueprint will have a scale and measurements for the tradesperson to follow. The scale is a ratio. The measurements are the actual length, width, etc of the final construction.

For example, the plumber’s blueprint will show all the pipe runs and connections for the plumbing system in the building. Each pipe run will be labelled and sized according to the needs of the system.

Depending on the size of the building, the blueprints could incorporate all of the trades’ details on one document. Sometimes there will be adjustments made to the blueprints during the construction.

It is important to follow the architect’s drawings as closely as possible. When the architect draws the blueprints, he takes into consideration all the costs associated with the building. This ensures that the building is constructed according to budget.

In the case of an apartment building, for example, a mistake in construction could result in thousands of dollars of extra costs.

Example:

A blueprint has a scale of 1:12. This means that every 1” of the drawing represents 12” (or 1 foot) of the completed work. The architect will provide this information on the blueprint. It is important to convert the scale to the actual measurement so you know, for example, how long to cut the 2x4 lumber.
Sample blueprint:
Drawings and Floor Plans

On small construction jobs, the blueprint or drawing could be limited to one document with each floor plan. The floor plan is drawn as if you are looking down on the plan. The dimensions of each room are given but it does not mean that the dimensions are to scale. The scale of the plan is written in the bottom right hand corner of the drawing and could read for example ¼” to 1 foot. The floor plan will not give the layout of the pipe runs or electrical wiring, as they will be on the Master Blueprint. On the floor plan will be the dimensions of the rooms and the location of fixtures in the bathroom and kitchen.

Usually floor plans are designed for the purchaser or owner to follow for furnishings etc. The floor plan will also allow the owner to make changes if necessary, usually at additional cost.

Vocabulary

Incorporate: include

Adjustments: changes

Dimensions: sizes

Fixtures: toilets, sinks, tub etc.
Blueprints and Drawings

Learning Activity #1

1. What is the purpose of the blueprint?

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

2. Why is it important to closely follow the blueprints?

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

3. What is the difference between a blueprint and floor plan?

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

4. What is the purpose of the floor plan?

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________
# Multiplication

## The Multiplication Table

If you don’t have a calculator, cut this out and put it in your tool box for a quick multiplication reference.

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<td>160</td>
<td>176</td>
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</tbody>
</table>
12 Times Table (12x)

There are 12 inches in a foot. Feet are units of measurement that are frequently used. It is a common unit of measurement in construction. If you memorize the 12 x tables, it will save you having to do calculations on a piece of paper or on a calculator.

16 Times Table (16 x)

16 x tables are another common unit of measurement in construction. If you are building load-bearing walls, you will be using the 16 times table. Why? Load-bearing wall studs are placed 16" apart.

Concrete blocks are 8"x16". If you are figuring out how many will fit into an area, knowing the 16 x table is helpful.

\[
egin{align*}
16 \times 1 &= 16 \\
16 \times 2 &= 32 \\
16 \times 3 &= 48 \\
16 \times 4 &= 64 \\
16 \times 5 &= 80 \\
16 \times 6 &= 96 \\
16 \times 7 &= 112 \\
16 \times 8 &= 128 \\
16 \times 9 &= 144 \\
16 \times 10 &= 160 \\
16 \times 11 &= 176 \\
16 \times 12 &= 192 \\
16 \times 13 &= 208 \\
16 \times 14 &= 224 \\
16 \times 15 &= 240 \\
16 \times 16 &= 256 \\
\end{align*}
\]
Imperial Measurement

Measurement is important in the Skilled Trades Helper field. It is used almost every day.

Imperial or Metric?

In Canada, there are two different units of measurement: imperial (inches) or metric (centimetres).

Americans use the imperial system. They measure in inches and feet.

Canadians use the metric system. Most industrialized countries in the world use the metric system. We measure in centimetres and metres. Canada used to use the imperial system. We changed to the metric system in the 1970's.

For whatever reason, a lot of carpenters and woodworkers in Canada still use the imperial system. Wood is sold by the foot. Screws are measured in inches. Imperial measurement is still widely used.

For this reason, this unit will focus on imperial measurement.
Inches and Feet

The imperial system is based on inches, feet, yards, and miles.

The two symbols used in imperial measurement are the ' (apostrophe) and the " (quote).

5' 3/4" means five feet and three quarter inches. 5 3/4" means 5 and 3/4 inches.

Sometimes measurements are only written in inches. 5' 3/4" can be written as 60 3/4" or 60 and three quarter inches. To find the total number of inches, we multiply the number of feet by 12, because there are 12 inches in a foot.

1' = 12" (1 x 12 = 12)
2' = 24" (2 x 12 = 24)
3' = 36" (3 x 12 = 36)

Learning Activity 1

Continue multiplying the whole numbers by 12 to find out the total number of inches.

1' = ___"  
2' = ___"  
3' = ___"  
4' = ___"  
5' = ___"  
6' = ___"

7' = ___"  
8' = ___"  
9' = ___"  
10' = ___"  
11' = ___"  
12' = ___"
Learning Activity 2

Get your tape measure or multiply by 12. Use a calculator if you would like. How many inches would the following measurements be written as?

1. 5' 3/4" = 60 - 3/4"
2. 3' 5/8" = ______
3. 8' 2 1/4" = ______
4. 10' 2/3" = ______
5. 5' 7/8" = ______
6. 1' 5 1/8" = ______
7. 4' 5/8" = ______
8. 6' 9/16" = ______
9. 7' ½" = ______
10. 8' 6 5/16" = ______
11. 7' 7/8" = ______
12. 2' 1/16" = ______
13. 4' 4 1/8" = ______
14. 6' 7/16" = ______
15. 8' 7/8" = ______
16. 2' 8 3/4" = ______
The Ruler

All those lines on a ruler have names. They mean something. The marks represent a whole number (1, 2, 3, etc.) and a ‘fraction of an inch’, or a part of an inch. The foot is divided into 12 inches. Each inch is then divided into equal parts. These parts have different names. The ruler has different length lines on it. Each line represents a measurement (½", 5/8", 1").

Fractions of an Inch

The longest line on the ruler represents the largest unit of measure: the inch. The second longest line on the ruler represents ½ inch. The next longest lines shows ¼ and ¾ inch. The lines that show 8ths are all the same length. The shortest lines show 16ths of an inch.

The Inch

Inches are clearly marked on a measuring tape. They are shown as whole numbers (1, 2, 3, 4, etc.). They are marked on a tape as the longest lines.
½ an Inch

The second longest line is the ½ (one-half) inch mark. It is one-half of the way between two whole numbers. One-half of the way between 1 inch and 2 inches is 1 and ½ inches (one and one-half inches or 1 ½”).

4ths of an Inch - 1/4

Within an inch, there are two lines that are ‘fourths’. There are only two of these: ¼ and ¾. The ¼ falls between the whole number and the ½ inch mark. The ¾ falls between the ½ and the whole number.

8ths of an Inch - 1/8

Look at the ruler again. The lines that are a little shorter than ¼ are called 8ths. 1/8, 3/8, etc. There are four of these: 1/8, 3/8, 5/8, and 7/8.
16\textsuperscript{ths} of an Inch

The shortest lines are called 16\textsuperscript{ths}. 1/16, 3/16, etc. Count over the total number of lines. This is the top number.

For example, you use a tape measure to measure a small item. The tape measure has lines on it, but doesn’t have the lines named. You hold the tape measure next to the item you are measuring. You look at the tape measure. You can find the line that marks the measurement, but you don’t know how to ‘read’ it. It is one of the smallest lines, so you know it is a ‘16\textsuperscript{th}’. How many 16ths? Count over the total number of lines. Start at the first 16\textsuperscript{th} line. This is 1/16th.

The total number of lines is 9. So, the answer is 9/16, or nine sixteenths.

Note on 32nds of an Inch

Some common rulers measure 32nds of an inch. These lines would then be the smallest. Not all rulers measure this small of an inch unit.

Learning Activity 3

On the ruler below, circle all the lines that represent 16\textsuperscript{ths}. Look at the solid black line above the ruler. According to the ruler, how long is this item? _____________________________
Learning Activity 4

Use your tape measure to measure the following:

What else is on a tape measure?

Every foot and every 16" increments are marked on a tape measure. The kind of marking varies from tape measure to tape measure. It may be a coloured box, triangle, or coloured number. Why? The markings are there because construction workers use these marks when they are spacing studs in a wall or when they are putting in floor or roof joists. For walls that are load-bearing, studs and joists are placed every 16 inches. For walls that are not load-bearing, they are placed every 24". Having every 16" and 24" clearly marked on a tape measure helps builders to measure correctly and faster.

Still having problems reading a tape measure?

If you find that you are having problems reading a tape measure, look for one that clearly marks the fractions of an inch. They aren’t as common, but they are available. Learning the names of these markings comes with time and practice. Use your tape measure every day. Carry it with you. Measure random items for practice.
Fractions of an Inch

one whole: Each inch is divided into 16 parts. One whole inch is $\frac{16}{16}$ or everything over everything or 16 out of 16...which is why we call it ‘one whole’.

one half (1/2"): One half of an inch is 8/16". When we talk about fractions, we talk in lowest terms. So, 8/16" can be reduced to $\frac{1}{2}$". Look at the diagram below. You can see that 8/16" and $\frac{1}{2}$" are the same thing. 8 out of 16 are coloured. That is half. 1 out of 2 is also half. 8/16" and $\frac{1}{2}$" mean the same thing.

one quarter (1/4"): One quarter (¼") is a fourth (¼") of the whole. Look at the diagram below. There are 16 total squares. One fourth of 16 is 4. Four squares are coloured in showing ¼". Four groupings of four would make a whole.

one eighth (1/8"): One eighth. This could also be called 2/16" or two sixteenths. There are two out of sixteen coloured in. 2/16" is not in its lowest terms. 2/16" is the same as saying 1/8".

one sixteenth (1/16"): One sixteenth. 1/16". There is one out of a possible 16 squares coloured in. 1/16" is the smallest fraction of an inch on most rulers.
A great website: The Ruler Game

There are a lot of great websites out there for learning about measurement. This is one that allows you to practice what you’ve learned.  
http://www.rickyspears.com/rulergame/

Learning Activity 5

1. Use the internet to go to the website listed above.
2. Select your increment level. Start with wholes and work up to sixteenths.

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<tr>
<th>Date</th>
<th>Increment Level</th>
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<td>sixteenths</td>
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</table>
A great website: Measure It! @ FunBrain

There are a lot of great websites out there for learning about measurement. This is one that allows you to practice what you’ve learned.

http://www.funbrain.com/measure/

This site also allows you to practice your metric measurement.

Start with Easy Inches. When you feel comfortable, move on to Medium Inches, Hard Inches, and then finally Super Brain Inches!

Learning Activity 6

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<td>Super Brain Inches</td>
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</table>
Since the 1970’s, Canada has been using the metric system of measurement. However, when you go into a lumber yard or hardware store, you’ll see a mixture of imperial and metric. If you listen to a carpenter while he’s working, you’ll hear words like feet and inches. These are units of measurement in the imperial system, not the metric system. So, while Canada is metric, most of the measuring you will do in the Skilled Trades field is imperial. You will most likely measure in feet and inches.

However, we have included this basic unit on metric, so that you are familiar with it.

**Unit of measurement**

Metric is based on units of 10. This means that all calculations within metric are based on the number 10. This makes calculations simple. If you know how to multiply and divide by 10, you can convert from one unit to another quite easily.

There are 3 base units of measurement in metric:

- **metre**: for measuring length
- **litre**: for measuring capacity (liquids)
- **gram**: for measuring weight

These units are called base units because they can stand alone or be used to make up other units of measurement in the metric system.

**Metre** is the base word for measuring length. A metre is a **basic unit of measure**, from which all other metric length units are measured. Each length unit of measurement in metric has the base word metre and a **prefix**.
**What is a prefix?**

A prefix is a group of letters that comes before a word that changes its meaning.

---

**For example:** cycle + prefix “bi” = bicycle

By adding the prefix bi to the word cycle, you change the meaning to cycle with 2 wheels. The prefix “bi” means two. Bi-annual = twice a year, bi-monthly = twice a month.

---

In metric, the prefixes that you add to the base word metre, changes the length of the measurement.

### Metric Prefixes

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<th>Symbol</th>
<th>Unit</th>
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**Note:** This list is not complete, however it is the basics of what you need to know how to use when working in the Skilled Trades field. If you find you enjoy learning about metric, ask your instructor for more information.
The Metric Ruler

Look at your ruler or tape measure. Tape measures vary, so it may or may not have metric units on it. Sometimes you will find tape measures have imperial at the top and metric on the bottom. Look and see what your tape measure shows. Find one that shows metric.

The ruler above shows metric on the bottom and imperial on the top. Look at the metric on the bottom. It is broken into centimetres (cm).

Learning Activity 1

Use your ruler to draw an accurate measure of 1cm here: [ ]

What do those lines mean?

Look at the ruler again. There are many lines, but only one of them is named. It shows 1cm. What do the other lines mean? They are called millimetres (mm).

The lines between the cm marks show mm (millimetres). There are ten mm in a cm. The longer line in the middle shows 5 mm.
Reading a metric ruler

To read a metric ruler, you first read the cm mark. How many whole cm are there in the measurement?

Let’s say you are measuring this black line. Place your ruler so that the beginning of the tape and the beginning of the item to be measured line up.

Once you have them lined up, read the whole numbers first. In this case the whole number would be 2 cm. The item measures 2 cm and then 2 more lines. We already know that these 2 lines represent mm (millimetres). How many mm? Two. So, the measurement is 2 cm 2 mm.

Instead of saying both units of measurement, we often say: 2.2 cm. We know that the .2 is 2 mm. .2 is 2/10ths of a cm or 2 mm.
Learning Activity 2

Look at the ruler above. What is the measurement of these points?

A = ___________  E = ___________
B = ___________  F = ___________
C = ___________  G = ___________
D = ___________

Learning Activity 3

Use the ruler above to figure out what the measurement is between these two points.

1. A & C = ________________  2. B & G = ________________
3. E & G = ________________  4. D & F = ________________
10 mm = 1 cm
10 mm are the same length as 1 cm.

There are 10 mm in 1 cm.

1 cm = 10 mm

Learning Activity 4

Remember: 10 mm = 1 cm

1. 20 mm = ________ cm
2. 100 mm = ________ cm
3. 76 mm = ________ cm
4. 50 mm = ________ cm
5. 185 mm = ________ cm
6. 124 mm = ________ cm
7. 40 mm = ________ cm
8. 110 mm = ________ cm
9. 57 mm = ________ cm
10. 30 mm = ________ cm
100 cm = 1 metre
100 cm are the same length as 1 metre.

There are 100 cm in 1 metre.

**Learning Activity 5**

Remember: 100 cm = 1 m

1. 100 cm = _______ m
2. 200 cm = _______ m
3. 500 cm = _______ m
4. 800 cm = _______ m
5. 700 cm = _______ m
6. 300 cm = _______ m
7. 600 cm = _______ m
8. 400 cm = _______ m
9. 900 cm = _______ m
A great website: Measure It! @ FunBrain

There are a lot of great websites out there for learning about measurement. This is one that allows you to practice what you’ve learned.

http://www.funbrain.com/measure/

This site also allows you to practice your imperial measurement.

Start with Easy Centimetres. When you feel comfortable, move on to Medium Centimetres, and finally Hard Centimetres.

Learning Activity 6

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<tr>
<td>Date</td>
<td>Hard Centimetres</td>
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</table>
Basic Geometry

Geometry is the study of lines, points, shapes, and angles.

These are lines:

When these two lines cross over one another, they intersect.
When lines intersect, they form *angles*. An angle is the space between two lines that meet.

To name these angles, we must first name the lines and the intersection point.
The angle names then become \( \angle \) AMD, \( \angle \) AMC, \( \angle \) BMC, \( \angle \) BMD.

Look at the angles. Notice that the angles that are opposite of one another look the same.

\( \angle \) AMD and \( \angle \) BMC are the same measurement.

\( \angle \) AMC and \( \angle \) BMD are the same measurement.

They are called *vertical angles*.

There are different types of angles. Angles are measured in degrees. The symbol for degrees is °. A circle has 360°. A straight line has 180°. A protractor is shaped like half of a circle and half a circle measures 180°.
Think of a pie. Cut the pie into 4. Each piece of the pie is 1/4 of the pie. Each quarter of pie has a 90° angle.

How do you measure these angles? The Protractor!

A protractor is a tool that is used to measure angles.
Ask your instructor for a protractor. Look at it. Notice that it is half a circle. The bottom line is marked with 0° and 180°. A straight line measures 180°.

To measure with a protractor, set the protractor on the solid line.

![Protractor on solid line](image)

When you are measuring an angle, set the protractor on the bottom solid line of the angle. Line up the point of the angle with the 90° mark on the bottom line of the protractor.

Notice the protractor has two sets of numbers. You always want to start at 0° and read the inside of the angle.

![Protractor with angle measured](image)

This angle measures 60°.
Learning Activity 1

1. Geometry is the study of ____________, ____________, ____________, and ________________.

2. When two lines cross over one another, they _________________.
   Draw a diagram of this.

3. When lines cross over one another, they form _________________.

4. What are the names of the four angles formed below?

   ![Diagram of angles](image)

   g __________
   g __________
   g __________
   g __________
5. What are angles measured in? __________________________

6. What is the symbol? ________

7. How many degrees are there in a straight line? _______________

8. How many degrees in a circle? _______________

9. Read the following paragraph.

   John was driving in his truck. He noticed a deer on the highway. He slammed on his brakes and turned the wheel. He did a 180 and came to a sudden stop.

What does it mean he did a "180"? How is this geometry?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

If John had done "a 360", what would that have meant?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
10. What tool is used to measure angles? ____________________________

11. Measure these angles.

A = _____  
B = _____  
C = _____  
D = _____  
E = _____  
F = _____
12. On a blank sheet of paper, draw 8 angles. Measure them using a protractor.

<table>
<thead>
<tr>
<th>Angle</th>
<th>Measurement in °</th>
<th>Angle</th>
<th>Measurement in °</th>
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<tbody>
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Types of Angles

Right Angle

This is a right angle. It is perfectly square. The measurement is 90°. (90 degrees)

To show that an angle is a right angle, we mark the angle like this:

Acute Angle

An acute angle is an angle where the measurement is less than 90°.

Obtuse Angle

An obtuse angle is an angle where the measurement is more than 90°.

Straight Angle

A straight angle is an angle that measures exactly 180°. It is also called a straight line.
How do I use angles in construction?

If you were building a house or even a picture frame, you will want to be sure that your angles are 90°! Can you imagine a house where the corners are not 90°?

It’s cute, but I wouldn’t want to live there! Can you imagine trying to drywall this house? Or hang wallpaper?

Mitre saws are used to cut angles in construction and woodworking. Mitre saws have a built in protractor so that you can set your blade to cut specific angles.

The most common mitre saw angles are 90°, 45°, and 22.5°

90° is a right angle.
45° is ½ of 90°.
22.5 is ½ of 45° and also ¼ of 90°.
### Learning Activity 2

1. Fill in the following chart using the information about the four kinds of angles.

<table>
<thead>
<tr>
<th>Name of angle</th>
<th>Number of degrees</th>
<th>Drawing of angle</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

2. What are the three most commonly cut mitre saw angles?

____________________________________________________________________________________
Parallel Lines

Parallel lines are lines that will never cross or intersect. They are opposite of each other. These two lines could run on forever and they would never, ever cross one another or intersect.

These two lines below would eventually intersect if you were to keep drawing them. They are not parallel.
Learning Activity 3

1. Parallel lines are lines that ________________________________

2. Draw two parallel lines.

3. Draw two lines that are not parallel. If you kept drawing these lines, they would eventually ______________.

4. Look around the room you are in right now. There are parallel lines everywhere. Look at the floor tiles. Are there parallel lines there? What about the window? It contains two sets of parallel lines. The top and bottom are parallel and the left and right are parallel.

List 6 other objects in the room with parallel lines.

1. ______________ 2. ______________ 3. ______________

4. ______________ 5. ______________ 6. ______________
Shapes

Square

All four sides are of equal length. All angles are 90°.

Rectangle

Opposite sides are of equal length. All angles are 90°.

Triangle

A three-sided enclosed shape.

Parallelogram

Opposite sides are parallel and are equal lengths. Opposite angles are the same. Neither set of opposite lines would ever intersect.

Trapezoid

One pair of the lines are parallel, the other set are not. One set would intersect.

Polygon

A polygon is a many sided shape made up of line segments. The shapes on these pages are all polygons.
**Pentagon**

A 5-sided polygon. The prefix pent means 5.

**Hexagon**

A 6-sided polygon.

**Octagon**

An 8-sided polygon. A stop sign is an octagon. Think of an octopus, which has 8 legs.
# Learning Activity 4

1. Fill in the following table using the information about shapes.

<table>
<thead>
<tr>
<th>Name of shape</th>
<th>Drawing of shape</th>
<th>Information about shape</th>
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<tbody>
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<td>Drawing of shape</td>
<td>Information about shape</td>
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</table>
Fractions in the Skilled Trades

Fractions are used quite a bit in the Skilled Trades field. Everyday, carpenters and construction people measure things. Often the measurements are not whole numbers (2 inches, 3 inches, etc.). A carpenter might measure a piece of wood that is $3\frac{3}{8}$ long. He needs to know how to work with this number.

Example:

Two pieces of wood.
One measures $4\frac{3}{4}$" long. The other is $3\frac{3}{8}$".

If the carpenter wants you to find the total measurement of the two pieces of wood, you need to be able to add them together. This is called **ADDING FRACTIONS**. You might also need to know how to **SUBTRACT**, **MULTIPLY**, and **DIVIDE FRACTIONS**.

**Tape measures** have markings on them that represent fractions of an inch. Some tape measures come with the fractions written on the tape. This is helpful if you don’t know how to read a tape measure.

There are also some **calculators** that can work with fractions. They cost a bit more than a regular calculator, take some time to learn how to use them, but could save you time in the end.

Fractions can be written in several ways:

$7\frac{3}{8}$" $\frac{3}{4}$ $\frac{1}{2}$
Using ½ as an example, the top number (1) is called the numerator. The bottom number (2) is called the denominator.

In the example above, the two boards measured 4 3/4" and 3 3/8". The two denominators are not the same. If your boss asked to add the two measurements together, you would have to do the following:

1. Look at the two denominators (4 and 8). Do they have something in common? In this case, 4 X 2 = 8.

2. Multiply the numerator and denominator by 2. This will allow the two fractions to be added because they have the same denominator.

\[
\frac{3}{4} \times \frac{2}{2} = \frac{6}{8}
\]

3. The one board measures 4 6/8" and the other board measures 3 3/8".

4. Add the measurements of the two boards.

\[
\begin{align*}
4 \frac{6}{8} + 3 \frac{3}{8} & \quad (\text{Add the whole numbers first.}) \\
4 + 3 & = 7 \\
6/8 + 3/8 & = 9/8 \quad (\text{Add the numerators. You do not add the denominators.})
\end{align*}
\]

5. The two boards measure 7 9/8" in total.

9/8 can be reduced because 9 is larger than 8. When you divide 9 by 8, you get 1 and some left over. The left over, in this case, is 1. This left over is the new numerator and is put over the denominator.

\[
9/8 = 1 \frac{1}{8}
\]

The two boards measure 7" + 1 1/8" = 8 1/8".
Fractions and Decimals

Learning Activity #1

1. Add the following measurements.
   a. \[3 \frac{1}{2} + 6 \frac{1}{2} =\]
   b. \[2 \frac{3}{4} + 7 \frac{1}{8} =\]
   c. \[4 \frac{3}{8} + 1 \frac{5}{16} =\]
   d. \[2 \frac{3}{4} + 5 \frac{9}{16} =\]
Decimals in the Skilled Trades

Decimals are also important in the Skilled Trades. Sometimes you will use decimals to make calculations.

Decimals, like fractions, are parts of a whole. Decimals are a different way of writing fractions and vice versa.

Here are some examples:

- 3.5 litres is the same as 3 ½ litres
- 1.5 feet is the same as 1 ½ feet
- 7.25 inches is the same as 7 ¼ inches

You can add, subtract, multiply and divide decimals.

Suppose you had to add the length of two boards measuring 4.5 feet and 2.25 feet.

\[
\begin{align*}
4.5 & \\
+ 2.25 & \\
\hline
6.75 & 
\end{align*}
\]

The two boards would measure 6.75 feet.

Suppose the boards measured 4.82 and 2.67.

\[
\begin{align*}
4.82 & \\
+ 2.67 & \\
\hline
7.49 & 
\end{align*}
\]

The two boards would measure 7.49 feet.

Adding decimals is very similar to adding whole numbers but you must remember the decimal point.
Fractions and Decimals

Learning Activity #2

1. Add the following.
   a. $12.75 + 3 =
   b. $4.15 + 5.84 =
   c. $17.36 + 6.75 =
   d. $35.1 + 29.99 =$
Converting Fractions and Decimals

Sometimes you will have to convert (or change) decimals to fractions or fractions to decimals. Sometimes measurements will mix fractions and decimals.

You decide if it is easier to add fractions or decimals.

Use this table to make conversions. The fractions are common in the Skilled Trades.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/16</td>
<td>.0625</td>
</tr>
<tr>
<td>1/8</td>
<td>.125</td>
</tr>
<tr>
<td>1/4</td>
<td>.25</td>
</tr>
<tr>
<td>1/2</td>
<td>.5</td>
</tr>
</tbody>
</table>

Suppose you were asked to convert 3/8" to a decimal. You know 1/8 is the same as .125. In this case, there are 3 1/8s. So you multiply .125 by 3.

\[ .125 \times 3 = .375 \]

3/8" is the same as .375".
Fractions and Decimals

Learning Activity #3

1. Using the table on Page 6, convert the following.
   a. 11/16 to a decimal
   b. 7/8 to a decimal
   c. 3/4 to a decimal

2. Suppose you had two boards measuring 7 5/8" and 3.25". What is the total measurement of the two boards?
   a. As a fraction
   b. As a decimal
Circles - The Basics

The circle is a shape with curved edges.

A line across the middle of the circle is called a diameter. The diameter is the distance from one side of the circle through the exact middle to the opposite side.

The radius of a circle is a line from the exact centre of a circle to any point on the edge. A radius is \( \frac{1}{2} \) the length of the diameter.

\[
\begin{align*}
\text{radius} &= \frac{1}{2} \text{diameter} \\
r &= \text{radius} \\
d &= \text{diameter}
\end{align*}
\]
Circumference of a Circle

The perimeter of a circle is called the circumference. It is the measurement of the outside edge of a circle. Imagine trying to use a tape measure to measure the outside edge. It wouldn’t be easy. There is a formula to find out the circumference.

\[ C = d \times B \]

\[ B = \pi (3.14) \]

What does that mean?

C means circumference.
Whatever follows the = (equal sign) is the formula to find C.

d = diameter
We learned that the diameter is the distance from one side of the circle through the exact middle to the opposite side.

x means to multiply

B means \( \pi \). Pi is a number that means 3.14. (There is a deeper mathematical explanation of what this number means and where it comes from, but for our purposes here, we’ll just memorize \( \pi \) as 3.14.)

\[ C=d \times B \] means circumference equals diameter times 3.14

The diameter of this circle is 6 cm. \((d=6\text{ cm})\)

\[ C = d \times B \]

\[ C = 6\text{ cm} \times 3.14 \]

\[ C = 18.84\text{ cm} \]

The circumference is 18.84 cm.

* Note: use the most appropriate unit of measure.
Learning Activity 1

1. Find the circumference for the following circles.

A) \[ d = 4'' \]

B) \[ d = 7'' \]

C) \[ d = 8'' \]

D) \[ d = 10'' \]

E) \[ d = 12'' \]
3 / 4 / 5 Rule for Making Square Corners
or Pythagorean Theorem

How does it work?

A square corner is also called a right angle. It is exactly 90°. To square off a corner, stake the spot where you want the 90° angle. Attach two strings to the stake. Attach one of the lines to another stake where you want the first side of the angle. Mark 4 feet on the string. Mark 3 feet on the second string. Place the tape measure on the 4 foot mark of first string. Move the second string until it measures exactly 5 feet on the mark. Stake the strings in place once the angle has been made. For larger projects simply use a larger number combination and multiply by the same common number.

Example: If you are trying to square off a large area, 3/4/5 isn’t big enough. Multiply 3 and 4 and 5 by the same number.
Let’s say you have an area 20' x 35' and you want to square it up. 3/4/5 is not going to be big enough. We need to find a number to multiply 3, 4, and 5 by. It can be any number as long as the proportion is the same. Let’s start with 2. 3x2=6, 4x2=8, 5x2=10. This means that the 3/4/5 rule becomes the 6/8/10 rule. If we use those numbers instead of 3, 4, and 5, will it be big enough?

The rule works, but is it big enough? We still have to go out another 14' on one side and another 17' on the other. With that much left to measure, we run the risk of coming out of true square.

Let’s pick a bigger number to multiply by: 5

3x5=15, 4x5=20, 5x5=25

The rule becomes 15/20/25. These numbers work better because they are closer to the total number of feet we are measuring.

How do I use this in construction?

The 3/4/5 rule is used to make things square: a foundation, deck, garden, or anything else that you want to make square. You can use it to test that things are square or to create a square corner.
3 / 4 / 5 Rule for Making Square Corners
or Pythagorean Theorem

Learning Activity

1. Work with a partner or your instructor and test this theory.

<table>
<thead>
<tr>
<th>Date</th>
<th>Theory worked</th>
<th>Had some difficulty</th>
<th>Re-tested and theory worked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work with a partner</td>
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<tr>
<td>Work by yourself</td>
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</table>

2. In your own words, how would this be helpful to someone working in construction?

______________________________________________________________
______________________________________________________________
______________________________________________________________
______________________________________________________________
______________________________________________________________

3. The 3/4/5 rule is also called the ____________________________ theorem.

4. Using the 3/4/5 rule, change 3/4/5 into proportions using the following numbers. Show your work. The first one is done for you.
A) 3 \[3 \times 3 = 9, \ 3 \times 4 = 12, \ 3 \times 5 = 15\] New Rule: \[9/12/15\]

B) 6 New Rule:

C) 5 New Rule:

D) 9 New Rule:

E) 2 New Rule:

F) 4 New Rule:

G) 7 New Rule:

5. Using this diagram to mark off the measurement in inches, show how the 3/4/5 rule works.
Area

Area is the amount of surface of something flat. For example, you calculate area of a floor to find the amount of carpet needed to cover it.

To calculate area, use the formula:
\[ A = LW \quad \text{or} \quad A = L \times W \]

A….is the area.
L….is the length.
W….is the width.

The formula tells you to multiply the length by the width.

When there are two letters right beside each other, just like LW, that is asking you to multiply them.

Area is always measured in square units like square feet (feet\(^2\)) or square yards (yards\(^2\)).

When you start the question (equation), the first step is to write down the formula. After that, you write it again and fill in the blanks. See the following example.

Find the area of a room that is 9 feet long and 5 feet wide.

\[ A = LW \]
\[ A = 9 \times 5 \]
\[ A = 45 \text{ feet}^2 \]

So what did we just do?
We replaced L (length) with 9 and W (width) with 5.
Using those numbers we can find out the size (or area) of the whole space.
There is a rectangle with a length of 3 feet and a width of 4 feet. How big is the area? Draw your own picture to help.

\[ A = LW \]
\[ A = \_\_ \times \_\_ \]
\[ A = \_\_ \]

Another example: A backyard measures 15 feet long by 20 feet wide. What is the area of the yard?

\[ A = LW \]
\[ A = \_\_ \times \_\_ \]
\[ A = \_\_ \]

Length usually means the longer side, but you can switch them around and still get the same answer.

Here is a scenario:

Joe wants to carpet his floor. He has a floor that is 7 feet long and 3 feet wide. How much carpet will he need?

\[ 7 \text{ feet} \]
\[ 3 \text{ feet} \]

\[ A = LW \]
\[ A = 7 \times 3 \]
\[ A = 21 \text{ feet}^2. \]

So now we know how big an area he has to carpet. Let’s say Joe buys a piece of carpet. The carpet is 5 feet long and 8 feet wide. What is the area of the carpet?

\[ A = LW \]
\[ A = 5 \times 8 \]
\[ A = 40 \text{ feet}^2. \]

How much more carpet does Joe have than floor?
40 - 21 = 19 square feet

So, what did we just do? We subtracted the smaller number (area) from the bigger one. So Joe would have 19 square feet of carpet left over.

Let’s pretend the numbers were switched, to make the area of floor 40 feet$^2$, and the area of the carpet 21 feet$^2$. Would we have enough carpet to fit the area of the floor? NO. We would be missing 19 feet$^2$. 
Area

Learning Activity #1

Calculate the area for the following measurements.

A) 13 feet (length)  10 feet (width)   Area = ______________________
B) 42 feet (length)  4 feet (width)   Area = ______________________
A) 2 inches (length) 4 inches (width) Area = ______________________
Cost per Square Foot

Joe didn’t like the carpet, so he returned it. Now he wants to buy a new one.

A = LW
A = 3 \times 7
A = 21

If the area Joe has to cover is 21 \text{ feet}^2, and it costs him $5 \text{ per foot}^2, how much money does he have to spend to cover his floor?

We need 21 \text{ feet}^2 of carpet at 5 \text{ dollars per foot}^2.
We could add 5 twenty-one times.
But what’s a quicker way to do that?
Multiply the area (21 \text{ feet}^2) by the cost per square foot ($5.00) to calculate the cost of the carpet.

21 \times 5.00 = 105.00

Therefore, it will cost Joe $105 to cover 21 \text{ feet}^2 of floor with carpet.

Joe decides to carpet his living room also. Joe’s living room is 10 feet long and 10 feet wide. Joe calculates the area of carpet he needs.

A = LW
A = 10 \times 10
A = 100 \text{ feet}^2

The areas of the two rooms are:

A = 21 \text{ feet}^2
A = 100 \text{ feet}^2

Now add both areas together.

100 + 21 = 121 \text{ feet}^2.
How much will the carpeting cost at $5 per foot$^2$?

$121 \times $5.00 = $605.00$

Therefore, it will cost Joe $605.00 to carpet his two rooms.
Cost per Square Foot

Learning Activity #2

1. Joe was so happy with the new carpet he decided to carpet his bedroom. Joe’s bedroom is 8 feet long and 6 feet wide. The carpet is $7.00 per square foot. Calculate the area of Joe’s bedroom. Calculate how much Joe will have to pay to carpet his bedroom.
How do I build a cube?

A cube is three-dimensional, such as a box or an ice cube.

A cube (or box) has three measurements.

L = length
H = height
W = width

Sometimes width is called depth (D).

My boss has asked me to build a box (cube). How do I do calculate the measurements?

Suppose your boss asked you to build a box (cube) that is 3 feet long, 1 foot high and 2 feet wide (deep).

Your boss has given you this diagram. A box is made up of six pieces:

- 1 top
- 1 bottom
- 4 sides

Let’s break this down. Remember the Geometry Module you have completed.

The front and the back sides will be the same size.

The top and bottom sides will be the same size.

The left and right sides will be the same size.
The front piece will be 3 feet long and 1 foot high. The back will be the same.

The top piece will be 3 feet long and 2 feet wide (deep). The bottom will be the same.

The left side will be 1 foot high and 2 feet wide (deep). The right will be the same.

Why are there so many sides the same? The sides that are the same are parallel. To have a perfect box (cube), all parallel (or opposite) sides must be the same.

Remember: measure twice and cut once!
Liquids

Often you will work with liquids, such as paint.

Some common measurements of liquids are:

- Pint
- Quart
- Gallon
- Millilitre
- Litre

The first three are Imperial and the last two are Metric. In this trade, both measurement systems are used.

Why would you have to know about liquid measurement?

Most of the supplies for the trade are measured using the Imperial system.

- Drywall may come in 4 feet by 8 feet sheets.
- Lumber may be 2 inches by 4 inches by 12 feet

Some supplies, especially liquid ones, are measured using the Metric system.

- Paint may come in 3.67 litre cans.
- Carpenters glue may come in 125 millilitre tubes.

Let’s take a look at an example.

A rule of thumb is you will need about 1 litre of paint to cover 110 square feet of surface.

After Joe bought the new carpet, he decided to paint the living room. The living room is 10 feet wide and 10 feet long. The walls are 8 feet high.

How much paint will Joe need to paint the four walls?

In this case, each wall is 10 feet long and 8 feet high.
Using the Area formula $A = L \times W$, we will adapt it for a wall. This time $W$ (width) is replaced with $H$ (height).

$A = L \times H$
$A = 10 \times 8$
$A = 80$ square feet

There are four walls in the living room. Each wall covers the same square footage. You will multiply the area of one wall by four to calculate the total area of the living room walls.

$A = 80$ (square feet) $\times 4$
$A = 320$ square feet

Joe needs enough paint to cover 320 square feet.

Joe buys a 3.67 litre can of paint. Does he have enough to cover the living room walls? Let’s see.

Use the rule of thumb, 1 litre of paint will cover 110 square feet.

2 litres will cover $2 \times 110$ square feet or 220 square feet.
3 litres will cover $3 \times 110$ square feet or 330 square feet.

With 3.67 litres of paint, Joe has more than enough to paint the four living room walls.
Liquids

Learning Activity #3

Joe wants to paint a room in his house. The room is 12 feet long and 11 feet wide. The walls are 10 feet high.

(Note: two walls will measure 12 feet long by 10 feet high. The other two walls will measure 11 feet by 10 feet.)

Joe has bought one 3.67 litre can of paint.

1. Calculate the square footage of each wall.

2. Calculate the total square footage of the four walls.

3. Calculate how much paint Joe will need. The rule is 1 litre of paint will cover 110 square feet.

4. Will Joe have enough paint?
If you find doing calculations difficult, use a calculator. It will do the calculation for you.

On this calculator, you see the “on” button in the top left corner. On the right-hand side are the operations (add, subtract, multiply and divide). C means clear. This
will erase what you are doing. All the numbers are in the centre. You will probably not need most of the other keys.

**Addition:** Key in the number then the + sign then the next number. Most calculators add cumulatively (as they go along), but on some you have to push the = sign between numbers to get it to do addition.

**Subtraction:** Put in the number you are subtracting from, then the – sign, then the number to be subtracted, then the = sign.

**Multiplication:** You can key in either number first in multiplication. Then you hit the x key. After that, you enter the second number and then push the = key.

**Division:** First enter the dividend (number to be divided), then the division sign then the number that you are dividing by. If you put the numbers in the wrong order, you will get the wrong answer. Any remainder will show as a decimal.

**Finding Errors** If you realize that you have keyed in the wrong number, clear the calculator and start over. It is a good idea to do each calculation two times. If you have the right answer both times, you likely have the right answer. If you have different answers, try the question again, paying close attention to each number you key in.
General Safety Tips

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What should you do before using woodworking machines?

Woodworking tools can be dangerous if not used properly.

- Only use woodworking machines that you have been trained to use properly and safely.
- Read the owner’s manual carefully.
- Make sure you understand instructions before attempting to use any tool or machine. Ask questions if you have any doubts about doing the work safely.

What safety procedures should you follow when using woodworking machines?

- Always wear safety glasses or goggles.
- Wear dust masks when required.
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the woodworking area. If you have trouble hearing someone speak from 3' (1m) away, the noise level from the machine is too high. Damage to hearing may occur.
- Use gloves to protect hands from splinters when handling wood but do not wear them near rotating blades and other machinery parts where the gloves can catch.
Make sure the guard is in position, is in good working condition, and guards the machine adequately before operating any equipment or machine. Check and adjust all other safety devices.

Make sure the equipment is properly grounded before use.

Check that keys and adjusting wrenches are removed from the machine before turning on the power.

Inspect stock for nails or other materials before cutting, planing, routing, or carrying out similar activities.

Make sure that all machines have start and stop buttons within easy and convenient reach of an operator. Start buttons should be protected so that accidental contact will not start the machine.

Ensure that all cutting tools and blades are clean, sharp, and in good working order so that they will cut freely. Do not force the object you are cutting.

Turn the power off and unplug the power cord (or lock out the power source) before inspecting, changing, cleaning, adjusting, or repairing a blade or a machine. Also turn the power off when discussing the work.

Use a "push stick" to push material into the cutting area. Jigs are also useful in keeping hands safe during cutting procedures. Keep hands out of the line of the cutting blade.

Clamp down and secure all work pieces when drilling or milling.

Use good lighting so that the work piece, cutting blades, and machine controls can be seen clearly. Position or shade lighting sources so they do not shine in the operator's eyes or cause any glare and reflections.

Ensure that the floor space around the equipment is big enough to allow you to move the size of work being processed safely without bumping into other workers or equipment.
Woodworking machines should be fitted with efficient and well-maintained local exhaust ventilation systems to remove sawdust or chips that are produced.

Electric power cords should be above head level or on the floor in such a way that they are not tripping hazards.

Keep work area free of clutter, clean, well swept, and well lit. Spills should be cleaned up immediately. Floor areas should be level and non-slip. Good housekeeping practices and workplace design will reduce the number of injuries and accidents from slips, trips, and falls.

What should you avoid when working with woodworking machines?

Do not wear loose clothing, work gloves, neckties, rings, bracelets, or other jewelry that can become entangled with moving parts. Tie long hair into a pony tail.

Avoid awkward operations and hand positions where a sudden slip could cause your hand to move into the cutting tool or blade.

Do not remove sawdust or cuttings from the cutting head by hand while a machine is running. Use a stick or brush when the machine has stopped moving.

Do not use compressed air to remove sawdust, turnings, etc. from machines or clothing.

Do not leave machines running unattended (unless they are designed and intended to be operated while unattended). Do not leave a machine until the power is turned off and the machine comes to a complete stop.

Do not try to free a stalled blade before unplugging the power cord.
• Do not distract or startle an operator while he or she is using woodworking equipment.

• Horse play is not allowed. It can lead to injuries.
General Safety Tips

Learning Activity

1. How do you know when the noise level is too high?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. Why shouldn’t you wear gloves when working near saw blades? What could happen?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. Pick one safety tip. Discuss it below, giving reasons why that tip is important.

Safety Tip: ________________________________________________________

Reasons why it is important: _________________________________________
__________________________________________________________________

__________________________________________________________________
4. “Ensure that the floor space around the equipment is big enough to allow you to move the size of work being processed safely without bumping into other workers or equipment.”

Discuss this tip. What does it mean? Why is it important? What could happen if you did bump into another worker?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

5. List ways to reduce injuries and accidents from slips, trips, and falls.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
6. Why shouldn’t you wear loose clothing, work gloves, neckties, rings, or bracelets, or long hair? What could happen?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

7. In your opinion, what is the most important safety tip to remember and why?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

8. Do you have other safety tips to share, or stories relating to safety? Write them below and share them with your classmates.

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__________________________________________________________________
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__________________________________________________________________
Fire Extinguishers

from: *Construction Safety Association of Ontario*

The law says that every worker who may be required to use a fire extinguisher must be trained to use it.

**On a construction site, fire extinguishers must be:**
- accessible
- inspected regularly
- refilled right away after use

**Extinguishers should be located:**
- where flammable materials are stored, handled, or used
- where temporary oil or gas fired equipment is being used
- where welding or open flame cutting is being done
- on each storey of an enclosed building being constructed or renovated
- in shops for at least every 325 square metres (2,400 square feet) of floor area

Fire extinguishers are classified according to their capacity to fight specific kinds of fire.

Class A wood, paper

Class B oil, gas, paint, grease

Class C electrical wiring

Class D combustible metals (combustible means ‘able to burn’)

© LLEO 2004, Skilled Trades Helper Essential Skills Training
How to Use a Fire Extinguisher

Fire extinguishers usually only go off for less than 1 minute, so it is important to aim right away. Don’t waste it.

Pull the pin.

Aim the nozzle at the base, or bottom, of the fire. Direct the spray back and forth.

Squeeze the trigger.

Sweep from side to side until the fire is out.

The idea is to put out the flames at their source.

Once you have used a fire extinguisher, tell your supervisor. They need to know that there has been a fire and they need to have the fire extinguisher refilled right away.

Know where the fire extinguishers are located. Don’t wait until a fire breaks out to go in search of an extinguisher!
Fire Extinguishers

Learning Activity

1. Explain, in your own words, why fire extinguishers need to be accessible, inspected regularly, and refilled right away after use. Use examples.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
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__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
2. According to the reading, what are 5 places where you should have a fire extinguisher. List them below.

1. __________________________________________________________
2. __________________________________________________________
3. __________________________________________________________
4. __________________________________________________________
5. __________________________________________________________

3. What class of fire extinguishers are needed for each:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Class</th>
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</thead>
<tbody>
<tr>
<td>wood or paper</td>
<td>Class</td>
</tr>
<tr>
<td>electrical wiring</td>
<td>Class</td>
</tr>
<tr>
<td>oil, paint, gas</td>
<td>Class</td>
</tr>
<tr>
<td>combustible metal</td>
<td>Class</td>
</tr>
</tbody>
</table>

4. Explain, step by step, how to use a fire extinguisher.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
5. Explain to your instructor how to use a fire extinguisher. Have your instructor fill in the following table.

<table>
<thead>
<tr>
<th>Date</th>
<th>able to demonstrate</th>
<th>had some difficulty</th>
<th>re-tested and able to demonstrate</th>
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</table>
The electrical current in regular businesses and homes has enough power to cause death by electrocution.

Even changing a light bulb without unplugging the lamp can be hazardous because coming in contact with the “hot” or live part of the socket could kill a person.

What kinds of injuries result from electrical currents?

There are four main types of injuries: electrocution (fatal), electric shock, burns, and falls.
These injuries can happen in various ways:

- direct contact with the electrical energy.
- when the electricity arcs (jumps) through a gas (such as air) to a person who is grounded (that would provide an alternative route to the ground for the electricity).
- muscle contractions, or a startle reaction, can cause a person to fall from a ladder, scaffold, or aerial bucket. The fall can cause serious injuries.

What are some general safety tips for working with or near electricity?

- Inspect tools, power cords, and electrical fittings for damage or wear prior to each use. Repair or replace damaged equipment immediately.
- Always tape cords to walls or floors when necessary. Nails and staples can damage cords causing fire and shock hazards.
- Use cords or equipment that are rated for the level of amperage or wattage that you are using.
- Always use the correct size fuse. Replacing a fuse with one of a larger size can cause excessive currents in the wiring and possibly start a fire.
- Be aware that unusually warm or hot outlets may be a sign that unsafe wiring conditions exist. Unplug any cords to these outlets and do not use until a qualified electrician has checked the wiring.
Always use ladders made of wood or other non-conductive materials when working with or near electricity or power lines. Wood doesn’t allow electricity to flow through it very easily.

Place halogen lights away from combustible materials such as cloths or curtains. Halogen lamps can become very hot and may be a fire hazard.

Risk of electric shock is greater in areas that are wet or damp.

Know where the breakers and boxes are located in case of emergency.

Label all circuit breakers and fuse boxes clearly. Each switch should be positively identified as to which outlet or appliance it is for.

Do not use outlets or cords that have exposed wiring.

Do not use power tools with the guards removed.

Do not block access to circuit breakers or fuse boxes.

Do not touch a person or electrical apparatus in the event of an electrical accident. Always disconnect the current first.

What are some tips for working with power cords?

Keep power cords clear of tools during use.

Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.

Replace open front plugs with dead front plugs. Dead front plugs are sealed and present less danger of shock or short circuit.

Do not use light duty power cords.
Do not carry electrical tools by the power cord.

Do not tie power cords in tight knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.

What is a sample checklist for basic electrical safety?

Inspect Cords and Plugs

- Check power cords and plugs daily. Discard if worn or damaged. Have any cord that feels more than comfortably warm checked by an electrician.

Eliminate Octopus Connection

- Do not plug several power cords into one outlet.
- Pull the plug, not the cord.
- Do not disconnect the power supply by pulling or jerking the cord from the outlet. Pulling the cord causes wear and may cause a shock.

Never Break OFF the Third Prong on a Plug

- Replace broken 3-prong plugs and make sure the third prong is properly grounded.

Never Use Extension Cords as Permanent Wiring

- Use extension cords only to temporarily supply power to an area that does not have a power outlet.
- Keep power cords away from heat, water, and oil. They can damage the insulation and cause a shock.
Electrical Safety

Learning Activity

1. Electrical current in regular businesses and homes has enough power to

__________________________________________________________________

2. Explain why it is dangerous to even change a lightbulb without unplugging the lamp.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

3. List the 4 kinds of injuries that can result from electrical currents.

__________________________________________        ________________________________

__________________________________________        ________________________________

__________________________________________________________________

__________________________________________________________________

4. Explain why it is dangerous to even get a small shock if you are up a ladder or on a roof.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
5. Always tape cords to __________ and __________ when necessary. Nails and ______________ can damage cords causing _______ and __________ hazards.

6. Unusually warm or hot outlets may be a sign that __________________________

7. Why should you use a ladder made of wood or non-conductive material when working around power lines? 

8. True or False

T   F  You don’t need to label all circuit breakers.

T   F  Halogen lights become very hot.

T   F  It is ok to use light duty power cords.

T   F  Wood allows electricity to flow through it very easily.

T   F  Know where the breakers are located in case of emergency.
9. Write one thing about each subject.

Inspect Cords and Plugs

__________________________________________________________________
__________________________________________________________________

Eliminate Octopus Connection

__________________________________________________________________
__________________________________________________________________

Never Break OFF the Third Prong on a Plug

__________________________________________________________________
__________________________________________________________________

Never Use Extension Cords as Permanent Wiring

__________________________________________________________________
__________________________________________________________________
Personal Protection Equipment (PPE)

from: OSHA “Personal Protective Equipment” www.osha.gov

Hazards exist in every workplace. Often, to make sure their employees are safe, it is necessary for employers to provide Personal Protection Equipment (PPE). PPE is equipment worn to reduce your exposure to potential hazards.
The Hazard Assessment

Hazard assessment is the first step in figuring out what possible physical or health-related hazards a workplace has and then what precautions and PPE may be necessary. The employee should be able to identify potential risks, inform their supervisor, and take action if necessary.

A basic hazard assessment should begin with a walk through the work site to develop a list of potential hazards in the following categories:

- impact (something that could hit you)
- penetration (sharp objects that could enter your body)
- chemical
- heat/cold
- harmful dust

Some other things to be aware of while conducting the basic assessment are:

- sources of electricity
- sources of motion, such as machines or processes which could result in injury to employees
- sources of high temperature
- types of chemicals used in the workplace
- potential for falling objects
- sharp objects
Types of PPE

There are many types of PPE available for a wide variety of potential risks.

When choosing PPE, there are a few things to think about. It is important that the equipment selected is appropriate for the workplace and the possible risks. All PPE should be designed and constructed well, and should be regularly checked and maintained. Finally, all PPE worn should fit each individual properly.

Eye and Face Protection

Most eye injuries in the work place could be prevented if employees wore the right eye protection. It should fit properly. Carpenters, electricians, plumbers, pipe fitters, and their helpers routinely use eye protection on the work site. Some examples of potential eye injuries include:

- dust, dirt, metal, or wood chips entering the eye as a result of activities such as chipping, grinding, sawing, hammering, the use of power tools, and even from strong wind forces.
- chemical splashes.
- objects swinging into the eye or face.

Some types of eye protection include:

- safety spectacles with safety frames and impact-resistant lenses.
- goggles that completely cover the eyes and provide protection from impact, dust, and splashes.
- welding shields that protect the eyes from the harmful light created when welding. They protect both the eyes and face from flying sparks and metal.

When selecting suitable eye and face protection employees should ask themselves the following questions:

- What hazards will this protect me from?
- Does it fit properly and reasonably comfortably?
- Does it restrict my movement or vision?
- Is it clean and durable?
- Is it compatible with all other PPE that I am required to wear?
Head Protection

Head injuries can kill you. They can also permanently change your personality, your ability to walk properly, your memory and your speech. The easiest means of prevention is simply wearing a hard hat. Hard hats can protect an individual from impact and penetration hazards, as well as from electrical shock and burns. Some occupations in which employees should be required to wear head protection include construction workers, carpenters, electricians, plumbers, and pipe fitters.

Hard hats should do the following:

- resist penetration by objects
- absorb the shock of a blow
- be water resistant, and slow burning
- have clear instructions explaining the proper way to wear, adjust and care for it

Like any other form of PPE, it is important that head protection fit properly, be in good condition, and be properly cared for.

Foot and Leg Protection

When facing possible foot or leg injuries from falling or rolling objects or from crushing or penetrating materials, employees should wear protective footwear. This is especially important when working with heavy objects which might fall or roll onto an employee’s feet, with sharp objects which could penetrate ordinary shoes, or where electrical hazards are present.

Safety shoes are the most common type of foot protection. They typically have impact-resistant toes, metal insoles, and heat-resistant soles. When buying safety footwear, look for the Canadian Safety Association Green Patch label.
Hand and Arm Protection

Gloves are the most common and effective type of hand and arm protection available when the hazard can not be eliminated through other precautions. The wide variety of potential hand injuries makes choosing the appropriate pair of gloves challenging. The following are some factors that might influence the selection of protective gloves:

- types of chemicals being handled
- the nature of contact (total immersion, splashing, etc)
- length of contact
- what area of the hands and arms require protection
- temperature protection
- size and comfort

It is important to know that, when using some machinery, it is better not to wear gloves. When using any machine where the glove could get caught or stuck, it is better not to wear them. As well, it is a good idea not to wear rings, watches, earrings and necklaces when operating certain types of machinery. Your company may have rules about what you are allowed to wear, in order to make sure you are safe.

Types of Gloves

There are various types of gloves that can be chosen with consideration of the factors previously mentioned. In the occupation of skilled trades labourer or helper the most common gloves you would encounter are:

- leather gloves that protect against sparks, moderate heat, blows, and rough objects
- aluminized gloves provide insulating protection against heat and cold
- fiber gloves also provide protection against heat and cold as well against cuts
- synthetic gloves of various materials can protect against heat and cold, cuts, and some chemicals
Hearing Protection

The need for hearing protection depends on a number of factors such as the loudness of noise (decibels), the length of the employee’s exposure to the noise, and whether the noise level changes between employee’s various work areas.

Some of the more common types of hearing protection include:

- single-use earplugs which are self-forming when properly inserted.
- pre-formed or molded earplugs are professionally fitted for the individual. They can be disposable or reusable (in which case they need to properly cleaned after each use).
- earmuffs which create a seal around the ear.
Personal Protective Equipment

Learning Activity #1

Match the word or expression on the left with the correct definition on the right. Use a dictionary if you need one.

- Hazard: possible
- Potential: causes death
- Precaution: danger
- Harmful: long-lasting
- Maintained: something you can do to reduce risk
- Restrict: a danger
- Fatal: kept in good condition
- Durable: to reduce; make more difficult

Learning Activity #2

1. __________________ is the first step in figuring out what possible physical and health and related hazards a workplace has.

2. A hazard assessment should begin with ____________________.
3. Name 3 things to be aware of while doing the assessment.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

4. Which kinds of workers regularly use eye protection?

__________________________________________________________________

__________________________________________________________________

5. Why is head protection so important?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

6. Safety shoes should have ________________________________.
Risk Management

The fact is that Skilled Trades Helpers work in dangerous situations. There is risk of injury every day because of the type of work you are doing. You cannot make your work environment 100% safe, but you can do a lot to minimize risk. It takes effort, but the gain far outweighs the cost when you have a worksite where no one gets hurt.

Risk management is something you can do...every day, all day. Always be on the lookout for situations that could be dangerous. This is an opportunity to put all of the safety information you’ve learned into practice. Prevention is the key.

Safety doesn’t just happen. It takes workers who are committed to making their sites as safe as possible.

situation L accident L consequences

Your job is to look at every situation. Think ‘what could go wrong?’ Ask yourself what accidents might happen and what the consequences of that accident would be, and then go back and change the situation to make it as safe as possible.

Tips
1. Anticipate or look out for what could go wrong.

Example: If I set my saw on the edge of this table, someone could walk by and knock it off. It could injure one or both of us.
Solution: Put your saw in a safer place.

Example: The extension cord stretches across the middle of the room, is twisted up, and clumped in the middle.
Solution: Tape the cord down, stretch it to the other side of the room by laying next to the wall, or at the very least, make sure it is laying flat with no twists, turns, or clumps. When someone is coming into the room, make them aware of the hazard by saying “Watch out for the cord. Don’t trip.”
2. Communicate with your co-workers and your supervisor. Ask questions if you are unsure.

3. Use common sense. If something looks dangerous, it probably is. Proceed with extreme caution, or change the situation until it is safer.

4. Listen to co-workers if they tell you that your work behaviour is unsafe.

5. Don’t take shortcuts! They can cost you a lot more in the long run. Example: Make sure the blades of the power saws you are using come to a full stop before you set them down, otherwise they could make the saw jump or cut the cord or any number of dangerous situations.

6. Safety equipment and practices are there to protect you. Equipment is designed because accidents have happened in the past. Equipment has to be used properly.

7. Learning and using proper safety procedures is as important, if not more so, than knowing your trade. Your career as a trades helper would quickly come to a stop if you loose your arm, hands, sight, or life!

8. Keep the safety of your co-workers in mind as well. It is your responsibility to make your environment safe.

Equipment, tools, and machines can all be replaced. Your eyes, arms, fingers, toes, hands, and life cannot be replaced.
Risk Management

Learning Activity

1. True or False?

   T   F   Skilled Trades Helper work is dangerous.
   T   F   The only way to be safe is to ask someone to do the work for you.
   T   F   Risk management is something that the boss does.
   T   F   You need to ask yourself ‘What could go wrong?’
   T   F   You should keep yourself safe and not worry about your co-workers.
   T   F   Ask questions if you are unsure.

2. In your own words, explain what risk management is and why it is so important.

__________________________________________________________________
__________________________________________________________________
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Housekeeping

from: Construction Safety Association of Ontario

Housekeeping on the job means:

- cleaning up scrap and debris
- putting it in containers
- making sure the containers are emptied regularly
- storing materials and equipment properly

We don’t do this to make the site look good. Housekeeping helps prevent accidents and injuries.

We all know how fast garbage accumulates on site: scrap lumber, broken bricks, pieces of drywall, garbage from coffee breaks and lunches. Construction rubbish is often irregular in shape, hard to handle, and full of sharp objects. One of the biggest problems is packaging. Too often it gets removed from material and left where it falls. This creates tripping and slipping hazards. It also makes other hazards difficult to see. Even worse, it invites more mess. When the site isn’t cleaned up, no one cares about leaving garbage where it drops. When that happens you can’t see faulty wiring, protruding nails, damaged flooring, or missing scaffold planks. Tools and material can get misplaced in a cluttered work area.

How can you concentrate on your work when you’re worried about slipping, falling, or tripping on debris underfoot?

Production and installation time go up while quality tails off.

Mess also makes it difficult to use materials handling equipment (e.g. forklifts). As a result, more material gets handled manually. This increases the risk of injury and damage.
Housekeeping starts with you and me. What can we do about it?

- Clean up as work proceeds.
- Keep equipment and the areas around equipment free of scrap and debris.
- Keep stairways, ramps, and other travel areas clear.
- Secure loose or light material stored on roofs and open floors to keep it from blowing away in the wind.
- Don’t let material fall from any level of the project. Use an enclosed chute or lower the material in containers.
- Keep material at least 1.8 metres or 6 feet away from floor and roof openings, floor and roof edges, excavations, and trenches.
- Store material so that it won’t roll or slide in the direction of the opening. Use blocking if necessary.
- Before handling used lumber, remove or bend over any protruding nails and chip away hardened concrete.
- Housekeeping is especially important when it comes to fire prevention. Flammable rubbish and debris should be immediately removed from the vicinity of welding, flame cutting, propane heating, or other ignition sources.

A clean site may not always be a safe site. But housekeeping is a good way to start improving health and safety on the job.
Housekeeping

Learning Activity

1. Housekeeping on the job, in the construction field, refers to ____________

__________________________________________________________________

__________________________________________________________________

2. "If people are worried about slipping, falling, or tripping on debris, production and installation time go up while quality goes down."

In your own words, what does this sentence mean? Use an example.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

3. If you were asked the top 5 tips of keeping a work area clean, what would they be?

1. ________________________________________________________________

2. ________________________________________________________________

3. __________________________________________________________________

4. __________________________________________________________________

5. __________________________________________________________________
4. Housekeeping on the job means cleaning up ____________ and ____________, putting it in containers, making sure the containers are ________________ regularly, and storing materials and ________________ properly. Housekeeping helps prevent ________________ and ________________.

Construction rubbish is often ________________ in shape, ________________ to handle, and full of ________________ objects.
Workplace Housekeeping - Checklist for Construction Sites

from: Canadian Centre for Occupational Health & Safety (CCOHS)
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What is an example of a workplace housekeeping checklist for construction sites?

DO

● Gather up and remove debris to keep the work site orderly.

● Plan for the proper disposal of scrap, waste, and extra materials.

● Keep the work area and all equipment tidy. Have areas for waste materials and provide containers.

● Keep stairways, passageways, and gangways free of material, supplies, and obstructions.

● Secure loose or light material that is stored on roofs or on open floors.

● Remove or bend over nails protruding from lumber.

DO NOT

● Do not permit rubbish to fall freely from any level of the project. Use chutes or other approved devices for materials.

● Do not throw tools or other materials.

● Do not raise or lower any tool or equipment by its own cable or supply hose.
Workplace Housekeeping - Checklist for Construction Sites

Learning Activity

1. Write **DO** or **DO NOT** before each sentence to make them true.

_________ gather up and remove debris to keep the work site orderly.

_________ permit rubbish to fall freely from any level of the project. Use chutes or other approved devices for materials.

_________ plan for the proper disposal of scrap, waste, and extra materials.

_________ keep the work area and all equipment tidy. Have areas for waste materials and provide containers.

_________ throw tools or other materials.

_________ keep stairways, passageways, and gangways free of material, supplies, and obstructions.

_________ remove or bend over nails protruding from lumber.

_________ secure loose or light material that is stored on roofs or on open floors.

_________ raise or lower any tool or equipment by its own cable or supply hose.
Contact Lenses at Work

What are contact lenses?

Contact lenses are small, thin discs made of a transparent (see through) material. Contact lenses can be a safe way to correct vision for most people. Many people wear contact lenses because they prefer them to eye glasses - contact lenses do not slip down your nose or fog up in the wintertime.

What is the problem with wearing contact lenses at work?

Contact lenses may complicate eye safety. Contact lenses may make it harder to keep your eyes safe. The arguments against wearing contact lenses in the work environment are based on the following:

• dusts or chemicals can be trapped behind the lens and cause irritation or damage to the eye
• gases and vapours can cause irritation and a lot of eye watering
• a chemical splash may cause more injury when contact lenses are worn. This increased risk is related to the removal of the lenses. If removing the lens takes some time, first aid treatment may not be as effective and, in turn, the eye's exposure time to the chemical may be increased.
However, the opposite may be true as well. Contact lenses may prevent some substances from reaching the eye. The injury may not be as bad or it might prevent the injury. Both situations have been documented. The critical point to remember is that contact lenses are not made to be used as protective devices.

Contact lenses are not a substitute for personal protective equipment (PPE).

If eye and face protection is needed for certain work then all workers, including contact lens wearers, should wear the proper protective devices.

Are there situations where it may be hazardous to wear contact lenses?

Conditions may be hazardous to both contact lens wearers and to people who do not wear them. Sometimes it is safer if you don’t wear your contact lenses. Each situation should be looked at carefully. These situations may include:

- exposure to chemical fumes and vapours
- chemical splash
- tiny matter or dust is in the air
- infrared rays
- intense heat
- dry atmosphere
- flying particles
- areas where caustic substances are handled, especially those used or stored under pressure (caustic substances are those that burn or corrode)
Contact Lenses at Work

Learning Activity

1. Describe in your own words, the problem with wearing contact lenses at work.

__________________________________________________________________

__________________________________________________________________

2. List the pros and cons to wearing contact lenses. Use point form.

<table>
<thead>
<tr>
<th>PRO (for)</th>
<th>CON (against)</th>
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</table>

3. Contact lenses are not to be used as protective devices. They are not a substitute for __________________________.

4. List situations where it may be hazardous to wear contact lenses.

__________________________________________________________________

__________________________________________________________________
Slips, Trips and Falls

Walking – sometimes we take it for granted and sometimes we forget to focus on where we are going. On the job site, we need to pay attention to where we are walking and what is happening around us. In the construction business, there are many safety hazards, three of which are: slipping, tripping and falling.

Slips - Lower Your Risk - Play it Safe

Slips happen when there isn’t enough friction or traction between your feet and surface of the floor.

You can lower your risk of slipping on indoor surfaces by using some of these tips.

- Use smaller steps to help keep your balance and walk with your toes pointed slightly outwards.
- Be sure to turn more slowly at corners when the surface is wet. It’s more dangerous than you think.
- Wear appropriate footwear. Shoes or boots with soles built for slippery surfaces are better.
- Know what personal protective equipment (PPE) is required to keep you safe on the job.
- If necessary, use ‘abrasive strips’ or other grips to prevent you from slipping.
- Make sure there are signs telling others about wet areas.
- Clean up spills when you see them!! If you are in doubt of your safety, ask your supervisor for help.
- Try to avoid small, loose rugs on hard surfaces. They can bunch up or move, causing you to trip or fall.
- Be careful of wet shoes on a dry floor. They can be just as slippery as dry shoes on a wet surface.
- Be careful of changing surfaces. Moving from carpet to vinyl to wood flooring can cause slips.
Outside weather conditions such as snow, ice, rain, and wind can cause you to slip as well.

**You can lower risk of slipping outside by using some of these tips.**

- Take the time to look around and be prepared for weather changes.
- Slow down. Take time to test your balance and the grip your shoes or boots have on the ground.
- Wear ‘slip-resistant’ shoes or ‘overshoes’.
- Wear sunglasses or goggles when it’s very sunny or bright, or when you’re in ice and snow. Cutting the glare will help you assess hazards.
- Be careful of changing surfaces. Moving from wet, snowy, or icy sidewalks to roads to grass can cause slips.
Trips

Walking into an object or being thrown off balance can cause you to trip.

- Clear all pathways and hallways of junk or anything that might inhibit your ability to walk or move safely.

**If you have to slow down to get by it, it needs to be moved!**

- All carpeted areas should be tacked down so that it can’t wrinkle or bunch up.
- Cables or wires that cross on walkways or stairs should be covered with tape to prevent tripping.
- Don’t forget! The doorway of an elevator isn’t always level with the floor. Sometimes there is a gap between the elevator and the floor. That’s a big trip hazard!
- Be careful of changing surfaces. Moving from carpet to vinyl to wood flooring can cause slips because of a difference in level.

Lighting can also be a hazard. Avoid working in a poorly lit room. Take extra care when walking in a dark room.

Always remember:

- If light is available, use it.
- Don’t forget to replace dead light bulbs as soon as you notice that they are blown.
- Fix any switches that are broken.
- Use a flashlight if you have to go into a dark room where there is no light.
Falls

Falling most commonly happens for one of two reasons:

- Ladders that are not used properly or safely.
- Other objects have been used as a ‘makeshift’ ladder.

When you are choosing the tool for the job, be sure to choose the right equipment! Make sure your ladder is locked into position and held stable. Make sure the steps or rungs are not damaged or broken.

Due to the height of extension ladders, they can cause a serious fall when not used correctly. To prevent a very dangerous fall, follow these tips:

- Follow the 1:4 rule. For every four feet you want to climb, position your ladder one foot out from the wall. For example, if you are climbing 12 feet up, your ladder should be 3 feet out from the wall.

- Make sure the ladder is tall enough for the job.

- If possible, have someone stay at the bottom of the ladder, keeping it secure.

- When working very high up or on a roof, the ladder should always be 3 feet higher than the building.

- Never use the top three rungs. The lower on the ladder you are, the safer you are. Climb only as high as necessary.

- Doors can be extremely dangerous to your health if you are perched on a ladder in front of one. Always be sure that any doors are securely locked so no one knocks you off the ladder, simply by opening the door.
Stairs

Stairs can be very useful, but if not maintained or used improperly, they can be hazardous. Here are some safety tips:

- Take one step at a time. There’s no rush.
- Don’t skip steps, run, or jump down them.
- Unless you are carrying something that requires both hands, use the handrail.
- Never use the stairs as a temporary closet. Keep clutter off the stairs.

A person working close to the ground might think they don’t have to pay as close attention as if they were working ten feet above the ground. The truth is, when you don’t pay attention, everyday clutter or mishaps sneak up on you. Be aware, pay attention, and be cautious.
Slips, Trips and Falls

Learning Activity #1

1. On the job site, we need to pay _______________ to where we are _______________ and what is happening around us.

2. _______ can happen when there isn’t enough ___________ or ___________ between your feet and the ___________ on the floor.

3. PPE stands for ____________________________.

4. Name four weather conditions that can affect your safety while working outdoors.

   _______________  _______________
   _______________  _______________

5. Try to avoid _______________, loose ________ on hard surfaces.

6. _______ shoes on a dry floor are just as ___________ as _______ shoes on a wet surface.

7. When working on a roof, the ___________ should always be _______ feet higher than the top of the building.

8. Always use the ______________ when walking up or down stairs.
Learning Activity #2

Use a dictionary to find the following words that you saw in this unit. Write out the definition of each word. If there is more than one definition, choose the definition of the word as it is used in this section. Choose 5 words and write a sentence using each one.

1. Abrasive
2. Appropriate
3. Balance
4. Clutter (noun)
5. Friction
6. Obstacle
7. Resistant
8. Rungs
9. Surroundings
10. Traction
Noise: Auditory Effects

from: Canadian Centre for Occupational Health & Safety (CCOHS)
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Noise-induced permanent hearing loss is the main concern related to noise exposure.

This can include:

- sudden hearing damage caused by a short burst of extremely loud noise such as a gun shot
- ringing or buzzing in the ear
- temporary hearing loss which happens after exposure to a high level of noise. Hearing comes back slowly when the affected person spends time in a quiet place. Complete recovery may take several hours.
- permanent hearing loss which happens over time, being exposed to noise month after month and year after year. You notice the hearing loss when it starts to interfere with daily living. At this stage, permanent and irreversible hearing damage has occurred. It cannot be cured and worsens if noise exposure continues.

Some people are more susceptible to hearing loss than others.

Protect your hearing...wear hearing protection!
Noise: Auditory Effects

Learning Activity

1. What is the main concern related to noise?

__________________________________________________________________
__________________________________________________________________

2. Sudden hearing loss can be caused by ______________________________
   __________________________________________________________________
   __________________________________________________________________

3. How might you cure your temporary hearing loss?
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
   __________________________________________________________________
Noise: Non-Auditory Effects

from: Canadian Centre for Occupational Health & Safety (CCOHS)
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What does non-auditory mean?

Non-auditory means things not associated with hearing. Auditory means concerned with hearing.

What are the non-auditory effects?

Hearing loss from long term exposure to noise has been recognized as a hazard for a long time. However, what the non-auditory effects of noise are is still not certain.

It is believed that the following may be affected by noise:

- heart and blood vessels
- changes to blood pressure
- hypertension
- changes in breathing
- annoyance
- sleep
- physical health
- mental health
- fatigue

Noise is a stressor. It can cause stress.
In the workplace, non-auditory affects of noise include:

- problems with oral communications
- absenteeism appears to be higher among workers in noisy places

Non-auditory effects can be divided into two categories: affects that happen within the body and performance effects.

The effects that happen within the body can be temporary or permanent.

**Temporary effects are:**

- muscles contract
- breathing changes
- changes in heart beat pattern

As for permanent effects, the researchers disagree on whether or not there are permanent effects.
Noise: Non-Auditory Effects

Learning Activity

1. Non-auditory means ____________________________________________

2. List several things that may be effected by noise.

__________________________________    ______________________________

__________________________________    ______________________________

__________________________________    ______________________________

__________________________________    ______________________________

__________________________________

3. True or False?

T F Sometimes workers are absent from work because of noise.

T F Noise does not affect the heart beat.

T F Noise is a stressor.

T F Muscles contract when loud noises are heard.
Lock Out and Tag Out

Lock Out

This is a system used to prevent hazardous energy from injuring or killing workers. A lock is placed on a switch, valve or circuit breaker. This closes off the energy supply. Without an energy supply, the device will not work.

Tag Out

Tag out is usually the second step to locking out. To tag out means that a written warning is placed on the lock, so that the disabled device or machine is clearly identified as out of order. The worker that tags out should always sign his or her name on the locked-out machine. The tag is a warning that it is dangerous to use the tool until the lock and tag are removed.

Why must we lock out and tag out?

Lock out and tag out procedures are extremely important because it means ensuring the safety of yourself and your co-workers. Make sure to always follow and be sure of lock out and tag out procedures. It could mean your job, your life, or the life of another!

DO NOT REMOVE A LOCK THAT DOES NOT BELONG TO YOU!

It is extremely important that you never remove another worker’s lock. It is dangerous, could be deadly and it is illegal! If someone leaves their lock on a tool or machine, do not try to remove it yourself. Inform your supervisor or manager immediately, and let them know that the lock was left on.
Lock Out and Tag Out

Learning Activity #1

Circle ‘True’ or ‘False’ for each of the following situations.

1. Lock out/Tag out procedures are in place to save lives.   TRUE   FALSE

2. When in doubt of the safety of a machine or device, ask your supervisor or manager for help.   TRUE   FALSE

3. When you are locking out a machine, any lock is ok.   TRUE   FALSE

4. You do not need to sign or initial the tag out slip that you attach to your lock.   TRUE   FALSE

5. Never lend your lock to another worker.   TRUE   FALSE

6. It’s illegal to remove someone else’s lock.   TRUE   FALSE
WHMIS Overview

Introduction

from: Construction Safety Association of Ontario

WHMIS in Construction User’s Guide (unless otherwise stated)

WHMIS (pronounced whim-iss) stands for the Workplace Hazardous Material Information System. WHMIS is a Canada-wide system designed to protect the health & safety of working Canadians by providing information about hazardous materials on the job. WHMIS addresses the worker’s “right to know”.

There are 3 main areas to WHMIS:
- labels
- material safety data sheets (MSDSs)
- worker education and training

WHMIS deals with the preservation of life and health against hazardous substances encountered at work. The industry, labour, and government representatives who worked together to create WHMIS were working to protect Canadians from injury or illness on the job.

WHMIS is the Law

For over four years, people from the federal (Canada), provincial (Ontario, British Columbia, Newfoundland, etc.), territorial (Yukon) governments and people from organized labour, got together and created WHMIS. The WHMIS legislations are laws in every province and territory in Canada. Federal and provincial legislation make WHMIS a Canada-wide program.
Hazardous Material

The Hazardous Products Act says that any product, material, or substance which falls into any of the six hazard classes described below is a controlled product.

<table>
<thead>
<tr>
<th>CLASS</th>
<th>SYMBOL</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLASS A: Compressed Gas</td>
<td><img src="image" alt="Symbol" /></td>
<td>oxygen</td>
</tr>
<tr>
<td>A substance that at room temperature (20°C) is in a gaseous state and kept under pressure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLASS B: Flammable and Combustible Material</td>
<td><img src="image" alt="Symbol" /></td>
<td>acetone</td>
</tr>
<tr>
<td>A solid, liquid, or gas that will ignite and continue to burn if exposed to a flame.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class C: Oxidizing Material</td>
<td><img src="image" alt="Symbol" /></td>
<td>chromic acid</td>
</tr>
<tr>
<td>A substance that will cause another substance to burn.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLASS D: Poisonous and Infectious Material</td>
<td><img src="image" alt="Symbol" /></td>
<td>ammonia</td>
</tr>
<tr>
<td>1) Materials causing immediate and serious toxic effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Materials causing other toxic effects (Cancer-causing materials are included here.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Biohazardous Infectious Material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class E: Corrosive Material</td>
<td><img src="image" alt="Symbol" /></td>
<td>hydrochloric acid</td>
</tr>
<tr>
<td>A substance that will erode steel or aluminum, or destroy animal tissue.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class F: Dangerously Reactive Material</td>
<td><img src="image" alt="Symbol" /></td>
<td>acetylene</td>
</tr>
<tr>
<td>A material which will react with water to produce a poisonous gas or which will undergo a reaction if the container is heated, pressurized, or agitated.</td>
<td></td>
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</tr>
</tbody>
</table>

KNOW THESE SYMBOLS...THEY COULD SAVE YOUR LIFE!
You can find hazardous substances in the workplace in the following forms:

**SOLID**
- dust
- fume
- smoke

**LIQUID**
- mist
- vapour

**GAS**

**SOLID: Dust, fumes, smoke**

**Dusts** are made by grinding, crushing, or handling. Fine particles of dust can remain suspended in the air.

**Fumes** are formed when a volatized solid such as metal, condenses in cool air. This occurs in welding operations.

**Smoke** is formed when a material containing carbon is burned.

**LIQUID: Mist, vapours**

**Mists** are suspended liquid droplets formed when gases move into a liquid state, or when a liquid is broken by splashing or foaming. Examples: paint mist from spraying.

**Vapours** are gaseous forms of substances which are normally a solid or liquid. You may find vapours in cleaning agents and paint thinners.
GAS

Gases are substances that do not exist as a solid or liquid at room temperature and pressure. Gases tend to spread out and occupy the entire space you are in. Examples: carbon monoxide, methane, and oxygen.

All of these different forms of substances can contaminate workplace air.

Chemicals can enter your body through:

- **your lungs** if you breathe fumes, mist, or dust
- **your skin** if liquid or dust touches, spills on you, or splashes
- **your mouth** if you eat after handling chemicals or if you accidentally swallow chemicals
- **your eyes** if chemicals splash on you or are in the air
Getting Information Out

Everyone has a right to know about hazardous materials in their workplace. WHMIS gives people the means to find out that information. It does this through a three-pronged approach:

- **warning labels** on containers of hazardous materials
- **material safety data sheets** (MSDSs) providing further, detailed information
- **worker training** on how to use the information contained on the labels and MSDSs.

All three of these requirements are of equal importance for the success of WHMIS. Labelling containers and providing material safety data sheets would accomplish little if workers were not trained about the significance of the information contained on the labels and MSDSs. Similarly, training would be of little use if containers and MSDSs were not available to provide detailed information about the products.
Labels

The label is the first and most basic form of WHMIS hazard warning to employers and workers. It is easily recognized, appears on the container of a controlled product, and provides basic information about the risks associated with the use of the material inside the container.

**WHMIS requires two kinds of labels:** supplier and workplace labels.

**Supplier Labels**

Suppliers are importers, manufacturers, or sellers of hazardous materials destined for use in Canadian workplaces.
Workplace Labels

Workplace Identifier

This is a substitute for the workplace label. It is used when a workplace label might not be practical. Look at the picture below. The two identifiers (tags) are used because there really is nowhere to put the labels. In this case, it makes more sense to use tags. That way there is no confusion as to which label goes with which pipe.
Labeling of Chemicals

If chemicals are placed in another container, this new container must have a label on it.

All containers must have labels. If two or more chemicals are mixed together, it could cause a serious reaction.

If there is not label:

Stop! - do not use the chemical.

Tell your supervisor.
Material Data Sheets (MSDS)

The MSDS is the second level of the WHMIS information-delivery system. While the label provides vital warning information to those on the spot, the MSDS contains additional details important for handling emergencies or clean-ups. Much of the information provided on the MSDS is of a technical nature. It is addressed primarily to engineers, occupational hygienists, fire fighters, emergency coordinators, and others.

Nevertheless it is useful for everyone in the workplace to understand how the information on the MSDS can be used to protect health and safety.

For each controlled product likely to be encountered on the job, Ontario employers must have an MSDS available at their site for workers.

Information Required on an MSDS

Product Identification and Use: Identification of the product by generic name, trade name, brand name, common name, chemical name, code name, or code number. You also need a description of product use.

Hazardous Ingredients: Names, concentrations, and other details of known hazardous ingredients, and of other ingredients which the employer or supplier suspects may be hazardous or whose dangers to the body are unknown.
Physical Data: Physical properties of the material, such as physical state (gas, solid, or liquid), odour, and appearance.

Fire or Explosion Hazard: Information such as flashpoint of the material, and upper and lower flammable limits.

Reactivity Data: Details of stability and reaction to conditions such as light, heat, moisture, and vibration.

Toxicological Properties: Adverse health effects from exposure.

Preventive Measures: Instructions for safe use, handling, and storage.

First Aid Measures: Instructions for initial treatment of anyone exposed or overexposed to the material.

Preparation Information: Name, address, and telephone number of the person, group, or department which prepared the MSDS and the date of preparation.
# Material Safety Data Sheet - SAMPLE ONLY

## SECTION 1 - PRODUCT IDENTIFICATION AND USE

<table>
<thead>
<tr>
<th>PRODUCT IDENTIFIER</th>
<th>PRODUCT IDENTIFICATION NUMBER (PIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
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</table>

| PRODUCT USE        |                                     |
|--------------------|                                     |
| *                  |                                     |

<table>
<thead>
<tr>
<th>MANUFACTURER’S NAME</th>
<th>SUPPLIER’S NAME</th>
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<table>
<thead>
<tr>
<th>STREET ADDRESS</th>
<th>STREET ADDRESS</th>
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<thead>
<tr>
<th>CITY</th>
<th>PROVINCE</th>
<th>STREET ADDRESS</th>
<th>CITY</th>
<th>PROVINCE</th>
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<table>
<thead>
<tr>
<th>POSTAL CODE</th>
<th>EMERGENCY TELEPHONE NO.</th>
<th>POSTAL CODE</th>
<th>EMERGENCY TELEPHONE NO.</th>
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</table>

## SECTION 2 - HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
<th>HAZARDOUS INGREDIENTS</th>
<th>%</th>
<th>CAS NUMBER</th>
<th>LD 50 OF INGREDIENT (SPECIFY SPECIES AND ROUTE)</th>
<th>LC 50 OF INGREDIENT (SPECIFY SPECIES)</th>
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<tr>
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</table>

## SECTION 3 - PHYSICAL DATA

<table>
<thead>
<tr>
<th>PHYSICAL STATE</th>
<th>ODOUR AND APPEARANCE</th>
<th>ODOUR THRESHOLD (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>VAPOUR PRESSURE (mm Hg)</th>
<th>VAPOUR DENSITY</th>
<th>EVAPORATION RATE</th>
<th>BOILING POINT</th>
<th>FREEZING POINT (°C)</th>
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<tbody>
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<td></td>
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<table>
<thead>
<tr>
<th>pH</th>
<th>SPECIFY GRAVITY</th>
<th>COEFF. WATER/OIL DIST.</th>
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</thead>
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</tbody>
</table>

## SECTION 4 - FIRE AND EXPLOSION DATA

<table>
<thead>
<tr>
<th>FLAMMABILITY</th>
<th>YES</th>
<th>NO</th>
<th>IF YES, UNDER WHAT CONDITIONS? *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>MEANS OF EXTINCTION</th>
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</table>

<table>
<thead>
<tr>
<th>FLASHPOINT (°C)</th>
<th>UPPER FLAMMABLE LIMIT (% BY VOLUME)</th>
<th>LOWER FLAMMABLE LIMIT (% BY VOLUME)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>AUTOIGNITION TEMPERATURE (°C)</th>
<th>HAZARDOUS COMBUSTION PRODUCTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPLOSION DATA</th>
<th>SENSITIVITY TO IMPACT</th>
<th>SENSITIVITY TO STATIC DISCHARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>

## SECTION 5 - REACTIVITY DATA

<table>
<thead>
<tr>
<th>CHEMICAL STABILITY</th>
<th>YES</th>
<th>NO</th>
<th>IF NO, UNDER WHICH CONDITIONS? *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>INCOMPATIBILITY WITH OTHER SUBSTANCES</th>
<th>YES</th>
<th>NO</th>
<th>IF SO, WHICH ONES? *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

| REACTIVITY, AND UNDER WHAT CONDITIONS | |
|---------------------------------------| |
|                                       | |

| HAZARDOUS DECOMPOSITION PRODUCTS | |
|----------------------------------| |
|                                  | |
### SECTION 6 - TOXICOLOGICAL PROPERTIES

**ROUTE OF ENTRY**
- SKIN CONTACT
- SKIN ABSORPTION
- EYE CONTACT
- INHALATION
- INGESTION

**EFFECTS OF CHRONIC EXPOSURE TO PRODUCT**

<table>
<thead>
<tr>
<th>Exposure Limits</th>
<th>Irritancy of Product</th>
<th>Sensitization to Product</th>
<th>Carcinogenicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teratogenicity</td>
<td>Reproductive Toxicity</td>
<td>Mutagenicity</td>
<td>Synergistic Products</td>
</tr>
</tbody>
</table>

### SECTION 7 - PREVENTATIVE MEASURES

**PERSONAL PROTECTIVE EQUIPMENT:**

<table>
<thead>
<tr>
<th>Gloves (Please Specify)</th>
<th>Respirator (Specify)</th>
<th>Eye (Specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footwear (Specify)</td>
<td>Clothing (Specify)</td>
<td>Other (Specify)</td>
</tr>
</tbody>
</table>

**ENGINEERING CONTROLS (Specify, E.g., Ventilation, Enclosed Process)**

**LEAK AND SPILL PROCEDURE**

**WASTE DISPOSAL**

**HANDLING PROCEDURES AND EQUIPMENT**

**STORAGE REQUIREMENTS**

**SPECIFY SHIPPING INFORMATION**

### SECTION 8 - FIRST AID MEASURES

**SPECIFIC MEASURES**

### SECTION 9 - PREPARATION DATE OF MSDS

<table>
<thead>
<tr>
<th>Prepared By (Group, Department, Etc.)</th>
<th>Phone Number</th>
<th>Date</th>
</tr>
</thead>
</table>
Worker Training and Education

The third part of the WHMIS information delivery system is the worker education program. Its purpose is to teach workers how to use the information on labels and MSDSs so that they can protect themselves. In fact, increasing workers’ knowledge of the hazards of the materials they work with is the main aim of WHMIS.

The information provided by labels and MSDSs will be of little use unless workers can understand it and apply it!

IMPORTANT! IMPORTANT! IMPORTANT! IMPORTANT!

Controlled Products

A worker who works with a “controlled product” is:
- any person who stores, handles, uses, or disposes of a controlled product or a person who supervises another worker performing these activities.

Workers need to:
- have access to hazard information
- be able to understand it
- follow required procedures and precautions.
- not be shy when it comes to asking a question or pointing something out

The employer has the general duty under the Occupational Health & Safety Act to provide workers with the information, instruction, and supervision necessary to protect their health and safety.
Worker Responsibilities Regarding Training

The worker:

1) must take and learn the information on controlled products which the employer must give you

2) must tell the employer when information about a controlled product is not good enough to keep the workers healthy and safe

3) should work with the employer through the health and safety representatives to make the training program as good as possible

4) should understand something completely and if not, should ask for it to be explained until it is understood

It was an ironic ending to Mr. Slasky's slide presentation on safety.
WHMIS in Construction

On typical construction projects there are several different employers, all of whom may be using or working with controlled substances. Those who need to know about the hazards are not only the crew using it, but other trades working in the vicinity.

Example: If an electrician goes into an area where tilesetters are applying a special adhesive and grout, the electrician should know what hazards these materials pose.

The general contractor can play an important role in coordinating the flow of information. Sub-contractors should provide a copy of their MSDSs to the general contractor.
The important thing to remember is that you can protect yourself by preventing or controlling your exposure.

“Good morning, and welcome to introduction to chemistry.”
Chemical Tips

- Some chemicals may be safe by themselves, but become dangerous when they come in contact with other chemicals.

- Store chemicals properly.

- Assume that all chemicals are hazardous.

- Wear your PPE! (Personal Protection Equipment)

- Know the location of emergency showers, eyewash stations, fire extinguishers, and exits.

- Wash your hands and face frequently during the day and be careful not to carry chemicals home on your clothing, hands, or hair.

- Avoid practical jokes or other behavior that might confuse, startle, or distract another worker.
WHMIS Overview

Learning Activity

1. WHMIS believes that workers have a __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __！

2. What are the 3 main areas of WHMIS?
   1. ________________________________________________________________
   2. ________________________________________________________________
   3. ________________________________________________________________

3. What is a controlled product?
   a) an item you can’t have
   b) a product, material, or substance that falls into one of the 6 hazard classes
   c) a product that is safe for anyone to handle, regardless of training

4. __Asbestos_____ is an example of a material that causes other toxic effects.
   ____________ is an example of a dangerously reactive material.
   ____________ is an example of a compressed gas.
   ____________ is an example of a material causing immediate and serious toxic effects.
5. The skull and cross bones symbol tells me that the material is poisonous or infectious, and causes immediate and serious effects.

The letter R symbol tells me that the material _____________________________

__________________________________________________________________

__________________________________________________________________

The flame symbol tells me that the material _____________________________

__________________________________________________________________

__________________________________________________________________

The flame and circle symbol tells me that the material _____________________

__________________________________________________________________

__________________________________________________________________

The symbol that looks like a cross between a T and an exclamation mark (!) tells me that the material _______________________________________________

__________________________________________________________________

The symbol that has a bottle or container on it tells me that the material _______

__________________________________________________________________
The symbol that has 3 semi-circles joined together tells me that the material

__________________________________________________________________

__________________________________________________________________

The symbol that shows a hand and a piece of steel with two bottles dripping on
them tells me that _______________________________________________

__________________________________________________________________

__________________________________________________________________

6. Why is it important to know these symbols?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

7. How is dust formed? ___________________________________________

__________________________________________________________________

__________________________________________________________________

8. Welding causes dangerous ________________.

9. Smoke is formed when a material containing carbon is ________________.

10. When you use spray paint, you are creating ________________.
11. You may find vapours in ____________________________________________

12. Three examples of gases are: ________________________________________

13. What are four ways that chemicals can enter your body?
   1. ________________________________________________________________
   2. ________________________________________________________________
   3. ________________________________________________________________
   4. ________________________________________________________________

14. What are the three ways that WHMIS works towards worker safety?
   1. ________________________________________________________________
   2. ________________________________________________________________
   3. ________________________________________________________________
15. The label is the first and most basic form of WHMIS hazard warning to employers and workers. It is ________________________________, appears on the container of ____________________________________________, and provides ____________________________ about the risks associated with the use of the material inside the container.

16. WHMIS requires two labels:
   1. ________________________________________________________________
   2. ________________________________________________________________

17. Suppliers are importers, manufacturers, or sellers of ______________________________
    ________________________________ destined for use in Canadian workplaces.
18. Underline all that apply. Supplier labels contain:

- first aid measures
- supplier name & address
- phone number of hospital
- risk phrases
- instructions for using product to clean floors
- the name of the company that you work for
- hazard symbols
- product name
- Spanish instructions
- precautionary measures
- reference to MSDS

19. Workplace labels contain:

1. ________________________________________________________________

2. ________________________________________________________________

3. ________________________________________________________________

20. What are workplace identifiers?

__________________________________________________________________
21. What should you do if you come across a chemical that is not labelled?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

22. Explain, in your own words, why it is important that a firefighter have the MSDS sheets for a building that is on fire.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

23. Give one example of the following, which are required on MSDSs.

Product Identification and Use: __________________________

Hazardous Ingredients: __________________________

Physical Data: __________________________

Fire or Explosion Hazard: __________________________

Reactivity Data: __________________________

Toxicological Properties: __________________________

Preventive Measures: __________________________
First Aid Measures:  _________________________________________________

Preparation Information:  _____________________________________________

24. Explain why WHMIS does more than just provide labels and MSDSs.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

25. What is the definition of someone who works with a controlled product?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

26. Workers need to:

1. ________________________________________________________________

2. ________________________________________________________________

3. ________________________________________________________________
27. What three things is a worker responsible for in regards to training?

1. ________________________________________________________________

2. ________________________________________________________________

3. ________________________________________________________________

28. On a construction site, how might workers run into hazards where chemicals are concerned?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

29. Who plays an important role in making sure everyone stays safe on a construction site?

__________________________________________________________________
30. Draw a line from the hazard and its definition.

highly toxic: similar to highly toxic, but takes longer exposure

target organ effects: damages a specific organ

carcinogen: can kill you quickly

toxic: may cause cancer

irritant: causes an allergic reaction

corrosive: harms your skin

sensitizer: destroys or changes your tissues

31. Pick one chemical tip. Why is it important? What might happen if this tip were ignored?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
In 1988, WHMIS (Workplace Hazardous Materials Information System) legislation came into effect across Canada. It is designed to protect the health and safety of workers through the provision of information about hazardous materials on the job.

Right to Know

WHMIS gives everyone the right to know about the hazards of materials they work with and provides the means to find out that information. It does this through labels, material safety data sheets (MSDSs), and worker training and education.

Hazardous Materials

Materials covered under WHMIS include six classes. Each class has its own symbol, which must appear on the supplier label so that the hazard is easily identified.

Class A Compressed gas (e.g., acetylene, nitrogen, oxygen).

Class B Flammable and combustible material (e.g., solvents).

Class C Oxidizing material (e.g., epoxy hardeners).

Class D Poisonous and infectious material.

Division 1: Immediate and serious toxic effects (e.g., ammonia, carbon monoxide gas, carbon tetrachloride, some pesticides).

Division 2: Other toxic effects (e.g., asbestos, silica).

Division 3: Biohazardous infectious material (not normally encountered in construction).

Class E Corrosive material (e.g., acids and alkalis).

Class F Dangerously reactive material (e.g., acetylene).
Labels

WHMIS labels help workers recognize that a product may be hazardous to their health. Hazardous products used in the workplace should have WHMIS supplier labels. These are readily identified by their cross-hatched border and must contain information on health hazards and safe handling, as well as other data. If material is transferred from the original container to another container, workplace labels must generally be used. These contain only three pertinent pieces of information, as shown above.

Material Safety Data Sheets (MSDSs)

MSDSs provide detailed information about the product, including the following.

- Product Information
- Hazardous Ingredients
- Physical Data
- Fire and Explosion Data
- Reactivity Data
- Toxicological Properties
- Preventive Measures
- First Aid Measures
- Preparation Information: name and phone number of party preparing the MSDS and date of preparation.

Worker Training and Education

WHMIS education should equip all workers to recognize hazardous products and use proper controls. Only then can everyone work safely with, or near, hazardous materials in the workplace.

To fulfill this requirement, the employer must

- develop and provide a program of worker instruction
- develop the program with the health and safety representative or committee
- ensure that the program educates workers to apply the information
- provide all hazardous information received from supplier and other sources
- review the program at least annually.

Instruction must Include

- information on content, purpose, and significance of labels and MSDSs
- procedures for safe storage, handling, use, and disposal of controlled products
- procedures to follow in emergencies.

What You Should Do

- Demand MSDS for all controlled products purchased.
- Ensure that controlled products have WHMIS labels and accompanying MSDSs.
- Make yourself and those reporting to you familiar with the hazards and recommended procedures for working with any hazardous materials that are used.
- Develop a worker training and education program as outlined above.

For more information, including the data sheet WHMIS in Construction (DS028) and WHMIS posters, contact CSAO.

Construction Safety Association of Ontario, 21 Voyager Court South, Etobicoke, Ontario M9W 5M7
(416) CSAO [2726] 1-800-781-CSAO [2726] Fax: (416) 674-8866
WHMIS - Information Bulletin

Learning Activity

Read the WHMIS Information Bulletin from the Construction Safety Association of Ontario. Answer the following questions. If you would like to read the bulletin on-line, go to: http://www.csao.org/t.tools/t15.downloads/index.cfm

1. What does WHMIS stand for?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. In what year did WHMIS legislation come into effect? ____________

3. WHMIS is designed to __________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

4. What are MSDS sheets? _________________________________________
__________________________________________________________________
__________________________________________________________________
5. Match the symbol to the name.

Class D - Poisonous and infectious material
Division 1 - Immediate and serious effects (ammonia)

Class E - Corrosive material (acid)

Class A - Compressed gas (oxygen)

Class D - Poisonous and infectious material
Division 3 - Biohazardous material (not normally found in construction)

Class B - Flammable and combustible material (solvents)

Class C - Oxidizing material (epoxy hardeners)

Class D - Poisonous and infectious material
Division 2 - Other toxic effects (asbestos)

Class F - Dangerously reactive material (acetylene)
Ergonomics

Repetitive Motion

“Everyday” jobs using your shoulder, neck, back, arms, wrists, and hands can cause pain and strain. Whether you are at home or at work, what you are doing needs to be done safely.

Repetition:
Performing the same action many times.

When joints are used too much in the same way for long periods of time, muscle and joint strain and pain occur. There are ways to prevent muscle and joint strain if you pay attention to your body. You can stop the pain before it starts if you are careful and act safely.
How to remain injury free

To remain safe and injury free, you will need to practice some of the following tips.

- Perform stretching exercises regularly
- Practice good posture
- Use smooth movements as often as you can
- Lift objects using your knees, which will relieve the pressure from your back and joints

When you are working, be sure to pay close attention to any ‘bad’ habits you may have. Check any that apply to you.

_____ Slouching your shoulders
_____ Lifting to the side
_____ Lifting above your shoulders
_____ Lifting behind your back
_____ Bending at the hip instead of the knee

Many back pain sufferers have hurt themselves by improperly lifting something too heavy for them.
Tips for Keeping Healthy

- Use a cart, pulley, portable floor crane, lift tables, a conveyor or a combination of these things to keep safe and eliminate heavy manual lifting.

- When standing for long periods of time, take breaks. Be sure to take a few minutes to stretch, relax and breathe. Sore feet, stiffness, varicose veins, lower back pain and muscular fatigue can all be a result of standing for long periods of time without stretching.

- Buy quality footwear. Pay attention to arch support, padding, cushioned soles, the heels, and flatness of the shoe and if it is Canadian Safety Association approved.

- Avoid reaching beyond the point of comfort.

- Shift your feet to face the object instead of reaching behind your shoulders to get it.
Pushing and Pulling

You may do a lot of pushing and pulling, such as:

- Using manual carts and trucks or wheel barrows
- Sliding objects like heavy boxes across the floor
- Operating tools or machines or their controls

The most common use you will likely see as a skilled-trades labourer will be using the wheelbarrow.
**Ergonomics**

**Learning Activity #1**

Match the word or expression on the left with the correct definition on the right. Use a dictionary if you need one.

<table>
<thead>
<tr>
<th>Posture</th>
<th>Tiredness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slouching</td>
<td>A belt along which objects move</td>
</tr>
<tr>
<td>Conveyor</td>
<td>Dark blue veins that stick out, caused by poor circulation</td>
</tr>
<tr>
<td>Varicose veins</td>
<td>Places where your body bends (knees, elbows etc.)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Not standing up straight</td>
</tr>
<tr>
<td>Joint(s)</td>
<td>The way you stand (straight, hunched over etc.)</td>
</tr>
</tbody>
</table>

**Learning Activity #2**

1. What happens when joints are used too much in the same way?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
2. Give one example of how you can help to prevent these kinds of problems?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

3. What should you look for when you buy work footwear?

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
Employee Rights

In Ontario, there are three important laws that have to do with workplace safety. They are:

- The Occupational Health and Safety Act
- The Workplace Safety and Insurance Act
- The Employment Standards Act

**Occupational Health and Safety Act**

The OHSA exists to prevent accidents and deaths in the workplace. It is more important than all other laws about the workplace. It must be followed, no matter what.

In the Act, we can see the health and safety responsibilities of workers, employers and supervisors.

The Occupational Health and Safety Act states that health and safety is everyone’s responsibility. Employers and owners are responsible for making sure that the workplace follows the OHSA and its regulations. They must make sure that supervisors know their responsibilities.

The employers must make sure that the workers are able to do their jobs properly. They must let the workers know about all dangers in the workplace. Also, the employer has to provide protective equipment if necessary.

There must be a written health and safety policy and it must be kept in a place where workers can read it.

Supervisors must make sure that employees are following safety regulations and wearing safety equipment.
Workers have three main rights under the Act

1. **Right to Know:** The employer must give you information about your job and any possible dangers. If you are not sure of something, it is your responsibility to ask: How do I do this job safely?

2. **Right to Participate:** If the workplace has more than 5 employees, it has to have either a health and safety representative or a health and safety committee. Anyone can be a member of the committee. You have a right to participate in training sessions and safety talks.

3. **Right to Refuse Unsafe Work:** You are allowed to say no to any work you believe is unsafe. You must inform your supervisor and he/she must deal with it. If your supervisor does not correct the situation, you may refuse to do the work. You cannot be punished for refusing unsafe work. If you refuse unsafe work, there is a procedure that must be followed by the employer (see section on refusing work). In any case, your health and safety are more important than any job.

Joint Health and Safety Committees (JHSC)

- If 20 or more workers regularly work in a workplace, there must be a Joint Health and Safety Committee.

- At least 50% of the members must be workers.

- Employee members are appointed or chosen by their co-workers.

- One management member and one employee member must have special training in health and safety. These are the “certified members”.

- If the workplace has 6-19 workers, there has to be one Health and Safety Representative.
Minimum Ages for Working

Construction: You are not allowed to be on a construction site if you are under 16.

Factories: You are not allowed to work in a factory, warehouse or kitchen under 15 years of age.

Reporting Critical Injuries and Death in the Workplace

If someone breaks a bone (an arm or a leg, for example), loses blood or becomes unconscious, these injuries must be reported to the Ministry of Labour. If a worker is killed in the workplace, the Ministry of Labour must be contacted right away. The site must be left as it is until the Ministry is contacted and gives the go-ahead to proceed.

Regulations under the OHSA

The employer must know which regulations apply to their industry. It is up to the employer and the employees to know what regulations apply to them.

Fines and Penalties

A person can be fined up to $25,000 and/or be jailed for up to 12 months for every charge laid under the Act.

Construction workers and some other industries can be ticketed if they are not wearing the regulation safety equipment. The worker might have to appear in court.
Workplace Safety and Insurance Act

This law is designed to help sick and injured workers return to work safely and quickly. It also gives compensation to workers who are off work because of an illness or injury they get at work.

If a person is injured at work, the employer and worker must provide certain information to Workplace Safety and Insurance Board (WSIB). If you are hurt, you must report this injury to the employer right away.

You can claim WSIB benefits as soon as possible if you lose time from work, earn less than usual, or get medical treatment.

To get compensation, there are 3 forms you need to fill out. You can get these from the WSIB. In Ontario, you can contact them, toll-free, at 1-800-387-0750.

Employment Standards Act

This law contains information about minimum wage, number of hours you are allowed to work, overtime pay, vacation pay and termination pay.

Minimum Wage: This is different in each province. Check with the Ministry of Labour.

Number of Hours: Most employees in Ontario can refuse to work more than 48 hours in a week. You can work 8 hours a day or the number of hours in a regular workday established by the employer. You must get 11 straight hours off in a 24-hour period.

Overtime Pay: This starts for most workers after working 44 hours in 7 days. You should get time-and-a-half for any hours worked above 44.

Vacation Pay: For every dollar you earn, your employer must pay you an extra 4%. For most employees who have worked more than a year at the same place, the employer must give you at least 2 weeks vacation with pay.
Rights if you lose your job: If a person is fired or permanently laid off and has worked more than 3 months, the employer has to give the worker a Notice Of Termination. If the worker doesn’t get this notice, he or she can get termination pay instead of notice.

- From 3-12 months: 1 week notice
- From 12-36 months: 2 weeks’ notice
- More than 3 years: 3 weeks’ notice plus one week for each additional year of service up to a maximum of 8 weeks.

The same formula applies to termination pay.
Human rights

One other law that is important in the workplace in Ontario is the Ontario Human Rights Code. Other provinces have similar legislation.

The Ontario Human Rights code protects workers in Ontario from discrimination and harassment by their employers or co-workers. It also reminds all workers to treat each other with respect.

Discrimination

Discrimination is what happens when you are treated differently from other people. It is against the law to discriminate against people because of:

- Where they were born (place of origin)
- Where their ancestors were born (ancestry)
- Ethnic group (ethnicity)
- Religion
- Sex (male or female)
- Sexual orientation (heterosexual or homosexual)
- Age
- Marital status (married, single, divorced or separated)
- Children (whether someone has children or not)
- Receiving social assistance or family benefits.

There are situations in which the employer is allowed to choose on the basis of citizenship, age or handicap. For example, certain government jobs require that any person hired be a Canadian citizen. As well, if a person is disabled and unable to perform the job tasks required by the employer, then it is not discrimination if he or she is not hired.
Harassment

Harassment is a situation in which someone threatens, bothers or insults you. Discrimination and harassment can occur in:

- Job ads
- Job applications
- Job interviews
- The way your employer or co-workers treat you

Discrimination or Harassment in the workplace

Racial harassment or discrimination includes racial jokes and comments.

Sexual harassment or discrimination includes unwanted touching, comments, sexual jokes and suggestions.

- If you feel that someone is discriminating against you or harassing you, get help.
- If a co-worker harasses you, report it to your employer.
- If an employer harasses you, tell them that the behaviour is not welcome.
- If the harassment continues, talk to your lawyer or community legal clinic.

In Ontario, you can find out about your rights and the “Human Rights Complaint Form” from the Ontario Human Rights Commission. They can be contacted at the following phone numbers and e-mail address:

Local: (416) 326-9511
Toll Free (outside Toronto Area): 1-800-387-9080
TTY (Local) (416) 314-6526
TTY (Toll Free) 1-800-308-5561

info@ohrc.on.ca
Employee Rights

Learning Activity #1

Discuss the following situation with your group or instructor about the right to refuse unsafe work.

Graphics from: http://www.wyrebc.gov.uk/images/HSCrtn01.gif

Situation:  Alex is covering for the regular supervisor, Julie. Alex tells Paul to restock the shelves with heavy items. He wants all the stock up on the shelves, including each of the new fifty-pound items. Paul tells Alex that he and Julie discussed the danger of stacking items too high, especially heavy items. Paul also tells Alex that he now only has a footstool because another department is borrowing his ladder. Without the ladder, he would have to climb on the shelves to reach the top. Alex dismisses this and tells Paul to get the merchandise off the floor because the customers will be coming in soon. The problem will be examined later. Paul refuses to do the work under the OHSA.

Alex goes to the Health and Safety committee member to discuss the situation and they decide that the shelves cannot be stacked with any more items. They tell Paul their decision. Alex promises the committee member that he will write a memo to management asking for more shelving.
Things to keep in mind for the discussion:

1. What is not safe about this situation? What is the hazard that exists or could exist?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. What can be done to prevent the hazard from happening?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

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Learning Activity #2

1. Have you ever had a job where your employee rights were violated? What did you do about it? If you didn’t do anything at the time, what could you do now if a similar situation happened again?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. Have you ever been injured on the job or become sick as a result of your job? Describe your experience.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
Learning Activity #3

1. Which one of the following is **not** an important workplace safety law in Ontario?
   a) Occupational Health and Safety Act
   b) British North America Act
   c) Employment Standards Act
   d) Workplace Safety and Insurance Act

2. Under the Occupational Health and Safety Act, you have the (circle all answers that apply):
   a) right to strike
   b) right to know
   c) right to refuse unsafe work

3. On a Joint Health and Safety committee, a minimum of _______ percent of the members must be workers:
   a) 25%
   b) 75%
   c) 50%
   d) 40%

4. Who must be contacted if someone dies on the job site?
5. The Employment Standards Act tells us about (circle all answers that apply):
   a) minimum wage
   b) overtime pay
   c) right to be promoted
   d) rights if you lose your job

6. If you are younger than ______ years old, you are not allowed to work on a construction site.
   a) 18
   b) 20
   c) 16
   d) 19

7. What is the purpose of the Workplace Safety and Insurance Act?
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
Learning Activity #4

Match each situation below with the type of discrimination or harassment that it is:

1) ___ Andy answered an advertisement for a “Girl Friday.” The duties of the job involved typing, filing and sorting. When he asked for an interview, he was told that the job was for “girls” only.

   a) place of origin  
   b) religion  
   c) ethnicity  
   d) race  
   e) sex  
   f) disability  
   g) age

2) ___ Nathan works in a machine shop. He is black. Most of his co-workers are white. Last week his co-workers were telling racist jokes. Nathan asked them to stop, but they just laughed and went on with the jokes.

3) ___ Ameena applied for a job as a receptionist. Ameena is East Indian. She speaks English very well, but she has an accent. At the job interview the employer told her that she was not right for the job. He said that the company needed someone who spoke English with no accent.

4) ___ Andrea stutters when she speaks. One of her co-workers makes fun of her when she stutters. He knows that this makes it harder for her to speak, but he does it anyway.

5) ___ Ute has been looking for a job for almost two years. She can’t understand why it is so difficult. Her friends say that it will be impossible for her to get a job because she is 52 years old.

6) ___ Olivia has worked in a small factory for three years. She has never had a raise. Olivia is from the Philippines. When Olivia asked her boss for a raise, he said: “You Filipinos are all the same. You take jobs away from Canadians, and then you want a raise too”.

7) ___ Ahmed is a Muslim. He has a special prayer time every Friday. Every Friday one of his co-workers teases him: “There goes Ahmed to the mosque again!”

Adapted from: Discrimination and Harassment at Work, CLEO. August, 1993