TEACHER'S FACILITATION GUIDE

The Teacher's Facilitation Guide (TFG) includes over 40 activities that can be used to engage students, Grades 7–12 and Career and Technology Studies (CTS), with occupational health and safety (OHS) activities.

Each activity is tied to a specific course and learning outcome(s) from Alberta Education's Programs of Study; however, many activities can be adapted for use with other courses and topics. These include:

- scavenger hunt (Identify Regulations of the *OHS Act*, p. 25)
- mix and match card game (Workers' Rights and Responsibilities, p. 27)
- game show Q & A (Jeopardy-like Game for Five Types of Hazards, p. 40); (Psychosocial Jeopardy, p. 120)
- mix and match cards (Mix and Match Cards for OHS Regulations, p. 44)
- top 10 list (Power Lines Top 10 List, p. 74)
- Pictionary-type game (Win, Lose or Draw Electrical Safety, p. 78)
- mix and match handout (Flammable and Combustible Materials Mix and Match, p. 84)
- information brochure (Drug Brochure – Short and Long Term Effects, p. 102)
- memory match (Pathogen Memory Card Match, p. 113)
- charades (Body Mechanics and Injury Prevention Pantomime, p. 124)

Throughout the OHS content, an icon referring to a TFG activity has been placed wherever an activity matches the content. Likewise, the TFG activities have references to the applicable OHS content.

Notes about the Learning Outcomes

"accident" vs. "incident"

The learning outcomes have been taken directly from Alberta Education's Programs of Study with two exceptions. First, throughout this document, the word "accident" has been replaced with "incident." It can be said that the word "accident" implies that an event is related to fate or chance. It is usually found that such "accidents" were predictable and could have been prevented – making the event not one of fate or chance and why the term "incident" is used.

"four types of hazards" vs. "five types of hazards"

The second deviation from the Programs of Study text deals with the number and types of hazards. The Programs of Study refer to "four types of hazards": physical, biological, chemical and ergonomic. Throughout this document, a fifth hazard, psychosocial, has been added to conform to up-to-date occupational health and safety information.

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Leader of the Pack

Health and Safety Management Systems
Pages 2–7, A-Intro.ppt Slide 1

Grade 7 Health and Life Skills
POS Learning Outcome: Safety and Responsibility W–7.9
Identify basic workplace safety procedures.

Student Activity: Students write a short story to describe a journey or original adventure using analogies for the eight "Elements of a Health and Safety Management System." Students describe the events, the people and places, how they conquered the difficult experience, and what the people thought about at the conclusion of the experience. Students with lower grade level writing abilities can present the story in the form of a comic strip.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- video clip of a popular movie (*Harry Potter, Lord of the Rings, Twilight,* etc.) showing a tense moment or decision to be made involving a **hazard** situation
- student copies of the eight "Elements of a Health and Safety Management System"
- student notebook

Lesson Outline:

Students write an adventure script based on criteria that will include six of the following eight Health and Safety management systems:

- management, leadership and organizational commitment
- hazard identification and assessment
- hazard control
- worker competency and training
- work site inspection
- incident investigation
- emergency response
- management system administration

Health and Life Skills

After reviewing the eight key points, the student writer decides on the type of journey they will take. Generate interest by sharing examples of favourite movie plots where the hero must take a journey that tests their character and abilities. Students should check off the example on the list as they incorporate them in the storyline. The hazards in the story do not necessarily need to be examples of the five types of hazards as identified in the OHS guidebook.

Guidelines for building the story:

- A minimum of three characters travel on the journey together. The hero has at least two other characters who assist the hero in decision making (worker competency and training).
- The hero makes the leadership decisions, satisfying the example for management and leadership.
- The hero must identify, assess and attempt to control the hazard.
- Characters must come across at least **two hazards** of any description (mythical creatures such as dragons, *Transformers*, Voldemort from *Harry Potter*, etc.).
- Following successful dealings with hazard #1, our hero must confirm that the group is able to safely move on in the journey (work site inspection).
- The characters in the story will meet to adapt a plan prior to confronting the next hazard (emergency response) until they successfully navigate all hazards to safety.
- The adventure ends with each character summarizing their experiences (as part of the incident investigation).

Health and Life Skills

So You Want to be a Lion Tamer!

Health and Safety Management Systems
Pages 17–18, B-8Elements.ppt Slide 13

Grade 7 Health and Life Skills
POS Learning Outcome: Safety and Responsibility W–7.9
Identify basic workplace safety procedures.

Student Activity: Students will write a fictitious job description that includes four to six of the points required for basic workplace safety procedures, Element 4 Orientation, and five to eight points for Element 4 Training according to OHS Regulations, Section 15. Students can choose any job they want to imagine.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- copy of a present day job description for skilled labourer from newspaper or craigslist, etc.
- copy of a fictitious job description "Lion Tamer" (see below) to read out as an example that meets the criteria for the specific parts of Element 4: Worker Orientation, Training and Competence
- student copy of the Element 4 requirements for orientation, training and competence

Lesson Outline:

Students need a pre-lesson on Orientation, Training and Competence points for the *Occupational Health and Safety Act*, Section 15, covered on page 18 in Health and Safety Management Systems. Refer to the Section 13 points before reading the fictitious job description "Lion Tamer" orally to the class.

Point out that many job descriptions are too vague using generic descriptions for the type of duties that are required, or are written using language that appears to inflate the job position beyond recognition. For example, a "maintenance engineer" is another name for a handyman.

Students should generate a variety of ideas for interesting jobs prior to the activity. Students need time to write the job description using Section 15 as a guide. After writing the job description, have students underline each example that applies to orientation and training examples using different colours for each. This is a self check to ensure that they have covered the criteria for the minimum points per category.

Example of fictitious job description—Lion Tamer

Wanted: Two enthusiastic animal lovers who are able to work flexible hours and/or shift work as required.

- Workers must keep workspace secure from the public at all times. Employer will provide weekly food supply of fresh farm animal meat as well as protective clothing for worker.
- Workers are required to rotate fresh stock, stack and store items up to 50 kg in commercial fridge. Workers must also be able to toss up to 15 kg of meat a horizontal distance of 15 meters, (or less if you are able to run really fast).
- Hook, pole, remote control for electric door, and biological fluid spill kit are provided. Training and/or demonstrated competency for spill kit use is required prior to employment. Large spear, and other optional equipment must be supplied by worker. Personal protective equipment does not guarantee prevention of loss of life. Firearms are not permitted inside the job site.
- Weekly worker performance evaluations will be conducted and salary will reflect competency in duties. Electric door must be oiled daily (while lions are sleeping) and cannot be operated if worker is trapped, dragged, or otherwise lodged under the door due to automatic electronic safety sensors. The electronic door must be cleaned weekly (see biological fluid spill kit training).
- Worker must report any slips, falls, and loss of limb to the Zoo security supervisor. All secure work areas have a full supply of whole blood, an air pressure cuff and compression bandages. In case of multiple worker injuries and/or near death experience, use personal panic button for emergency medical attention. For other emergencies, refer to "Lock Down" procedures, section 5 after Nuclear Holocaust procedures.

Health and Life Skills

Harassment Scenario Solution Skit

Psychosocial Hazards

Pages 16–22, C-Types.ppt Slides 5–8

Grade 7 Health and Life Skills

POS Learning Outcome: Safety and Responsibility W–7.7
Analyze the definition, effects and possible consequences of various forms of harassment.

Student Activity: Students perform two skits in small groups. The first skit is a typical harassment scenario. The second skit is a similar scenario where the performers *pause* and insert an appropriate counter harassment suggestion.

Time Required: 30–45 minutes

Resources/Equipment Needed:

- two to four prewritten scenarios for short skits involving two to four performers (one copy per student performer)
- follow up questions for scenarios
- examples of positive ways to deal with and avoid harassment

Lesson Outline:

Students have previously identified various examples of bullying and harassment in the workplace. Students are grouped into four to six people per group. Two or three of the members perform the first skit as for a prewritten scenario. The skit involves a situation where the "worker" student is put in a position where they are harassed. When the scene is complete, the non-performers are asked questions following the skit to help the students identify the possible source of the harassment and methods to deal with harassment.

Example Scenario 1: Performers can use their own lines to act out the scene.

Worker A is cleaning a public restroom in a far corner of a large big box store. Two people enter as worker A informs them that the washroom is closed for cleaning. The two people begin to advance and make comments criticizing the worker's clothes, duties, etc. The worker tells them to leave. The two intruders now advance on the worker and show no indication of leaving. They may even knock off a hat or touch the worker's clothes (but do not physically contact or threaten violence). They can ask the worker to turn over an item of value to them in order for them to leave. The scene ends as the worker and the two intruders are face to face.

Scenario 1 Questions:

1. Why didn't the two people leave the washroom when asked?
2. How do the two people feel as they are harassing the worker?
3. How would this scenario be different if there were two workers and one intruder?
4. How do you think these people interact with their parents?
5. What is the worker feeling in this situation?

After working through the Scenario 1 questions, the students are given help to identify reasons why people like the intruders would behave in an aggressive/ harassing manner.

The students are also given examples of responses that can be used to take preventative steps to avoid and/or defuse the situation. The students in the group switch places between performer and non-performer for the second skit. In this second skit, the scenario is similar (or use the same script) except after each line of dialogue or action where harassment occurs the student(s) being harassed are asked to "insert" an appropriate action or response. The scene is "paused" until the student offers a line or action in an attempt to change the balance of power in the situation.

Example Scenario 1 with Responses

Repeat the same scenario as before, except this time, after each line of dialogue or action where the worker is harassed, pause the action. The worker now inserts an appropriate action or response to try to change the balance of power in the situation.

Examples of Harassment Scenario Solutions:

- Politely respond "No thank-you" or "I would prefer that you do not…" over and over. The polite, non-confrontational, broken record will wear them down.
- Ignore negative comments and pay a compliment to the aggressor on a different topic.
- Sympathize with the aggressor if you know something about them personally. They have a lot on their shoulders/not enough freedom/etc.
- Calmly state the rules and consequences of harassing behaviour and ask if that is what the aggressor intended to portray.
- Offer to share food/comfort item/activity with the aggressor to show they have not been excluded from your circle of contacts.
- Make light of the comment by agreeing and suggest a more silly self-deprecating comment. Go for the laugh.
- Ask yourself what the aggressor is getting out of the situation. What do they need and how else could they get it. Do they want respect, leadership, attention, belonging, etc.
- Follow up on the harassing incident by contacting superiors as soon as possible.
- Talk to people you trust about the situation after the fact to give release to the emotional feelings.
- Publicize examples to inform "workers" as to the types of unacceptable behaviour that should be followed up with a supervisor. "Have you ever experienced…? Did you know that this is harassment? What you can do about it is…."

Safety Alert Device

Science

Physical Hazards

Pages 2–59, C-SlipsTripsFalls.ppt Slides 10–11 and 13–18
D-Electricity.ppt Slide 9, E-MachineGuard.ppt Slides 11–15,
F-LockingOut.ppt Slides 4–8

Grade 7 Science Unit D: Structures and Forces
Grade 8 Science Unit D: Mechanical Systems

POS Learning Outcome: Evaluate designs and prototypes in terms of function, reliability, safety, efficiency and impact on the environment.

Student Activity: Students use a practical or original example of a device that uses a simple machine to design a safety alert and or injury prevention device.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- Examples of mechanical devices that use a simple machine as part of the component: window blinds, hand and power tools, automatic garage doors, loading ramps on ferries, block and tackle, and automotive hoist.
- News articles relating to injuries that occur when mechanical devices fail or are used incorrectly: car jacks, block and tackle, curtain blind pulley, garage doors and Ferris wheels.
- Examples of safety devices that are designed to prevent injuries during the operation of a mechanical device: air bags in cars, guard rail on table saw, sensors on mechanical doors, auto pilot devices for airplanes and red light cameras.

Reference Material:

- Statistics for United States amusement park accidents: www.rideaccidents.com/2011.html
- How motion sensors work: www.home.howstuffworks.com/home-improvement/household-safety/security/burglar-alarm2.htm

Science

Lesson Outline:

Prior to this activity, students need to be made aware of examples of useful everyday mechanical devices and problems and or injuries that occur when these devices fail. Students should be able to generate or recognize examples of safety devices present today in different mechanical devices.

- Students will complete a diagram of an existing or original mechanical device that is used to assist a worker complete a typical work-related task.
- Included as part of the diagram are labels for significant parts that include at least one simple machine and one safety alert device.
- A short description of how the safety alert device detects and controls the operation of the mechanical device is also included.

Extension: Students research a mechanical device that has a history of mechanical failure and suggest one practical method to improve the safety of the device.

Identify Regulations of the *OHS Act*

Legislation

Pages 2–20, Supplemental Information Page 49,
A-OHS.ppt Slides 2–5, C-EmployStandards.ppt Slide 1,
SA-ReadingLeg.ppt Slide 5 and Handouts 21–27

Grade 8 Health and Life Skills

POS Learning Outcome: Safety and Responsibility W–8.9
Identify regulations of the *OHS Act*.

Student Activity: Scavenger Hunt – Given an overview of the different regulations in the *OHS Act*, and a resource copy of the *Act*, students will complete a scavenger hunt to find the answer to 15–20 questions in the regulations.

Time Required: 30–45 minutes

Resources/Equipment Needed:

- copies of Regulations of the *OHS Act* for each student team or group (may be online)
- "parchment style" paper
- ink stamp

Lesson Outline:

- Introduce the topic using basic key points for the Regulations of the *OHS Act*. Ensure that students have previously understood how to navigate the resource material they will be using. Use either the entire *OHS Act* or notes shared with students on the *OHS Act*.
- Describe the task and how to proceed, either individually, or with a partner/team. When the first student team is done, they should receive an ink stamp as reinforcement/proof they successfully completed the task.
- The questions should be presented on a "parchment style" document, using fancy script font to simulate an ancient document.
- A key word is missing in the answer that the students search for while researching the legislation. Clues can be given to students as small footnotes or posted in locations around the classroom as if this was a treasure hunt. A key letter in the missing word is underlined.

Health and Life Skills

- When the student or team of students fills in the key word on each progressive question, they will be building a "secret word" using the underlined letters. ("Hazards" for example.) The key word may then be a lead to the next lesson topic. It is useful to have several variations on the secret word to allow students in slower groups to finish the activity successfully.
- Students will obviously be vocal about solving the secret word puzzle. Other students can continue the task if more than one secret word is used. The class could be asked to check for understanding as a group when a sufficient amount of time has been given for at least half of the students to complete the task.

Workers' Rights and Responsibilities

Legislation
Pages 7–10, Supplemental Information Page 46, Handout 9

Grade 8 Health and Life Skills
POS Learning Outcome: Safety and Responsibility W–8.9
Describe rights and responsibilities of employers and employees in relation to workplace safety.

Student Activity: Mix and Match Card Game

Time Required: 20–40 minutes

Resources/Equipment Needed:

- 30+ blank cards
- large sheet of paper

Lesson Outline:

The students will use flash cards to match examples of different rights and responsibilities to one of three categories: Rights, Responsibility, or Neither.

30+ cards with short phrases on one side are pre-typed and cut into individual cards. Each phrase represents an obvious example of one of the three categories. Students can also be given a printed sheet to cut and organize the cards ahead of the activity. Three large print categories: Right, Responsibility and Neither, should be printed with space on the same sheet to place cards with enough space around to place playing cards without blocking the category name. Students should be paired or grouped (maximum four students per group) to play the card game. Each card has a number from one to thirty in small type on the card. A separate answer paper will be given out at the end of the game to check for accuracy. The answer paper has the card number and the correct category listed. Insert some silly examples for the neither category.

Groups of students are given the cards blank side up. When the first card is flipped over, the students decide as a group if the card is "Rights" or "Responsibility" or "Neither" and then place the card on the category. If they cannot agree, the card goes on the "Neither" category. When they have worked through the deck, the team then is given the answer paper. Each pile is evaluated for accuracy. Cards that were correctly categorized are placed aside. Cards that were not correctly categorized are placed blank side up for a second round. Complete this until all the cards have been correctly

categorized. This activity can be adjusted by giving students with lower abilities fewer cards and fewer words on the description. One student in the group can read out the card aloud. Cards with two sets of reading abilities should be prepared to accommodate all students.

"Will B. Safe" Legislation Internet Activity

Legislation

Pages 3–14, Supplemental Information Pages 43–47

Grade 8 Health and Life Skills

POS Learning Outcome: Safety and Responsibility W–8.9
Describe rights and responsibilities of employers and employees in relation to workplace safety.

Student Activity: Students use an online software program that provides information on Alberta's Health and Safety Legislation. A summative check for understanding each interactive module provides sample questions based on the entire unit.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- one computer with earphones per student
- interactive animated Alberta Work Safe site on Occupational Health and Safety Legislation: www.humanservices.alberta.ca/elearning/Legislation/Legislation.htm

Lesson Outline:

This online lesson is found on the "e Learning Programs" provided by the Government of Alberta Human Services website. The lesson is written at a junior high school age level.

- "Will B. Safe" is the animated character that introduces the activity and helps the students to navigate through the different topics called modules. Students use the interactive animated website to work through sample exercises on reading and locating OHS regulations for different employer, worker related example questions.
- The Four Modules include: **Introduction**, ***OHS Act***, **OHS Regulation** and **OHS Code**. Each module presents information using narration as well as short paragraphs accompanied by graphics. The student can easily move back and forth between Modules and Index Topics within the Modules.

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- The final **Check for Understanding** uses a short game-like question and answer animation. For each correct answer, the player moves forward and for each incorrect answer, the player moves back. The player is attempting to reach the tenth space on the route. A summary of each module and the index activities are as follows:

  Module 1: Introduction – Index Topics
  - Learning Objectives
  - The 3 Parts of the Legislation
  - Where to Find the Legislation
  - Finding Information in the Legislation
  - The Structure of the Legislation
  - Reading the Legislation
  - Try it out: Three questions relating to module

  Module 2: The *OHS Act* – Index Topics
  - The *OHS Act*: Table of Contents
  - Try it out: Three questions relating to module

  Module 3: The Regulation – Index Topics
  - The Regulation: Table of Contents
  - Try it out: Three questions

  Module 4: OHS Code – Index Topics
  - Code Table of Contents
  - Try it out: Three Questions
  - Try it out: Match Game

  Check Your Understanding
  - Multiple choice or true false questions relating to all modules. The player moves forward for correct answers and back if incorrect.

Investigate Force Used for Three Pulley Systems

Physical Hazards
Pages 2–3, 25–32, E-MachineGuard.ppt Slides 1–6 and 11–16

Grade 8 Knowledge and Employability Science
POS Learning Outcome: Unit D: Mechanical Systems
Identify and correct the practical problems of simple machines.

Student Activity: Small groups of two to four students assemble three pulleys systems to evaluate the different force required and mechanical advantage of each type.

Time Required: 12 minutes

Resources/Equipment Needed for Each Group:

- one metal pole stand 50 centimetre or taller
- one ring clamp
- 1–1.5 metres of string
- two single pulleys approximately 4 centimetre in diameter
- one standard mass of 100 grams or 1 kilogram
- one Newton spring scale: 0–5 N for 100 gram mass or 0–20 N for 1 kilogram mass
- One student copy of a diagram of the three pulley systems they will assemble: a single fixed pulley, a single moveable pulley and a combination of both single and moveable pulley
- student notebook

Reference Material:

Reference website video of pulley systems and mechanical advantage
www.sciencekids.co.nz/videos/physics/pulleys.html

Lesson Outline:

- Prior to this activity, students will need to be familiar with the following terms associated with simple machines: load, force, newtons, distance force exerted, mass, weight, mechanical advantage, friction.
- Demonstrate how to use and read a Newton spring scale prior to this activity.

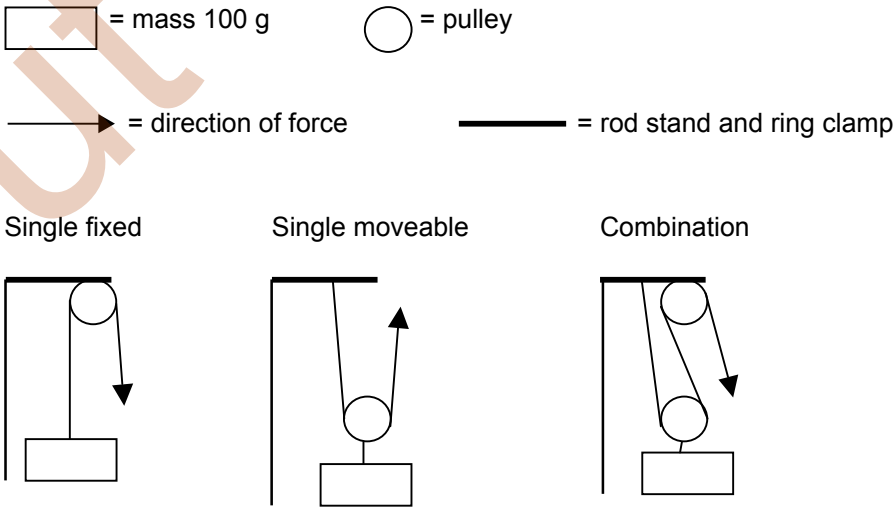
Knowledge and Employability Science

- Students build one pulley system at a time. After each system is assembled, students record the Newton force and the distance their hand travelled – start to finish – in order to lift the mass to a height of 20 or 30 cm. Hand distance equals the length of the string pulled or the distance over which the force was exerted.
- When they complete all three systems, students compare the force and distance values as well as the direction of the force. Students are given a formula to find the mechanical advantage for each system.
- Students discuss where pulley systems may be found in the workforce and determine the potential hazards of pulley systems.

Example of student data table:

Pulley type	Distance hand moves in metres	Force without pulley to lift 30 cm	Force with pulley to lift 30 cm	Calculate mechanical advantage without pulley/with
Single fixed				
Single moveable				
Combination				

Diagram examples of three pulley systems:



Extension: Students can hypothesize, design and test a pulley system that would achieve a higher mechanical advantage than those already used in the activity. One or two extra pulleys per group would be required.

Balloon Air Jack

Chemical Hazards

Compressed Gases Page 5

Grade 8 Knowledge and Employability Science

POS Learning Outcome: Unit D: Mechanical Systems, Skill Outcomes
Apply science-related analyzing and interpreting skills to examine data and to assess possible explanations at home, in the workplace and in the community.

Student Activity: Students will use a variety of balloon shapes to lift different masses (textbooks) to simulate fluid use in technology.

Time Required: 20–30 minutes

Resources/Equipment Needed:

- one balloon per small group of students
- one large diameter plastic straw
- duct tape
- small ruler
- five textbooks or more to use for weight
- video clip of RakJak Pneumatic Jack for quick air-jacking
  www.youtube.com/watch?v=rnmK_glTWFA
- video clip of Air Cushions and Safety Catch Bags
  www.youtube.com/watch?v=h5T06qlZ-Fg

Lesson Outline:

The video clips of the air jacks can be used as an introduction to the activity and then revisited to discuss the advantages of the shape of the design. Each team of students will predict and then carry out an experiment to see how many textbooks can be levered up to a minimum height of 2 or 3 cm on one side using only a balloon.

1. Student teams should be given more than one type of balloon shape to use in the experiment. Several uniform sized textbooks should be available to each group.

2. The balloon is inserted over the straw and securely duct taped to prevent air leaking out during inflation.

Knowledge and Employability Science

3. Place the balloon on a table close to the edge but as near to the center of the book as possible, and place the first book on top. The purpose in using the straw is to extend the balloon closer to the center of the mass for better lift. The balloon will distort into a wedge shape and will exert pressure on the books until it can distort past the edge of the book where there is less pressure holding it back.

4. Blow on the straw to inflate the balloon and raise the first book bottom edge to 2–3 cm. To prevent books from moving, have a weight blocking the opposite side of the book.

5. Add another book and repeat. Eventually the balloon shape will distort more than it is able to lift. Change balloon shapes and have the partner conduct the same experiment.

Summary questions:

Based on your observations, what balloon shape was the best air jack?

What factors were not measured and could have affected the accuracy of your decision?

What other uses could an air jack or "air pillow" be used for at home or at a job site?

What changes could you make to the balloon structure to increase the number of books raised?

What are some of the safety issues that could occur when using an air jack?

What precautions would you take to prevent injury to your coworkers while using an air jack?

Fluid Density and Viscosity

Chemical Hazards
Page 4, B-Overview Slide 1

Grade 8 Science
POS Learning Outcome: Unit A: Mix and Flow of Matter
Investigate and describe fluids used in technological devices and everyday materials. Investigate and identify examples of fluids in household materials, technological devices, living things and natural environments.

Student Activity: Density – Students will find the mass and volume of a sample of 3–6 liquids to determine the density of each. The density activity provides the set up for the following viscosity activity. **Viscosity** – Students pour 20 mL of one liquid into a test tube, and line up each test tube of liquid samples in the rack. The time taken for one ball bearing to go through the liquid top to bottom is recorded. The slower the ball bearing falls the more viscous the liquid.

Time Required: 30–45 minutes (plus 5 minutes demonstration time)

Resources/Equipment Needed per Group:

- one graduated cylinder of 10–20 mL
- one test tube 20 mL for each liquid sample and one test tube rack per group
- supply of vegetable oil, glycerol, isopropyl alcohol
- one small supply beaker
- supply of common fluids used in everyday home and commercial use*: molasses, milk, paint
- mass scale
- small ball bearings or dense plastic jewellery beads for each test tube
- one stopwatch
- chemical waste container (plastic dairy product container)
- soap and paper towels

*If vinegar or other caustic chemical is used, provide eye protection for students.

Science

Lesson Outline:

The demonstration introduces the differences in density of three fluids by using the following equipment: three 100 mL beakers filled about half way or more with three clear liquids, and 3 ice cubes. The first beaker containing tap water will allow the ice to float. The second liquid, saturated salt water will allow the ice cube to float higher, but in the third beaker with isopropyl alcohol, the students will watch the ice cube sink and wonder what happened. Students will determine the density of the first three liquids as well as water using the formula g/mL. Water = 1.0, Vegetable oil = 0.9, Glycerol = 1.26, Isopropyl Alcohol = 0.79.

Step 1:

Density – Students weigh a dry 20 mL graduated cylinder first and record on data table. Then collect slightly more than 20 mL of the first liquid in a supply beaker to take to work area. Use correct measuring technique for 20 mL into the graduated cylinder. Then weigh the cylinder and the liquid and record on data table. Calculate the mass of the liquid. Use grams/mL to calculate density on the data table.

Step 2:

Viscosity – Either draw a line equal distance on the top of 3–6 test tubes with a marker (faster) or measure the same volume of each liquid into each test tube. Take a small ball bearing or bead and hold it on the inside of the test tube. **Caution**: The ball bearing could shatter the bottom of the test tube so don't hold it high and drop it in the middle. A partner with a stopwatch needs to call the start drop time. When finished each density and viscosity test, clean out the cylinder, beaker and the test tube. Pour the liquid with the ball bearing onto a paper towel covering the waste container to catch it.

Sample Data Table for Density

Liquid	Mass of empty cylinder (g)	Mass of cylinder and liquid (g)	Calculated mass of liquid only (g)	**Volume** of liquid mL	**Density** of liquid g/mL
Oil					
Glycerol					
Water					

Sample Data Table for Viscosity

Liquid	Bearing Time	Order of most (slowest) to least (fastest) viscous

Step 3:
Evaluate Density and Viscosity Data

Follow up questions supported by the data:

What liquid had the greatest density, the lowest density?

What liquid had the greatest viscosity, the lowest viscosity?

Do any liquids with low densities have a high viscosity?

Why did we use a ball bearing shape instead of a paperclip?

How long do you think your test tube would need to be to stop a bullet fired from a gun? (Ballistics test use a tank 10' by 3' square).

Extension: Imagine that each chemical with different viscosity was extremely corrosive. What type of safety response would you take if each chemical came in contact with your skin? What type of personal safety equipment should you wear?

Science

Chemical Hazards Response

Chemical Hazards
Pages 45–49, J-ChemHazards Slides 1–7

Grade 8 Science
POS Learning Outcome: Unit A: Mix and Flow of Matter
Demonstrate the safety precautions to follow when handling, storing and disposing of substances at home and in the laboratory.

Student Activity: 10 to 15 stations relating to safe responses to chemical hazards. One station per two students given a class of 20 to 30 students.

Time Required: 30–45 minutes

Resources/Equipment Needed:

- 10 to 15 props of chemical-related safety equipment and/or chemicals that are readily available such as: brush, wet mop, hot plate, gloves, aprons, eye protection, bleach, drain cleaner, etc.
  Note: avoid using real chemical samples at stations. Empty containers from real chemicals with appropriate labels. Glass or plastic food containers with coloured water labelled as "Drain cleaner" will prevent a genuine hazardous situation.
  Where chemical-related props are not readily available, use photos of products, equipment, examples of unsafe situations and close-up photos of WHMIS and/or HHPS symbols.
- one set of three questions per station (see two station examples below)
- one response sheet per student or pair of students (see example below)

Lesson Outline:

Given a sample of 10 to 15 different props relating to chemical hazards and/or printed pictures, students respond to questions specific to the prop at each station. Students rotate from one station to the next with a partner. This can be used as an introduction, review activity or practical evaluation. Student's engagement and participation is higher when students are able to move around and converse with their peers. Following completion of the stations, the entire group can come together to check for understanding.

Preparation: Place one or more props at a station area on a table or bench or space around the classroom. On one piece of paper identifying the station number, prepare a maximum of three questions relating to the equipment placed at that station. Questions can be written ahead of time or as each station is assembled.

Prepare one response sheet for students or have students prepare their own template in class during instructions for the activity.

Safety Station Response Sheet

Name _____ Partner Name _____

Station Number	Question A	Question B	Question C
1			
2			
3			

Examples of station questions:

Station #1

Equipment:

1) wet mop
2) small brush with dustpan
3) broom

Question A: A student has just dropped a beaker (glass container) on the floor that has broken. Which equipment should be used to clean this up?

Question B: If we do not put broken glass in the garbage can, where should it be placed?

Question C: What type of chemical cleanup should use a wet mop? Acid, water, or powdered cleanser?

Station #2

Equipment: A container with liquid labelled "Drain cleaner" and another container labelled "Bleach".

Question: You have been asked to clean the toilet and the sink in the company restroom. List three possible examples of misuse of these cleaning compounds.

Knowledge and Employability
Workplace Readiness

Jeopardy-like Game for Five Types of Hazards

Legislation

Physical Hazards C-SlipsTripsFalls.ppt Slides 1–6,
Chemical Hazards C-Types.ppt Slides 1–7
Biological Hazards C-Types.ppt Slide 1 and D-HowEnter.ppt Slides 1–5
Psychosocial Hazards B-Overview.ppt Slide 1 and C-Types.ppt Slides 1–8
Ergonomics C-Overview.ppt Slides 1–2, D-Work.ppt Slides 1–2,
E-Capabilities.ppt Slide 1, F-Anthropometry.ppt Slide 1

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness

POS Learning Outcome: Unit A: Personal and Workplace Safety
Identify the five main types of Hazards: Chemical, Physical, Biological, Ergonomic and Psychosocial.

Student Activity: Two teams of students compete for points using questions and answers displayed in a Jeopardy-like game format.

Time Required: 30–45 minutes

Resources/Equipment Needed:

- internet connection with projection onto a white board or paper screen
- five to eight questions and answers for each of the five categories
- free online Jeopardy-like power point program template or paper copy with appropriate questions entered into the slides. Examples of questions provided in the following table: www.powerpointgames.wikispaces.com/PowerPoint+Game+Templates
- sample questions for Jeopardy-like game either electronic or paper version. See the following examples.

Lesson Outline:

Before the game begins, enter the questions and answers into the electronic program or make a paper copy using one card for each question with the answer on the back. Questions can be traditional question and answer or as in a Jeopardy game where the answer is presented in the form of the question.

Chemical Hazards	Physical Hazards	Biological Hazards	Ergonomic Hazards	Psychosocial Hazards
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500

Knowledge and Employability
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Examples of questions and answers for game up to 300 points each.

Chemical Hazards	Physical Hazards	Biological Hazards	Ergonomic Hazards	Psychosocial Hazards
100 Q. True or False: Compressed gas is a type of chemical hazard.	100 Q. True or False: Noise is a type of physical hazard.	100 Q. The most common type of biological hazards include: Bacteria, Viruses and _____.	100 Q. True or False: Pulling open a drawer is an example of static work.	100 Q. The term for feeling sleepy due to insufficient sleep or mental tiredness is _____.
A. True	A. True	A. Fungi	A. False, it is dynamic.	A. Fatigue
200 Q. Give one of the three situations where an unstable chemical could become violent.	200 Q. What type of physical hazard occurs when you are transferring your body weight from back heel to front foot?	200 Q. What type of biological hazard would a food service industry worker be exposed to?	200 Q. The part of ergonomics that deals with body size and physical activities is called _____.	200 Q. Which of the following are not symptoms of Fatigue? Depression Irritability Hunger
A. Temperature, pressure or mechanical changes	A. Slips	A. Salmonella, or E.coli bacteria from undercooked food	A. Anthropometry	A. Hunger
300 Q. A harmless gas can cause injury or death in high concentrations restricting available oxygen. This is called _____.	300 Q. Serious injuries and/or death have resulted from falls less than 10 m, 3 m, or 1 m.	300 Q. Name one of the four ways a biological hazard can enter the body.	300 Q. Structures are designed to fit what % of the population (height of a doorway for example): 50%, 75%, 90% or 100%?	300 Q. True or False: Shift work is considered a workplace hazard.
A. Asphyxiation (suffocation)	A. 3 m	A. Inhalation, absorption, ingestion, inhalation	A. 90%	A. True

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Student rules for play:

- Two teams, each side alternates turns to answer the lowest point value in any column.
- One student (hand up) is selected to answer. Each student answers only one question. They are encouraged to assist other students when they have used up their own turn.
- Use a light coloured white board marker to cross off the game board point values to avoid repeating questions accidentally. Keep a running score of totals for all to see to encourage cooperative learning.

Extension: Students can prepare their own question given a key word or chapter section. Each student directs their question to the other team. Questions must be written in a true or false, multiple choice, or one word term definition so that only one possible choice is correct for the team that is required to answer.

Knowledge and Employability Workplace Readiness

Mix and Match Cards for OHS Regulations

Legislation

Pages 3–7, Handouts 7, 10, 12, 14, 15, 18, 25, 32

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness

POS Learning Outcome: Unit A: Personal and Workplace Safety
Identify the regulations in the *Occupational Health and Safety Act*.

Student Activity: Students will match the first half of the legislation card to the correct second half of the card from a table of randomly mixed cards face side up. The student with the most correct matches receives the most points.

Time Required: 15–30 minutes

Resources/Equipment Needed:

- student copies of the Occupational Health and Safety Regulation and Code (It is recommended to use only one or two of the sections at a time. Legislation, page 61 has a complete list of the 41 parts. See handouts for useful breakdown of topics in the legislation.)
- one paper copy per student group of the precut Mix and Match legislation cards (see example in Lesson Outline)
- one zip lock bag to store and distribute cards

Lesson Outline:

The teacher prepares a two column list based on the regulations from the *Occupational Health and Safety Act* in Chapter One of the OHS Guide. The first column contains part of one of the acts. The second column directly beside contains the second part of the act. The size of each card space in a column should be equal.

- Take a pair of scissors and make a zigzag and/or wavy cut to separate the columns. See the following example. The resulting pattern will help the students identify correct (the puzzle edges match) and incorrect matches. Then cut the columns horizontally to form individual cards. Place the set of cards in a zip lock bag.
- Students in groups of four or less spread the cards from one set face up on the desk or table.

- The first student picks up a left or right side card and tries to find the matching side. When the student selects the second card, they can check for accuracy if the puzzle side edges match. The student keeps the cards for one point. If not correct, the student returns the cards to the table and the second student begins. At the end of the game, all the cards are picked up and the student with the most points is the winner.

Example of Mix and Match Cards:

Cut wavy line between columns.

The *OHS Act* sets out the basic duties of:	owners, employers, workers, contractors and suppliers.
Workers must:	take reasonable care to protect the health and safety of themselves and other workers.
The *OHS Act* is in place to protect the health and safety of workers. It does this by establishing:	expectations, and responsibilities, that workers must follow.

Knowledge and Employability Human Care

"Will B. Safe" Health and Safety Management Internet Activity

Health and Safety Management Systems
Pages 9–13, 15–16, 17–18, 26–27

Grade 8 Knowledge and Employability Human Care
Grade 9 Knowledge and Employability Human Care
POS Learning Outcome: Unit A: First Aid Level 1 Safety
Identify potential hazards found at home, in school or in a workplace.

Student Activity: Students use an online software program that provides information and interactive practice on eight Health and Safety topics called modules. A summative Check for Understanding interactive module provides sample questions based on the entire unit. Responses are validated as to accuracy.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- one computer with earphones per student
- Basic Health and Safety interactive website: www.humanservices.alberta.ca/elearning/health/index.html

Lesson Outline:

This online lesson is found on the "e Learning Programs" provided by the Government of Alberta Human Services website. The lesson is written at a junior high school age level.

"Will B. Safe" is the animated character that introduces the students to the navigation buttons on the program for the basic health and safety modules. This software has eleven modules that cover the following topics (besides the basic introductory modules): **Alberta Laws**; **Health and Safety Management**; **Workplace Hazards and Controls**; **Communications and Training**; **WHMIS**; **First Aid and Emergency Response**; **Working Alone**; and **Preventing Workplace Violence**. The final module is an interactive **Check for Understanding**.

Each module begins with a short narration to accompany the printed information. Simple cartoon graphics are used to illustrate the information at the same time. Each module has at least one interactive activity where students apply the information. Students can choose modules in any order and can go back and forth easily in this program. Each module should take approximately five minutes or less to complete.

Knowledge and Employability Human Care

Knowledge and Employability Workplace Readiness

Hazard Song

Health and Safety Management Systems
Types of Hazards Page 10, Types of Hazard Control Pages 12–14, B-8Elements.ppt Slides 3–12

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness
POS Learning Outcome: Unit A: Personal and Workplace Safety Level 1 Describe workplace practices designed to prevent the four main types of hazards.

Student Activity: Students write verses representing the four types of hazards and one type of hazard control for each.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- internet/computer and projection device
- example of humorous workplace safety mistakes video "What's Wrong with this Picture? Video 1 (Humorous) from SafetyInstruction.com showing Ergonomic Hazards (3 min) www.youtube.com/watch?v=kqzxEVDwwB0
- example of a funny workplace hazard song/video the "Hazcom Song" also called the "WHMIS Warble" showing Chemical Hazards (4 min) www.youtube.com/watch?v=eeyA4Z6aDCw
- student copy of five main types of hazards
- student copy of types of hazard controls

Lesson Outline:

This lesson can be used as an introduction to teach the types of hazard controls or as a summary for previous lessons on the types of hazard control: engineering, administrative, personal protective and elimination. The video example of ergonomic hazards will give the students examples of simple mistakes to begin building a "verse."

The second video is a good example of funny visuals and chemical hazard examples sung to a simple folk style tune. Although the song is repetitious, students who are not inclined to write poetry or songs would benefit from using a similar style for their song.

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- Survey the students for their favourite songs. Encourage students to use songs from their elementary school years, where the tune is familiar.
- Ask the group to help you write four lines of verse to describe one of the examples. Ask them to use the verse to fit into the tune of the song.
- Students should now be prepare to write their own original song/ poem by selecting an example for each of the chemical, physical, biological, psychosocial or ergonomic hazards to use. Each hazard example should use one verse each minimum.
- Each example should have a follow up verse at minimum representing one example of a method of controlling the individual hazard example.
- Students will want to share their songs when complete.

Extension: Students could video record their songs using instruments and props to share with the class.

Knowledge and Employability
Workplace Readiness

Sample Jobs Hazard Identification and Engineering Controls

Health and Safety Management Systems
Pages 9–13, B-8Elements.ppt Slides 8–9 and 11–12

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness
POS Learning Outcome: Unit A: Personal and Workplace Safety
Describe workplace practices designed to prevent the five main types of hazards.

Student Activity: An introductory lesson to two elements of a Health and Safety Management System: Hazard Identification and Engineering Controls. Students are given a typical job description (or a picture or short video) and the duties involved. The students identify the possible types of hazards, and suggest an example of an engineering control.

Time Required: 30–45 minutes

Resources/Equipment Needed:

- three to five examples of a job description in written or visual aid form (Examples can be realistic or in cartoon/parody format. See example below for "Service Station Attendant.")
- student checklist for identification of hazards and engineering control examples
- examples of personal protective equipment in written and visual aid form

Lesson Outline:

This lesson activity can be used to introduce two of the eight elements of a Health and Safety Management System. Students will have been exposed to examples of different personal protective equipment and their function prior to this activity. Students can do the activity individually or in small groups. One copy of each job description can be rotated through the groups or used one at a time with the entire group.

- The activity starts with an example of a job description presented to the group (example: service station attendant).

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- Students then use a template to prompt them to respond to predicting the types of hazards involved. No previous discussion of examples of hazards is necessary. Students do not need to identify the type of hazard (physical, ergonomic, etc.) just give an example, or minimum number of examples (three) of a possible hazards. Answers will vary from group to group.
- Students are then directed to the three general methods for engineering controls. Students can generate their own examples of a specific engineering control for each hazard.
- Students do not need to know the names of specific equipment that would be used as engineering controls, they instead could describe a device that may exist or that they imagine.
- Following the completion of the checklist, students should report out to their group.

Sample Job Description

Gas Station Attendants are responsible for refuelling vehicles, checking oil and other fluid levels, cashiering, collecting cash payments from customers and making change, or charging purchases to customers' credit cards and providing customers with receipts. Other duties include minor gardening duties, sweeping and scrubbing service bays and cleaning washrooms. They order stock, price and shelve incoming goods, and provide assistance and customer service. Training for flammable combustible handling provided.

Qualifications: Must be at least 18 years of age. High school graduate. Must be able to frequently lift 10 pounds and occasionally lift up to 30 pounds. Must successfully pass Math and Cashier Test.

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Sample Student Template and checklist

Job Title	**Suggested Hazards**	**Engineering Controls:** Use one or more	**Examples** of engineering controls for each hazard
Service Station Attendant	1. _____ 2. _____ 3. _____	• Substitute • Isolate • Add helpful equipment	1. _____ 2. _____ 3. _____
Retail store stock person	1. _____ 2. _____ 3. _____	• Substitute • Isolate • Add helpful equipment	1. _____ 2. _____ 3. _____

A Hazardous Collection Poster

Knowledge and Employability
Workplace Readiness

Health and Safety Management Systems
Pages 10–12, B-8Elements.ppt Slides 3–8

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness
POS Learning Outcome: Unit A: Personal and Workplace Safety
Students will understand the function and safe application of tools, equipment and materials. Describe the potential consequences of hazards left unaddressed.

Student Activity: Students create a scene of a fictitious workplace that includes approximately ten different hazard examples from the five types of hazards. Each hazard sketch or cut out should be identified using a number or letter that matches a key beside the picture. The key identifies the hazard by specific type and describes the potential consequences to the worker, coworkers and public.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- one poster paper or newsprint per student or team
- catalogues, retail advertisement flyers or internet connection for images
- scissors and glue sticks
- student copy of types and examples of hazards

Lesson Outline:

Students will have previously discussed the types and examples of physical, biological, chemical, psychosocial and ergonomic hazards. Pictures of typical workspace equipment can be found in many retail flyers and/or catalogues. Students should be given a time limit to select up to 10 pictures from a source. Students can also include original sketches as part of the assignment.

- Before students begin using the poster paper or newsprint, they should be given advice on how to arrange and plan their poster information.
- Pictures should be organized as if this scene was a snapshot of a unique workplace at a given moment.

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- The sketches or cut out examples for hazards should be placed in the middle of the paper allowing space around the side for the key information.
- Each picture of a hazard example should have an identity number or letter attached to match the key. The key includes the type and description of each hazard and the consequences that could result.
- Students can add original sketches after organizing the cut out pictures to complete the workplace scene.

Extension: This activity is a lead-in to hazard controls. Students could evaluate other student posters by identifying a type and specific example of a control for hazards presented.

Undercover Boss Safety Checklist

Knowledge and Employability
Workplace Readiness

Health and Safety Management Systems
Pages 9–12

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness
POS Learning Outcome: Unit A: Personal and Workplace Safety
Demonstrate and apply basic safety habits, skills, attitudes and knowledge when planning, preparing, completing and/or evaluating activities at home, in school or in the workplace.

Student Activity: Students identify hazards for samples of different job descriptions. Students create a safety checklist for five safety rules and/or engineering controls for each job.

Time Required: 30–45 minutes

Resources/Equipment Needed:

- one prepared job description paragraph with detailed duties for five different jobs
- one student handout of job descriptions (see the following example)
- optional: one computer with projector to show video of job duties, examples:
  Short Order Cooking Careers Overview:
  www.youtube.com/watch?v=BZWhexEF2bw
  Painters Careers Overview:
  www.youtube.com/watch?v=5glRwgnb5gk
  Construction Carpenter (Carpenter – CJCC.avi):
  www.youtube.com/watch?v=zAPVeEBkuhU

Lesson Outline:

- Students will have five different entry level job descriptions to read or view a short video. They will imagine that they are the boss who goes undercover for the day to work beside their employees and managers.
- They must write a short safety checklist of at least five safety points that should be in place before they go on to the job site. A review of engineering controls prior to this activity is helpful.

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- The variety of job descriptions can include realistic entry level jobs in their community. It is helpful if the students have a familiarity with the type of occupations to identify some of the hazards that might be a concern.
- The five job samples should provide an example for each of the physical, ergonomic, biological, chemical and psychosocial hazards. The following list is a sample of some typical jobs and related hazards.

Example Jobs	Type of Hazards	Basic Job Description
Restaurant Cook	**Biological:** food borne illness **Physical:** slips, cuts from sharp objects **Chemical:** flammables, toxic fumes	Knowledge of gas stove/ grill operation. Food safe certificate. Able to prepare diverse menus using fresh local products.
Gas Station Attendant	**Psychosocial:** working alone **Chemical:** flammable, solvent fumes **Ergonomic:** repetitive motion stress	Able to work shifts. Knowledge of cash register operation for sales of convenience items. Duties include keeping reception and restrooms clean.
Construction Labourer	**Physical:** electrical, vibration falls, trips, noise, etc. **Ergonomic:** repetitive and awkward movement injuries **Chemical:** flammables, toxic gases	Able to use power tools such as electric hammer, radial arm saw. Provide own hand tools. Some exterior painting experience required.
Grocery Store Stock Person	**Ergonomic:** repetitive and awkward movement injuries **Physical:** slips, falls, noise	Physically fit, able to work with minimal supervision. Unload supplies up to 40 kg each from pallets and carry to shelves using ladder if necessary.
Hardware Store Employee	**Chemical:** toxic solvents, pesticides, etc. **Ergonomic:** repetitive, awkward movement, heavy lifting **Physical:** falls, trips, cuts	Unpack and shelve new store inventory including pesticides, paints, appliances and tools, up to 25 kg each item.

Example Jobs	Type of Hazards	Basic Job Description
Auto Repair Apprentice	**Physical:** vibration, slips, cuts, electrical **Chemical:** solvent fumes, flammables **Ergonomic:** awkward movement, heavy lifting	Use power tools to: install tires, exhaust systems etc., change oil, batteries, transmission and brake fluids. Use hydraulic lift.

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Alberta's Worst Handyman Cartoon

Physical Hazards

Overview of Nine Physical Hazards Page 3, C-SlipsTripsFalls.ppt Slide 1, D-Electricity.ppt Slide 1 and Slide 3, E-MachineGuard.ppt Slides 3–4, G-HeatStress.ppt Slide 1, H-ColdStress.ppt Slide 2, I-Noise.ppt Slide 1, J-Vibration.ppt Slide 1, L-FireHazards.ppt Slide 4, SA-HeatStress.ppt Slide 1, SC-Noise.ppt Slide 4, SE-Radiation.ppt Slides 7–8

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness

POS Learning Outcome: Unit A: Personal and Workplace Safety
Recognize that incidents and injuries are caused by a variety of circumstance (e.g., human error and/or equipment malfunction) and can be prevented.

Student Activity: Following a presentation or lesson of the physical hazards common in a workplace, students will design a cartoon strip of 6–10 frames. The cartoon frames will show ten different examples of a workplace physical hazard as the "stick man" or simple handyman goes about his work.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- one piece of 14" by 8 ½" paper (or other available size) per student for cartoon diagrams
- student reference for nine types of hazards common in the workplace with space for examples (see the following table)

Lesson Outline:

During a previous lesson and/or introduction to this activity, the students will record two or more examples of each of the nine hazards to use as reference for the activity. See the following example of a student template for the examples of physical hazards:

Hazard	Example 1	Example 2
Slips, trips, falls	Ladder not secure	Tripped on uneven cement
Electricity	Touched overhead wire with metal tool	Used a power tool in wet weather
Tools and machinery	Fingers caught in a conveyer belt	Rotating head on drill injured worker
Etc.		

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- When students have completed their example table, they are ready to start the cartoon strip. Students do not need to use all the examples in the table.
- Fold the paper into six or eight equal sized frames. Number the frames to show the order of the Handyman's Adventure as he goes about his day on the work site. No artistic talent is required. Stick men and simple labelled sketches are encouraged.
- Points should be awarded for the number of physical hazards represented in the cartoon strip. More than one hazard per frame is encouraged.
- Avoid the use of colour on the cartoon strip (unless the student has completed the criteria first). Students at all grade levels love to colour but can easily waste time and fall behind quickly on the lesson objective.

Knowledge and Employability Workplace Readiness

Don't Overload Circuit – Power Calculations

Physical Hazards
Pages 18–20, D-Electricity.ppt Slides 1–5

Grade 8 Knowledge and Employability Workplace Readiness
POS Learning Outcome: Unit A: Personal and Workplace Safety
Identify common safety issues from a variety of work sites.

Student Activity: Students will calculate the amperes of common electrical devices to decide what combination of devices can be safely used on one circuit of 15 amps.

Time Required: 30 minutes

Resources/Equipment Needed:

- a variety of electrical appliances (with power cord) from any office, school or home (Some examples are hand tools, computer hard drive, microwave, kettle, monitor, fridge, projector, lamp, electric pencil sharpener, hairdryer and television.)
- a list of electrical appliances with the power wattage can be supplied to students instead
- a template for recording the volts, amps and watts of the appliances

Lesson Outline:

In a classroom setting, students are asked to find all the electrical outlets. The standard voltage from each outlet is 110 volts. Each outlet will be on the same circuit (not always true, but state this for the exercise). Students are then asked to locate common appliances and record the wattage found on a label on the back or base. An example table is provided below.

- Explain that electrical energy has two components, voltage and current, that together form watts, the unit of electrical power. The more appliances on one circuit, the more current is travelling through the wires behind the walls. Wires can heat up with increased current.

- The maximum power capacity for an electrical wire is 1650 watts. At that point a circuit breaker will cut off the electricity. If the breaker fails then the wire could heat up enough to cause a fire.

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Workplace Readiness

- Watts will be used to calculate the amps or current drawn from the outlet by the appliance as most appliances do not list the amps on the label. Voltage is the same 110 volts for each outlet. Use the formula:
  Power (Watts) = Voltage (V) x Amps(A) *or*
  Watts/Volts = Amps

Appliance	Watts	Volts = 110 for each outlet	Amps Calculated
Lamp (bulb)	60 W	110	0.55
¼" drill	250 W	110	2.27
Shop vac	1000 W	110	9.1

- Having completed the calculations for about 10 appliances, students will be asked to group appliances in order to remain close to but below 15 amps so as to not overload the circuit.

Follow up questions:

1. What two appliances used together would trip the circuit breaker?
2. Why do some small lamps have a warning not to use more than one 60 watt bulb?
3. Kitchen appliances commonly use about 10 amps each. Why do you not blow a breaker every time you use two or more appliances to cook a meal?

Knowledge and Employability Workplace Readiness

Ladder Safety

Physical Hazards
Pages 6–10, C-SlipsTripsFalls.ppt Slides 6–11

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness
POS Learning Outcome: Unit A: Personal and Workplace Safety
Identify common safety issues for a variety of work sites.

Student Activity: Students use the paper graphics to place the ladder correctly beside the house. Students will measure the lengths and angles of the structures to prove they have placed the ladder in the correct position.

Time Required: 15–20 minutes

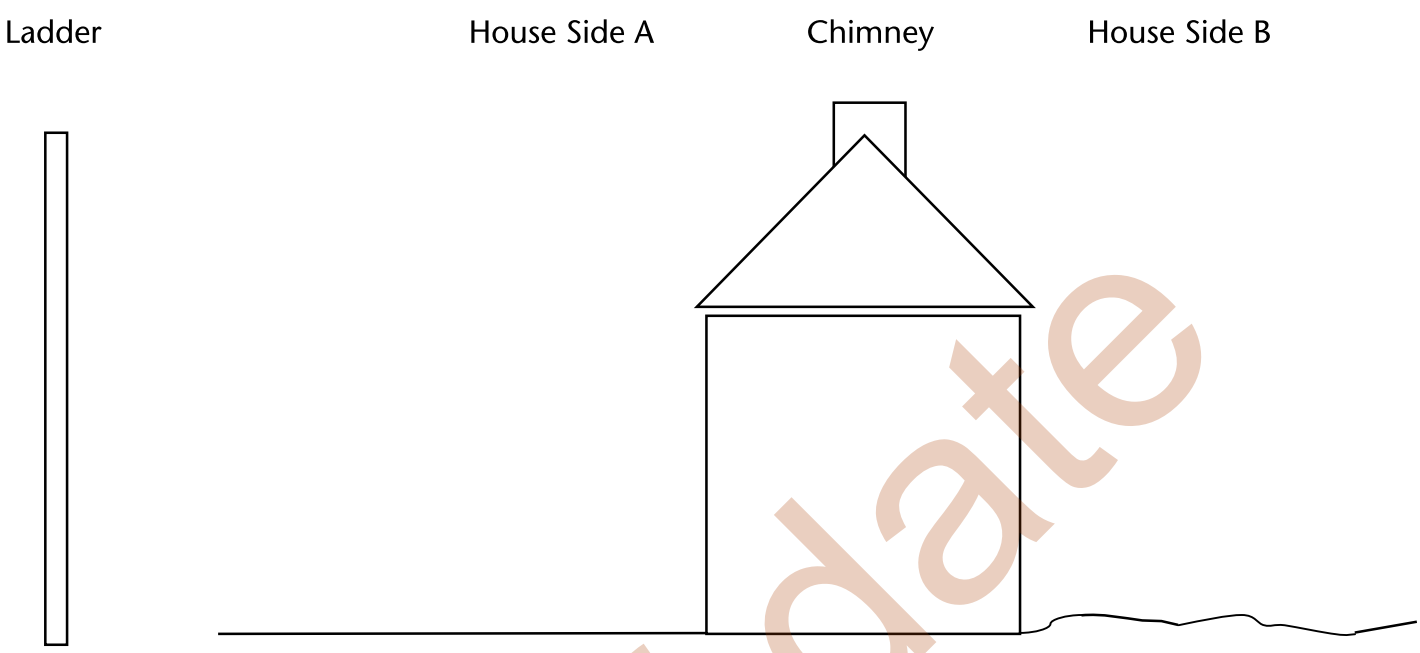
Resources/Equipment Needed per Student:

- one handout with house and ladder graphic called "Ladder Safety"
- one pair of scissors and a piece of paper
- one glue stick or clear tape
- one protractor

Lesson Outline:

- Use the presentations to introduce the hazards and how to prevent an injury while using portable ladders.
- Provide each student with the Ladder Safety handout and tools required. Directions for activity are on the handout.
- Students will use a 7 cm = 7 metre ladder and a 4 cm = 4 metre wall of a house to place a cut out ladder correctly. They will record the angle of the ladder and the height above the landing (edge of roof line).
- The ratio of 4 metres of height for 1 metre of distance from the structure should be ideal for ladder stability.
- The angle should be 75 degrees. Students will be asked to consider how to make the top and bottom of the ladder more secure.

LADDER SAFETY



Imagine you have been asked to help work on routine maintenance on a house (exterior painting, gutter clean out, etc.). You are asked to demonstrate safe use of a ladder by completing the following directions.

- Cut out a piece of paper the same size as the ladder graphic.
- Place the side of your ladder beside the house so that it touches the ground and the edge of the roof.
- Measure the angle of the ladder using the protractor and record this number below on your data table.
- Paste the ladder to your diagram.

Data table:

Angle of ladder base to ground beside house _____degrees

		Convert cm to meters (1 cm = 1 m)
Length of ladder	_____ cm →	_____ m
Height of house not including roof	_____ cm →	_____ m
Distance base of ladder from house	_____ cm →	_____ m

Does your ladder follow the guidelines for safe use as follows:	Yes?	No?
1. Base of ladder is at least one meter out for every 4 metres of structure height	_____	_____
2. Base of your ladder less than 78 degrees but greater than 68 degrees	_____	_____
3. The top of the ladder extends at least one meter above the landing edge	_____	_____
4. Did you place the base supports on even ground?	_____	_____

Follow up questions.

What two methods could be used to secure the ladder base on side A of the house? On side B?

_____

_____

_____

_____

_____

_____

_____

_____

Would you secure the top of the ladder by using the rungs or the side supports?

_____

_____

_____

_____

Recognize WHMIS and HHPS Symbols

Knowledge and Employability
Workplace Readiness

Chemical Hazards
Pages 50–66, J-ChemHazards.ppt Slides 1–7

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness
POS Learning Outcome: Unit A: Personal and Workplace Safety
Recognize WHMIS symbols and HHPS (Hazardous Household Product Symbols).

Student Activity: Design a new product label.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- a reference sheet showing the WHMIS symbols and HHPS

Lesson Outline:

Students will use various WHMIS symbols and HHPS and information to design an original product label.

Students have previously completed the Learning outcome, "Identify required information on a WHMIS label." Students have been shown various product label pictures during a PowerPoint style lesson and have completed an exercise where they have identified a variety of information and symbols on various labels. Students should be provided with blank paper or a template for a product label. Colour is encouraged in the final product.

Students are encouraged to imagine an original product they have just invented such as invisibility gas. Students provide a regulation label including all the categories of required information on the WHMIS labels as previously covered. A small part of the label will include the original name of the product and a small diagram (can be cut and pasted if desired). The students must organize the label into sections first before recording their unique information. The product label should include at least three WHMIS labels. The final label can be taped into a tube or pasted onto a cereal box to display and compare. Evaluation of a partner label can include a check list, one point for each item required on a WHMIS and/or HHPS symbol.

Knowledge and Employability Workplace Readiness

Dissection of a WHMIS and Consumer Product Label

Chemical Hazards

Pages 50–56, J-ChemHazards.ppt Slides 2–4,
Consumer Chemical Labels Pages 61–63, J-ChemHazards.ppt Slide 7

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness

POS Learning Outcome: Unit A: Personal and Workplace Safety
Recognize WHMIS symbols and HHPS (Household Hazardous Products Symbols).

Student Activity: Given a photocopy of a variety of WHMIS labels and household product label examples, students will cut up the labels and place each section under a correct category heading as required by either WHMIS and/or Consumer Chemical Hazard Labels guidelines.

Time Required: 45 minutes

Resources/Equipment Needed:

- student reference Consumer Chemical Hazard Label Symbols for: explosive, flammable, poisonous and corrosive
- student copy for WHMIS label requirements
- scissors
- glue sticks
- large newsprint or notebook paper
- photocopies of WHMIS labels and household products containing chemical warning symbols. Use two or more different label examples per student group. Product examples: Household cleaners, nail polish remover, pesticides, aerosol hairsprays, paint thinner, etc. Hint – Select a small product as all sides containing label information are required for students to complete the assignment.
- optional product labels brought from home by students

Lesson Outline:

Knowledge and Employability
Workplace Readiness

After a general introduction of the similarities and differences between a WHMIS and Consumer Chemical Hazard Label, students should be ready to cut up individual photocopies of product labels and arrange each section under the correct category title.

WHMIS Labels	Consumer Chemical Hazard Label
• product identifier – the name of the product (must be the same as on the MSDS) • supplier identifier – name of manufacturer or distributor • hazard symbols – all WHMIS hazard symbols that apply, based on the classification • risk phrases – brief statements of main risks associated with the product • precautionary measures – brief statements of main precautions to be taken when using or storing the product • first aid measures – main first aid measures to be taken in case of acute overexposure • reference to the MSD – for more detailed information on the hazards of the product	• hazard symbol(s), which are not quite the same as WHMIS hazard symbols • the signal word *Extreme Danger*, *Danger* or *Caution* • specific hazard statement(s) • instructions for use • cautions about non-intended uses • first aid treatments

Knowledge and Employability Workplace Readiness

Preventing Ergonomic Injuries

Ergonomics

Pages 2–7, C-Overview.ppt Slides 1–2, D-Work.ppt Slides 1–2, E-Capabilities.ppt Slide 1

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness

POS Learning Outcome: Unit A: Personal and Workplace Safety
Describe workplace practices designed to prevent the five main types of hazards.

Student Activity: Five stations each with one ergonomic action example. Small student groups rotate through each example.

Time Required: 20–30 minutes

Resources/Equipment Needed:

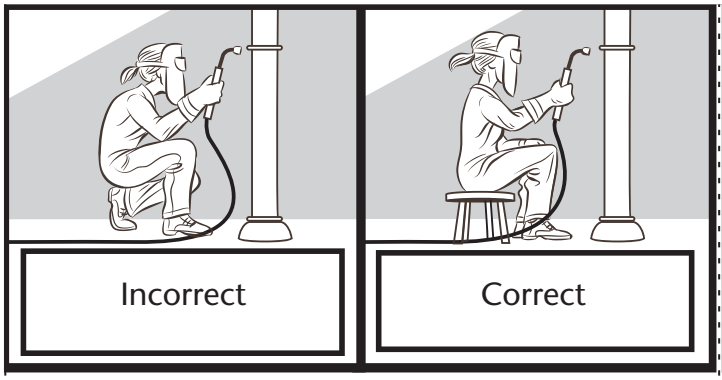
- one empty cardboard box (medium sized) taped closed
- five body motion cards
- one cardboard tube approximately 20 cm long, 3 cm diameter

Lesson Outline:

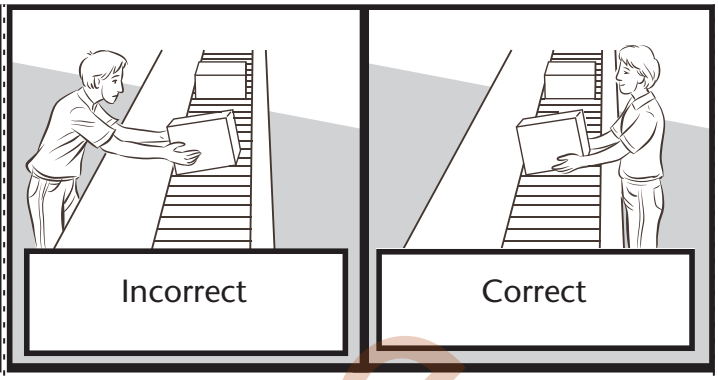
Students will identify ergonomic hazards and will describe practices designed to prevent injuries due to these hazards.

Have one group of students per station. Each station has one of the motion cards and the appropriate piece of equipment. One student from the group at one station picks up the motion card and studies it. Each motion card has two pictures of the ergonomic technique on the same side of the card. One of the pictures is a simple sketch (similar to the Work Safe Alberta Bulletin for Assessing Ergonomic Hazards) showing the correct technique, the other is an incorrect example. Each motion card is specific to one area of the body that is susceptible to a form of ergonomic injury: neck, shoulders, wrists, lower back and knees.

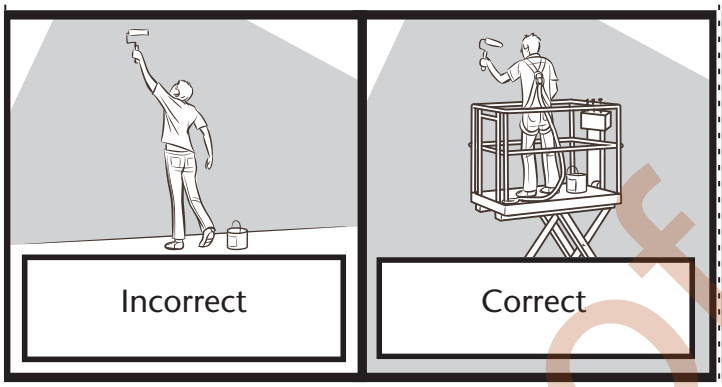
The student then pantomimes **either** the correct or incorrect motion using the picture as the guide. The other members of the group have to vote on whether or not the action was correct or incorrect. The other members also identify the action as either: *awkward body position*, *high hand force*, *repetitive force* or *heavy lifting* type of injury. The students take turns rotating the "performer" at each station. Students are encouraged to take a turn but should not be required to act out a station.



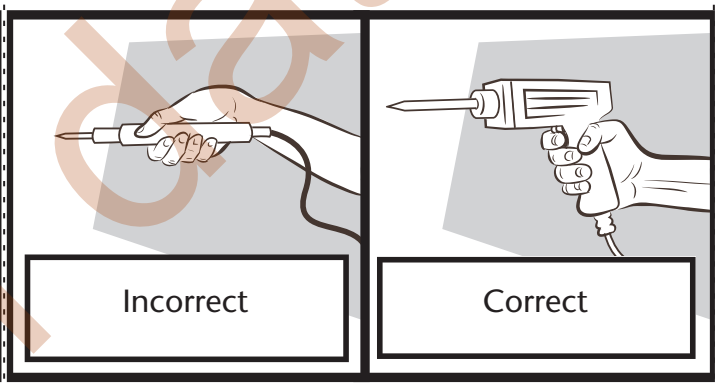
Potential knee problems.



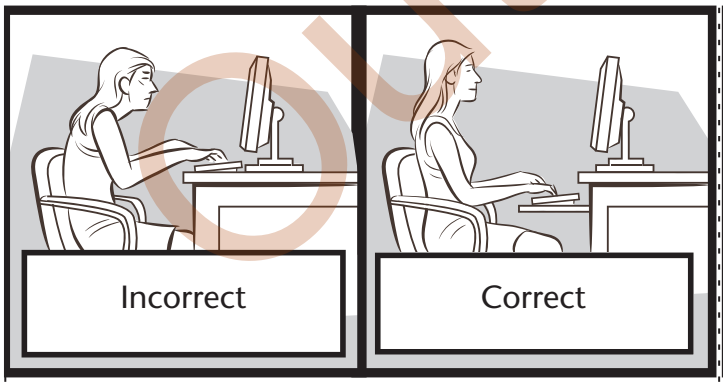
Potential back, shoulder and neck problems.



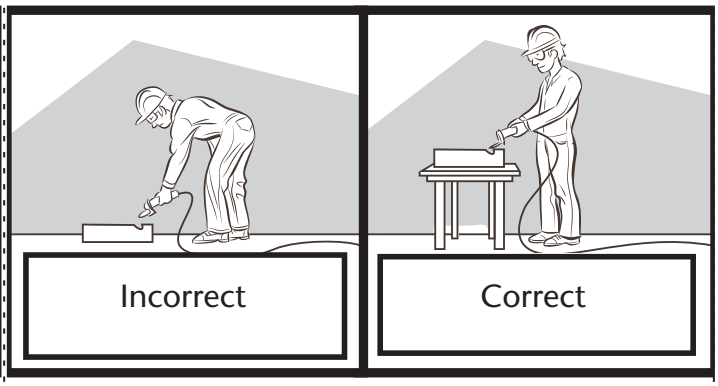
Potential back, neck and shoulder problems.



Potential wrist problems.



Potential shoulder problems.



Potential back problems.

Backs and Bums Interactive Ergonomics

Knowledge and Employability
Workplace Readiness

Ergonomics
Pages 2–18

Grade 8 Knowledge and Employability Workplace Readiness
Grade 9 Knowledge and Employability Workplace Readiness
POS Learning Outcome: Unit A: Personal and Workplace Safety
Identify the five main types of hazards; i.e., chemical, physical, biological, ergonomic and psychosocial.

Student Activity: Students use the Alberta Work Safe online interactive "Backs and Bums" website to identify ergonomic hazards and types of engineering controls. Each of the four modules plus the final **Check Your Understanding** takes about five to fifteen minutes each depending on the number of index items as listed below. Students do not need to complete all modules in one sitting.

Time Required: 45 minutes

Resources/Equipment Needed:

- one computer with earphones per student
- link for interactive Ergonomic website "Work Safe Alberta: Backs and Bums Applying Basic Ergonomics" designed for junior high students www.humanservices.alberta.ca/elearning/ergonomics/data/ergonomics.html

Lesson Outline:

This online lesson is found on the "eLearning Programs" provided by the Government of Alberta Human Services website. This website is an exceptionally well crafted interactive unit on Ergonomics aimed at junior high students.

The animated character "Will B. Safe" prompts the students through the menu and index options for each of the four modules: **Welcome**; **What is Ergonomics**; **Does my Work Station Fit me?** and **Lifting and Handling, the Forces we Face**. The final menu option **Check Your Understanding** asks multiple choice type questions.

Knowledge and Employability
Workplace Readiness

The graphic moves along a conveyer belt for each correct answer along 10 positions. If an answer is incorrect, the graphic moves back one, increasing motivation to select a correct answer. Students can easily move back and forth between index and menu options. A summary of each module and interactive index links are as follows.

Module 1: Welcome – Index Activities
- Overuse Injuries Affect Everyone
- Program Purpose and Structure
- Module Index
- What you will learn
- What does the Law say?
- Try it out: What is a Workplace Hazard
- What Hazards Are
- Controlling Hazards

Module 2: What is Ergonomics – Index Activities
- What is Ergonomics?
- Work Stations and Work Processes
- Body Shapes and Size
- Try it out: Body Shapes and Size
- Types of Injuries
- Stages of Injuries
- Prevention
- Prevention at home
- Costs

Module 3: Does My Work Station Fit Me? – Index Activities
- Types of Computer Work Stations
- Make Your Adjustments
- Try it out: Setting up a Work Station
- Evaluation a Standing Work Station
- Other Things You Can Do

Module 4: Lifting and Handling, The Forces We Face – Index Activities
- Try it out: Myth or Fact?
- Using Your Muscles
- Try it out: How Much Weight?
- Manual Materials Handling
- Dealing with MMH
- How to Adapt a Load
- When You Can't Adapt a Load
- Real World Examples
- Pushing vs Pulling
- Hints for Pushing and Pulling Tasks

Knowledge and Employability
Workplace Readiness

Try it out: Lifting zones
Key Points for Lifting
Try it out: Lift Evaluation 1
Try it out: Lift Evaluation 2

Check Your Understanding

This is an interactive multiple choice question section summarizing the four modules. Students need to answer 10 or more questions correctly to complete this section.

Knowledge and Employability Science

Power Lines Top 10 List

Physical Hazards

Pages 21–23, D-Electricity.ppt Slides 2–3, 8, 10–13

Grade 9 Knowledge and Employability Science

POS Learning Outcome: Unit D: Electrical Principles and Technologies
Assess the potential danger of electrical devices by referring to the voltage and current rating (amperage) and distinguish between safe and unsafe activities.

Student Activity: Students will create a **top 10 list** of ways to experience an electrical shock involving power lines. The list should describe an original and humorous example as if "David Letterman" was presenting the top 10 list on his nightly talk show. For example, "Number 9 – You thought that bungee jumping was a good idea as you wouldn't touch the ground – and then the arc came out of your nose!" "Number 8 – You didn't have to listen to your boss tell you 'I told you so' when you didn't secure the ladder as you didn't injure yourself in a fall when you caught the wires on the side of the house."

Time Required: 30 minutes

Resources/Equipment Needed:

- video clip from a sample David Letterman top 10 sketch from the tonight show: Top Ten Reasons It's Fun To Be Justin Bieber: www.youtube.com/watch?v=c2sVxX-vJSo
- an internet connection, speakers and projector to show video clip prior to activity
- reference material for overhead power lines and voltage hazards
- student notepaper

Lesson Outline:

Students will have reviewed the hazards associated with overhead power lines, and the safe versus unsafe distances for various voltage areas. Students should be asked to review occupations that would put workers near to power lines and/or experience a higher risk of electrocution.

D-Electricity.ppt Slide 13 has several different examples and statistics of contact with power lines.

- Students can create a variety of examples realistic and/or fantastic to demonstrate the ways that people can be shocked by:
  - coming in contact with both ends of a circuit conductor
  - getting between an ungrounded conductor and the ground
  - getting between a material that is in contact with an ungrounded conductor
  - contacting two different voltage rings from a high voltage wire contacting the ground.
- Students create the top ten list by starting at the 10th example. Each example that gets closer to number one should become more extreme. Audience anticipation will engage students as some of the lists are shared.

Knowledge and Employability Science

Resistors are Hot

Physical Hazards
Pages 18–20, D-Electricity.ppt Slides 1–3

Grade 9 Knowledge and Employability Science
POS Learning Outcome: Unit D: Electrical Principles and Technologies
Assess the potential danger of electrical devices by referring to the voltage and current rating (amperage) and distinguish between safe and unsafe activities.

Student Activity: Students will assemble three circuits using three different ohm resistors. Students measure the temperature of the resistor contact (which increases as the ohm value increases).

Time Required: 30 minutes

Resources/Equipment Needed for each Group:

- one 1.5 Volt C or D battery (this is the total voltage value in the circuit)
- three connecting wires
- one ammeter to measure amperes, the rate of current flow
- three resistors of 100 ohms, 50 ohms, 10 ohms or 2 ohms (Take a permanent marker and colour one of the wires from the resistor the same colour for the same ohm value instead of using the manufacturer's band markings which are too small and confusing for students.)
- one small thermometer
- one data table per student or team to record and calculate the ohms resistance in the circuit (see the following example)

Lesson Outline:

Discuss resistors with students. Resistors can be any electrical device that transforms electrical energy into useable energy. All electrical devices will generate heat. Adding more voltage increases amperage and also resistance will result in excessive heat in a circuit that could cause a fire.

- A small 1.5 V light bulb can be used to check the circuit first before using the resistors.
- Students should record one of the lower resistor values first and be cautioned on not touching any of the exposed wires while the circuit is complete.

- When the circuit is complete, students use a thermometer to measure the temperature of an exposed wire on the resistor. Students should recognize the heat produced by electrical circuits as a possible hazard.

Data table example:

Resistor Colour	**Battery** Volts	**Milliamps** (divide by 1000) =	**Amps**	**Volts/Amps = Ohms** (Calculate)	**Temperature** degrees C
Green	1.5 V	150	0.15	10	———
Red	1.5 V	30	0.03	50	——— (warmer)
Blue	1.5 V	15	0.015	100	——— (hot)

Knowledge and Employability Science

Win, Lose or Draw Electrical Safety

Physical Hazards

Pages 18–22, C-SlipsTripsFalls.ppt Slides 18–20, D-Electricity.ppt Slides 1–2

Grade 9 Knowledge and Employability Science

POS Learning Outcome: Unit D: Electrical Principles and Technologies
Assess the potential danger of electrical devices by referring to the voltage and current rating (amperage) and distinguish between safe and unsafe activities.

Student Activity: Two student teams send one individual at a time to communicate either: a type of electrical injury, how the injury happens or how unsafe activities can lead to electrical injury by drawing on the front board or paper instead of using written words or speaking. Students can prepare the type of electrical safety topic by writing a short description on a small card as part of the activity or the teacher could prepare the cards ahead of the activity.

Time Required: 45 minutes

Resources/Equipment Needed:

- recipe sized cards or paper cut up into roughly 5 cm by 10 cm size one or two per student
- student references on electrical hazards
- large whiteboard or one newsprint sheet per student divided into two sets
- two markers for two students to compete side by side

Lesson Outline:

- Each student from a team prepares one or two cards using a few words to represent one example from the references on electrical hazards.
- Students should use a number to indicate which category the example will represent. #1 = type of injury, #2 = how the injury occurs and #3 = unsafe activities that result in injuries. The back side of the card remains blank.
- Cards are collected and placed in front of the drawing area of the opposing team. This is to prevent a student from receiving their own card or teammate's card.

- When two teams have completed preparing their cards and are ready to play, one member of each team picks a card from the opposing team's deck. They can hold up the number of fingers to represent the category #1, #2 or #3.
- The team member begins to sketch the example written on the board as quickly as possible.
- The team members of the person sketching try to identify the example correctly before the opposing team.
- No words are used on the sketch, however, allow symbols for specific electrical references and allow numbers where required (10,000 V for example).
- Instead of allowing time for students to research and edit the information onto a card, the teacher can prepare 20+ cards of the examples of electrical safety hazards by cutting and pasting lines from the OHS reference.
- This game can become noisy and correct responses may be overlooked, so guidelines for how teams answer and how to engage all participants is advised.
- Students who are drawing should face away from the audience and turn towards their team when they have completed drawing.
- Try to encourage more than a few students to participate in answering the question by limiting the number of answers an individual can contribute, but allowing the team to help each other prior to answering.
- A small soft toy or "talking stick" can be passed around to identify the student who is next on the team to answer.

Science

My Chemical Song (or Poem)

Chemical Hazards

Pages 4–25
C-Types Slide 2, 3, 4, 6, 7, 8

Grade 9 Science

POS Learning Outcome: Unit B: Matter and Chemical Change
Investigate materials, and describe them in terms of their physical and chemical properties. Investigate and describe properties of materials (e.g., investigate and describe the melting point, solubility and conductivity of materials observed).

Student Activity: Write verses to a poem or song that describes materials and their physical and/or chemical properties.

Time Required: 60 minutes

Resources/Equipment Needed:

- one computer with internet connection, speakers and one computer projector
- student notepaper
- reference list of materials with physical and chemical properties, one per student or pair of students
- one copy of "Sodium Chloride, a Poem"

Lesson Outline:

- Begin by sharing an example of a song parody (Youtube) using the internet and projector to generate interest and demonstrate an exemplar final product. Some examples found on Youtube are:

  Mr. Edmond's *The PROPERTIES Song*
  www.youtube.com/watch?v=uJOGy0dgmUU

  Mr. Edmond's *The CHEMICAL BONDS Song*
  www.youtube.com/watch?v=BCYrNU-7SfA

- Recite one simple verse example for the students and/or read out the Sodium Chloride Poem. Suggest simple, familiar tunes to use to build the song verses.

- Students are given a minimum number of verses of about three to five as a target goal for the assignment.

- Students are given a recommendation for the minimum number of properties to use for the assignment (varies depending on references available to students).

Sodium Chloride, a Poem

My name is Sodium Chloride that's me on your table

I can sit there for years, because I'm so stable

I can take the heat up to 800 degrees

Before I melt and change physically.

If you change me chemically, I will split in two

Ions of Sodium and Chlorine and you will wonder who

Who are these two? They are so different, one is metallic

Also violent in water, not so angelic

The other one is Chlorine, give her a pass

Toxic, green, she is an evil gas.

Who would have thought they would get together

To form a perfect shape so symmetrical

As a salt they're a crystal, some say square,

I think they complement each other, a perfect pair.

Sodium is happier with Chlorine, she's his best pal

Together they chemically get on so well.

Science

Corrosive, Oxidizing and Reactive Household Product Poster

Chemical Hazards

Corrosive Pages 15–16, Supplemental Information Pages 120–121, C-Types.ppt Slides 3–4
Oxidizers Page 19–22, Supplemental Information Pages 124–130, C-Types.ppt Slide 6
Reactive Materials Pages 23–25, Supplemental Information Pages 134–136, C-Types.ppt Slide 7

Grade 9 Science

POS Learning Outcome: Unit B: Matter and Chemical Change
Describe and interpret patterns in chemical reactions. Identify and evaluate dangers of caustic materials and potentially explosive reactions.

Student Activity: Students use household advertisement flyers to collect product samples containing chemicals that could cause harmful reactions. Three types of harmful chemical categories are: corrosive, oxidizer or reactive chemicals. Students create a poster showing a collection of products identifying the type of chemical they contain and an example of a chemical or product that would be harmful if mixed with the first product.

Time Required: 45–60 minutes

Resources/Equipment Needed per student or pair of students:

- research material for identifying common chemicals in the three categories (website for identifying corrosive and oxidizing household chemicals, as well as flammable and poisonous: www.ci.redding.ca.us/solwaste/documents/HHW/COMMONHOUSEHOLDHAZARDOUSWASTES.pdf)
- one or two flyers from retail stores – Walmart, Canadian Tire, drug stores, etc. (flyers are easily acquired from recycle boxes)
- scissors
- glue
- newsprint for poster paper

Science

Lesson Outline:

Students need time to complete background information for the three types of chemical hazards before beginning poster activity. Students should then identify household products containing hazardous chemicals, for example: hair dye, bleach, fertilizer, drain cleaners, batteries, window cleaners, swimming pool disinfectants, tooth bleaching products, oven cleaners, bathroom/toilet cleaners, eye drops and batteries. Students then look through the flyers and cut out several products. Each product is displayed on one side of the poster. Beside the product picture on the poster, the student includes a short description on how to avoid a hazardous chemical reaction.

Science

Flammable and Combustible Materials Mix and Match

Chemical Hazards

Pages 11–14, Supplemental Information Pages 113–119, C-Types.ppt Slide 2, SD-Options.ppt Slides 3–4

Grade 9 Science

POS Learning Outcome: Unit B: Matter and Chemical Change
Demonstrate knowledge of WHMIS standards, by using proper techniques for the storage, handling and disposal of laboratory materials.

Student Activity: Students match the correct definition to the terms given a mix and match handout for Flammable and Combustible Materials.

Time Required: 20–30 minutes

Resources/Equipment Needed:

- prepared handout for mix and match facts (see the following table with six examples)
- student resource for WHMIS Flammable and Combustible Materials
- scissors
- glue stick
- optional internet/computer and projector for video clips of flammable hazards and controls:
  - Flammable and Combustible Liquids Safety Video (1 min) www.youtube.com/watch?v=CjbkY8n5XJE
  - Flammable Liquids Safety from SafetyInstruction.com (2 min) www.youtube.com/watch?v=2DdgQ9QpFbs
  - Hazardous Materials Team Training, part 1 (7 min) www.youtube.com/watch?v=tw7xmCSuV1s

Lesson Outline:

Use the video clips to provide examples for storage, flashpoints and hazardous materials training, etc., to introduce the activity. Students should have a printed copy of reference material on flammable/combustibles to help them identify a set of terms with the correct definition on the mix and match handout. On the handout the terms in the third column are cut and pasted into the middle column beside the correct definition.

Answers:

1. static electricity
2. flashpoint
3. flammable liquid
4. combustible liquid
5. approved oily waste disposal cans
6. safety cans
7. upper explosive limit (upper flammability limit)
8. fire
9. fire triangle
10. lower explosive limit (lower flammable limit)
11. flashback
12. static collectors
13. spontaneous combustion
14. auto-ignition temperature
15. bonding and grounding
16. endothermic reaction
17. exothermic reaction
18. vapour pressure
19. asphyxiation
20. flammable materials

Flammable and Combustible Materials Mix and Match

Definitions	Paste correct term
1. an electric charge that cannot move	
2. the lowest temperature at which a flammable or combustible liquid gives off enough vapour to form an ignitable mixture with air	
3. a liquid with a flashpoint below 37°C (100°F)	
4. a liquid with a flashpoint between 37°C (100°F) and 93°C (200°F)	
5. made of metal and have self-closing lids	
6. have spring-mounted spout caps that automatically open when the vapour pressure builds up inside	
7. the maximum concentration of flammable vapour in air that will burn	
8. the main hazard from flammable and combustible chemicals	
9. commonly used to model how a fire starts and how to prevent it	
10. minimum concentration of a flammable vapour in air that will burn	

Cut out term

approved oily waste disposal cans

combustible liquid

fire

fire triangle

flammable liquid

flashpoint

lower explosive limit (lower flammable limit)

safety cans

static electricity

upper explosive limit (upper flammability limit)

Definitions	Paste correct term
11. flames travelling back to the container or source of ignition	
12. devices used on moving equipment parts and nonconductive materials	
13. occurs when a material in contact with air can heat up enough, on its own, to burn	
14. lowest temperature at which a flammable material will ignite on its own	
15. techniques used to prevent sparks from being created when liquids are transferred between containers	
16. a chemical reaction that absorbs heat	
17. a chemical reaction that gives off heat	
18. a measure of a liquid's ability to evaporate	
19. a hazard from flammable gases and vapours accumulating near the ground	
20. substances that can ignite easily and burn rapidly	

Cut out term

asphyxiation

auto-ignition temperature

bonding and grounding

endothermic reaction

exothermic reaction

flammable materials

flashback

spontaneous combustion

static collectors

vapour pressure

How to Clean Up an Oil Spill

Chemical Hazards

Liquids Page 11 and Controlling Chemical Hazards Pages 41–43

Grade 9 Science

POS Learning Outcome: Unit C: Environmental Chemistry
Analyze and evaluate mechanisms affecting the distribution of potentially harmful substances within an environment.

Student Activity: Students will use samples of common everyday materials such as: an original paper container, sand, paper towel, synthetic fibres, paper funnel cups, etc., to capture the most vegetable oil floating on water.

Time Required: 60 minutes

Resources/Equipment Needed:

- sand supply bucket – about 250 mL per student group
- paper towels – limit surface area equal to other similar supplies (synthetic fibres, etc.)
- fabric samples the same surface area of paper towel (use a variety of synthetic and natural fibres)
- paper or plastic drinking cups (funnel shaped cups would be more effective)
- vegetable oil, about 50–100 mL per group
- basin, bowl, beaker or container with the same surface of water per group
- paper and duct tape for improvised designs
- 50–100 mL measuring beaker or cylinder
- optional student supplies brought from home
- water supply
- newsprint for "land" area to deposit device oil collected
- 250 mL beaker for depositing oil on "land"
- dish soap and towels for cleanup

Science

Lesson Outline:

Students have previous knowledge of organic hydrocarbons and their chemical and physical properties. Students have also previously studied the effects on the environment when proper storage, handling and transportation methods for liquid hydrocarbons are not followed correctly.

Use examples of news articles from the Gulf of Mexico 2010 to highlight the environmental impact of an oil spill in coastal waters. Students will then be given a simulation of an oil spill by measuring 50–100 mL of vegetable oil into a container with a surface area about the size of a small basin. Each student group is asked to design a device that will collect the most oil from the surface of the water.

Given a choice of materials, students are allowed to select only one type of material plus any amount of notebook/cartridge paper and waterproof duct tape to assist designing a device that should pick up oil in a minimum number of passes (approximately 3–5) over the spill, while holding the device in their hand.

A time limit of 20 minutes maximum should be used for designing and assembling their device so that all student groups are ready to begin the simulation at approximately the same time. Students begin their first pass over the spill and deposit either the oil and/or material containing oil into the "land" beaker. Students continue using the device until they have used up the maximum number of passes or have successfully collected all of the oil from the surface.

Students should be given time to debrief the class about their device including the success and suggestions for improvements for the device. Following the debrief, students could vote on the device they think would be the most practical in a real situation given the problems associated with collecting and recovering oil from the environment.

Lethal Dose Hunt

Chemical Hazards

Pages 17–18 and 26–29, C-Types.ppt Slide 5, D-HowExposed.ppt Slides 1–3

Grade 9 Science

POS Learning Outcome: Unit C: Environmental Chemistry
Comprehend information on the biological impacts of hazardous chemicals on local and global environments, by interpreting LD_{50} data and other information on toxicity.

Student Activity: Students choose from a prepared list of one or more common substances that are used in typical workplaces (paint, pesticides, etc.). Students research to find out what hazardous chemicals the sample could contain and the LD_{50} lethal dose and/or LC_{50} concentration of the chemical. Students are "on the hunt" to find substances that they think would be the most toxic.

Time Required: 30–45 minutes

Resources/Equipment Needed:

- one internet/computer per student for research of chemical contents of substances
- optional MSDS one per group or per student in addition to internet resource
- newsprint chart with a scale from 0–50 titled "Lethal Dose (LD_{50})"
- optional newsprint chart for 0–50 "Lethal Dose Inhaled (LC_{50})"
- clear tape or glue sticks – one per small group of students

Lesson Outline:

Students should have previous knowledge of how toxins/chemical hazards enter the body (ingestion, inhaling, skin absorption or puncture). Students also should be familiar with the WHMIS and Consumer Label Symbols (Household Hazardous Products) for toxicity.

Science

As part of this activity, students should be given an introduction to the LD_{50} and LC_{50} lethal dose definitions. Use an example to explain such as, "If a dose of 5 mg of Chemical 'A' killed 50 rats out of 100, and a dose of 75 mg of Chemical 'B' killed 50 out of 100 rats, which chemical is the most lethal?" Chemical A is the most lethal as less is required to kill the same number of rats. The low LD_{50}/LC_{50} numbers are the most lethal toxins. LD_{50} is measured in milligrams per kilogram of body weight ingested or applied to the skin that will kill 50% of an animal (rat) population. LC_{50} is the inhaled amount measured in parts per million that would kill 50% of the animal population.

Students select a product to research from the prepared list. Examples of products that contain toxic chemicals that could be found in the workplace are: paints, paint removers, liquid correction fluid with a solvent base (most currently used are water based), cleaning fluid, including window-cleaning fluid and cleaning products such as those used for whiteboards or desk tops, photocopier toner, photo developing chemicals, toners, and developers, rubber cement and other glues, pesticides, car antifreeze and asbestos. Other everyday "safe" chemicals are lethal in high doses such as: toothpaste (sodium fluoride), paracetamol (over the counter painkiller), vitamin D, clove oil, mouthwash, table salt, oxygen, and even water are toxic in high quantity.

Students will need a short time (15 minutes) to research and locate the MSDS online for a particular chemical found in the common workplace products. Different publications of MSDS have the LD_{50}/LC_{50} numbers in different locations on the multi-page documents for each chemical. Teachers should prepare a recent overhead example to guide the students to the correct location.

Students create a "lethal dose" sticker for the wall chart with an original sketch beside the product/chemical name and LD_{50}/LC_{50} and apply the product stickers to the wall chart between 0–50. The student who applies the lowest number to the chart has found the most lethal product and should be recognized.

Extension: Students apply their knowledge of scientific method to identify the factors that need to be controlled to conduct an experiment to produce reliable lethal dose numbers. The age of the animals, body mass, health, type of animal, number of animals tested at once and time spent in captivity (stress) etc., can all affect experiment results.

Mystery Chemical Curator

Chemical Hazards

Pages 26–34, 48–50, D-HowExposed.ppt Slides 1–3, E-Forms.ppt Slide 1, F-ExposeRoutes.ppt Slide 1, I-Controlling.ppt Slide 5

Grade 10 Knowledge and Employability Science 10-4

POS Learning Outcome: Unit A: Investigating Properties of Matter
Communicate and demonstrate safe handling, storage and disposal of household and workplace substances, using the Workplace Hazardous Materials Information System (WHMIS) and Hazardous Household Product Symbols (HHPS).

Student Activity: Students will read the labels of 5 mystery products and correctly identify the correct way to handle, store and dispose of mystery chemicals given a short list of options from which to choose.

Time Required: 30–45 minutes

Resources/Equipment Needed:

- copy or original labels from 5 household and/or laboratory chemical products with the name of the product omitted (label products A–E)
- student copy of checklist, see the following example
- optional Material Safety Data Sheet one per group (These are supplied with chemicals upon delivery and/or are kept in a booklet in the chemical storage area.)
- optional examples of chemical waste and storage containers

Lesson Outline:

Students have previous knowledge of the information symbols and categories of a WHMIS and HHPS label prior to this activity. A previous lesson on the handling, storage and disposal of the main categories of hazardous chemicals is recommended. The teacher should review the ways in which chemical hazards can enter the body and the forms of chemical hazards as for pages 26–34 in the OHS reference.

Knowledge and Employability Science 10-4

For the activity, students will be asked to use the information on the Mystery Chemical labels to select the correct personal protective equipment that should be used prior to handling the chemical as well as the correct storage and disposal options. For example, if Chemical "A" has a label with the symbol that represents a corrosive chemical, the student should select gloves, eye protection, and respirator on the checklist. For storage of the corrosive chemical, the student should look to the options presented and select ventilated storage, flammable proof cabinet, and any other recommended options as for the particular type of chemical. Students complete the checklists for each chemical before comparing to an answer key provided by the teacher.

Mystery Chemical	A	B	C	D	E
Handling **Personal Protective Equipment Options** 1. Eye protection 2. Chemical resistant gloves 3. Chemical resistant apron 4. Respirator 5. Covered-toed shoes					
Storage Options 1. Flammable materials cabinet 2. Organic material shelf 3. Inorganic material shelf 4. Sealed container with oil					
Disposal options 1. Flush down drain with plenty of water 2. Mix with base before flushing with water 3. Mix with acid before flushing with water					

Extension: Students are given the complete chemical name for each product to compare their recommendations to the MSDS recommendations. OHS reference pages 56–58 for MSDS.

Case Studies: Rights and Responsibilities

OHS Reference Material

Health and Safety Management Systems Page 8
Legislation Pages 4–10 (Regulation Section 1 and 2)

Grades 10–12 CALM

POS Learning Outcome: Career and Life Choices C10
Investigate employer and employee ethics, rights and responsibilities.

Student Activity: Students are given a case study to either read or perform as a skit. Following the case study the students are asked to evaluate the response of the employer and the employee in the scenario as to who has the correct solution to the situation as well as identify the correct right and/or responsibility that supports the student decision.

Time Required: 15 minutes per case study, 30–45 minutes per lesson

Resources/Equipment Needed:

- three separate case studies, one copy of each per student (see the following example)
- student copy of the Rights and Responsibilities of the Employer and Employee

Lesson Outline:

One to three case studies in paragraph form are written involving a situation where the employer and the employee disagree on what action should be taken on a work site. Students can read individually or work in small groups and/or act out the scenarios. Students will then decide if the employer or employee has the correct solution for each scenario. Students should also identify the particular legislation regulation that justifies the outcome.

Career and Life Choices

Case Study: Furniture Factory

John the cabinet maker owns his own shop. He was using his lathe and a chisel tool to craft a spindle leg for a table. The spindle slowed down unexpectedly and then began to speed up to normal operating speed. John wondered if this was a one-time power surge and continued working. When it happened again, he looked at the power cord plug and noticed it was loose in the wall and would not stay in place without constant pressure on the cord. John used duct tape to hold the plug in place. When he was finished, worker Joe needed to use the lathe. While using the chisel on the lathe, the device slowed down making the chisel ineffective, so Joe pressed harder with the chisel into the wood. The lathe suddenly sped up and the chisel flew out of his hand and cut his arm.

Joe complained to John that the device was defective and Joe was owed compensation for his injuries. John told Joe that he should have been more careful using the chisel and should know not to press too hard into the wood. John stated that he was not responsible for Joe's carelessness.

Solution: Joe is correct

Positive and Negative Stress Activities

Psychosocial Hazards
Stress Pages 12–13, C-Types.ppt Slide 3

Grades 10–12 CALM
POS Learning Outcome: Personal Choices P8
Develop and assess strategies for anticipating, identifying, managing and embracing change. Recognize that change and stress are inevitable in life.

Student Activity: Students compete in relay type activities to demonstrate positive and negative types of stress.

Time Required: 30 minutes

Resources/Equipment Needed:

Task A

- one pair of thick socks or gloves per team
- one foil wrapped Hershey kiss chocolate per person per team in one open container

Task B

- 50 to 100 small confetti sized pieces of paper per team (Take the paper from a hole punch or cut strips into small square pieces using a paper cutter.)
- a small dish or open container for the paper confetti per team
- one pair of tweezers
- one stopwatch per team

Task C

- five to ten samples of anagram word puzzles or another problem solving puzzle on one sheet of paper (one paper per team)
- one copy of lyrics to a popular song per team

Lesson Outline:

Divide the group into two teams. Each team can divide into three groups, one for each activity A, B or C. Teams can rotate to each activity when complete, or teams can complete only one activity to reduce overall time for activities. Following the activity time, teams will discuss the activity and decide if it was a positive or negative stress situation. Summary questions following the completion of all activities will help students identify factors of positive and negative stress that are part of everyday lives.

Task A: Hershey Kiss Relay

Teams line up behind a supply of foil wrapped Hershey chocolate kisses. The first person on the team puts the socks or gloves on their hands. They select one chocolate and unwrap it in order to feed it to the second person in line. When the team has each completed the task, they signal that they are complete. The first team is the winner. This is a positive stress example as teamwork is encouraged, everyone has the same goal and contributes to the team's success. The task is easy and quick to perform. A tasty treat is also motivating to participants.

Task B: Birdies in the Nest Relay

Teams line up behind the first person who has a pair of tweezers and the same number of confetti pieces as the other competing team. The confetti or "Birdie" is sprinkled on the desk or table. The first person has to pick up each piece of confetti with the tweezers and place it in the container "nest." One person from the opposite team is the timer for that team. If the person takes longer than sixty seconds (or similar time line) the confetti in the nest is dumped back on the table and the same person starts over. Once the nest is full, they dump the paper on the table and hand the tweezers to the next participant on the team. The first team to complete the task is the winner.

Participants may feel less satisfied with this repetitive task and may feel more pressure from teammates to "hurry up." Time to complete task is unreasonable and lack of success is punished by starting over. After completing the frustrating task, their "work" is negated by starting over again. The only motivation to complete the task is to be first to finish. There are no treats for first or second place.

Task C: Concentration

Only one person from each team will participate to represent the team. The job of the remaining participants is to distract the other team competitor by talking/singing out loud close to the competitor. The participants are given several word anagrams to solve on one paper. The first one to finish accurately is the winner. Time is limited to 5 minutes to finish.

Participants may feel frustrated with distractions and may not be able to complete the task.

Follow up questions:

1. Identify the activities that were examples of positive stress. Give reasons why you think so.

2. Pick one word to describe how you felt after your team completed the task.

3. Identify the activities that were examples of negative stress. Give reasons why you think so.

4. Pick one word to describe how you felt after your team completed the task.

Career and Life Choices

Drug Brochure – Short and Long Term Effects

Psychosocial Hazards

Fatigue Page 7, Supplementary Information on Drugs Pages 46–47

Grades 10–12 CALM

POS Learning Outcome: Personal Choices P6
Determine practices and behaviours that contribute to optimal physical well-being. Analyze safety/risk-taking behaviours, nutritious choices, fitness and exercise as contributors to physical well being.

Student Activity: Students research and create an information brochure describing the short term and long term effects of caffeine, nicotine and alcohol.

Time Required: 45–60 minutes. Good copy work time 30–45 minutes

Resources/Equipment Needed:

- student needs access to reference material from the school library books, health department information booklets or Internet sites
- student notebook for rough copy notes
- one 14" × 8½" paper for each student good copy
- one set of pencil crayons shared for a group of students

Lesson Outline:

Prior to research time for students, provide the criteria for the activity and share an example of a final product. Limit the type and space for each specific categories on the good copy to encourage processing and editing skills. Sample categories to use: description of drug, short term effects, long term effects and contribution to fatigue could be the four category headings. The paper can be folded over into three even spaces "burrito style" to form a brochure. Both front and back can be used to organize information as follows. One picture per drug example is recommended.

Front side of 14" × 8½" paper Brochure

Fold lines

Contributions to Fatigue: Caffeine Nicotine Alcohol		Title: **Drugs and Fatigue**

Back side of Brochure

Caffeine **Short term effects:** **Long tem effects:**	**Nicotine** **Short term effects:** **Long tem effects:**	**Alcohol** **Short term effects:** **Long tem effects:**

The skills used in researching, editing and organizing information are as important as the final product and should be evaluated as such. A rough copy of information including bibliography should be submitted to encourage editing skills. Cut and paste information should be discouraged.

Career and Life Choices

Mental and Physical Fatigue Simulation

Psychosocial Hazards

Fatigue Pages 5–7, C-Types.ppt Slide 1

Grades 10–12 CALM

POS Learning Outcome: Personal Choices P8
Develop and assess strategies for anticipating, identifying, managing and embracing change.

Student Activity: Students experience physical and mental fatigue while participating in two short simulation activities.

Time Required: 15–20 minutes (two people to complete two stations)

Resources/Equipment Needed:

- one large textbook per small group of students
- one stopwatch or timing device per group
- two similar math exercises of about 30 problems using multiple operation type of questions per two students.
  (Students will need to follow basic BEDMAS rules to solve. Between every 5th or 6th math question, insert a direction to get up and do a different task [sharpen your pencil, write your name on the board] before returning to their seat and proceeding to the next math question. The same directions should be put in different order on the second math sheet so that two partners who are competing are not doing the same tasks at about the same time, which will intentionally add to the mental fatigue.)
- separate answer paper for students to self mark math problems to score for accuracy
- paper to record data for first and second trials for each of the simulations

Lesson Outline:

Divide students into two groups—one for each activity. Multiple sets of equipment can reduce the size of each group to a minimum of four students. Following completion of the activities, students can discuss how physical and mental fatigue occurs in a work situation.

Activity #1: Simulation of Physical Fatigue

Student A will hold a large textbook of about 1.5 kg or more with one hand, out to the side at shoulder height. The textbook should be positioned flat, parallel to the ground. The arm must remain motionless from the start until the student can no longer hold the position due to fatigue. Partner B starts the stopwatch and stops it when Student A either attempts to move position or lowers arm due to fatigue. Student A is then allowed a 15 second rest and attempts a second trial.

The second trial is expected to have a shorter duration to demonstrate the need for appropriate rest intervals. Students can calculate the change in performance efficiency by dividing the second time by the first and multiplying by 100 to equal a negative change in % efficiency. The students can discuss workplace situations where physical fatigue could occur.

Activity #2: Simulation of Mental Fatigue

Student A and B are both asked to follow all the directions on the paper and be the first to finish with the greatest accuracy. Both students start at the same time. At first glance, the paper appears to be math problems only. The student's focus will be constantly interrupted with directions to do a silly task (go sharpen your pencil) every few questions. The student's accuracy on the math problems should decrease the further along they get in the process. The students should discuss the cause and effects of mental fatigue as it relates to a workplace situation.

Extension: Given a specific job scenario, students identify examples of physical and mental fatigue in the workplace.

Career and Life Choices

Bullying Role Playing

Psychosocial Hazards

Pages 16–17, Review Questions and Answers Pages 23–26
C-Types.ppt Slides 5–6, Handout 5, page 35

Grades 10–12 CALM

POS Learning Outcome: Personal Choices P10
Examine various attitudes, values and behaviours for developing meaningful interpersonal relationships. Develop strategies for identifying unhealthy relationships and for dealing with exploitation and violence in relationships.

Student Activity: Groups of three students are given a scenario to act out where bullying occurs.

Time Required: 10 minutes per scenario including follow up discussion. Three scenarios performed for the class per lesson.

Resources/Equipment Needed:

- three bullying scenario skit cards, one per group of three students
- students can use whatever is on hand as props to assist their performance of the skit

Lesson Outline:

Part of the class will be the performers and the rest of the students will analyse the scenarios following the performances. A pre-written script such as the examples given are preferred rather than allowing students to create their own scenario. Student performers and audience will follow up with discussing probable solutions for reducing bullying in the workplace.

Bullying Skit Card #1

Performer #1: "I am a supervisor at a local fast food restaurant. (Insert name of *Performer #2 and #3*) _____ and _____ are employees."

Performer #2 and #3: pantomime a typical work related task at the same pace.

Performer #1: "Hey you, I need to talk to you (points at *#2* and is speaking loud enough for other performer to hear). Come here! Now! I said, now! Get over here (continue using pointing gestures and improper body language). Listen, I don't know why you were hired, my grandmother could do this job better than you. You are slower than a retard, can't you do any better? I expect better work out of all my employees. Now get back to work and don't give me a reason to let the boss know that you can't measure up."

Performer #2: Moves back to work beside *#3* with head down and a sad face.

Performer #3: "What was that all about?"

Performer #2: "I don't know, I thought I was doing all right."

Performer #3: "Well if it was me, you know what I would do...."

End scene and refer to follow up questions.

Bullying Skit Card #2

Performer #1: "I am the job supervisor at a big box store. These two people are workers in my department."

"Welcome to the weekly staff meeting. These are your job assignments for the week. (Insert name of *Performer #2*) I want you to be the store greeter. Be friendly and smile. For your second shift, I want you to be security detail in the electronics department. If you suspect a potential theft, take a photo with this camera, do not confront anyone."

"(Insert name of *Performer #3*), I want you to stock and catalogue the new shipment of auto parts. Joey has been off sick for a few days so there is a bit of catch up to do and you will be alone. We need a full report today before the next shipment arrives tomorrow. Don't leave today until that is done. Your second shift will be the maintenance of the public washrooms. The health inspector is due to arrive tomorrow, so do a good job."

End scene and refer to follow up questions.

Bullying Skit Card #3

Performer #1: "I am a supervisor in a retail store. I have two new employees, (names of *Performer #2 and #3*) _____ and _____. "

(*Performer #1*: behaves in an agitated manner before addressing *Performer #2*). "Hey, _____ (name of *Performer #2*) I want you to go to the third checkout and collect all the garbage. No, never mind, you should have done that earlier, you don't have time now. You need to restock the back shelf with the new appliances because we have a big sale tomorrow. Then set up the display area out front with the new shelving."

Performer #2: moves a few feet away and pantomimes duties.

Performer #3: is off to the side performing stacking duties.

Performer #1: pauses for five seconds and approaches *Performer #2*.

Performer #1: "What are you doing back here? I need you to set up the display area. I told you I needed that shelving ages ago. I can't do everything around here. Get out there and get that done. Wait a minute, you go _____ (name of *Performer #3*) and do the job. Go over there, and send (*Performer #2*) _____ over to me."

End scene and refer to follow up questions.

Follow up questions:

1. What do you think #3 is going to say and how will that affect the situation?
2. What type of example is this bullying scenario? (Refer to Handout #5.)
3. What reason would cause the supervisor to treat *Performer #2* in a bullying manner?
4. What could a worker or workers do to prevent this type of bullying situation?

Ten Minute Epidemic

Biological Hazards

Pages 6–8, 17–18, C-Types.ppt Slide 1, D-HowEnter.ppt Slides 1–4

Knowledge and Employability Science 20-4

POS Learning Outcome: Unit C: Disease Defence and Human Health
Examine the relationship between human health and environmental disease-causing agents. Describe how different communicable diseases are transmitted and how they affect human health.

HCS1100: Infection & Immunity 1

POS Learning Outcome: 1.6 – Explain how communicable infections occur (chain of infection), including (1.6.3) discussing person-to-person direct contact.

Student Activity: This activity demonstrates how communicable diseases spread through everyday contact. Students will be given a small container of about 20 mL of clear liquid (water) and an eyedropper to exchange "sneezes," etc. with other students. One student is given the "diseased" container of 20 mL of 1.0 M sodium hydroxide. After students have rotated through different partners, a chemical indicator is added to all student liquids to reveal if they contracted the "disease."

Time Required: 30–45 minutes

Resources/Equipment Needed:

- one clear plastic cup or 80 or 100 mL beaker per student (Even number of cups, teacher joins in if odd number of students.)
- one eyedropper per student
- one pair of eye protection per student
- one 10–15 mL supply of phenolphthalein base indicator with eyedropper
- 10 mL of 1 molar sodium hydroxide
- student note paper

Knowledge and Employability Science 20-4

HCS1100: Infection & Immunity 1

Lesson Outline:

This lesson demonstrates how epidemics and pandemics occur. Prior to the activity, prepare the student equipment. Fill the small cups with about 20 mL of water and add one eyedropper. In one of the cups, add only the aqueous 1 molar sodium hydroxide. When students select a cup at random, they should spread out and wait to start at the same time. Students are not aware of the identity of the chemical in any container. Students wear eye protection as sodium hydroxide is caustic at high concentrations. (1 molar is classified as an irritant.) Students are instructed to use the eyedropper to share liquids to represent a typical sneeze, cough or contact with another person.

Declare different areas of the room as examples of different locations either in a business or another country. For the first round, students are asked to keep to one location. At the same time, students exchange one or two eyedroppers of liquid from their own container to one other person. Record the name of that person as "first exchange." Students are then asked to move to a different location and exchange with only one other person. Again, record the name of the person. Continue exchanging until the probability of students contaminated by the diseased beaker is less than the number of students in the class.

The probability of the maximum number of students "infected": after the first exchange = 2, after the second = 4, after the third = 8, after the fourth = 16, after the fifth = 32. When you have finished the set number of exchanges, students should gather around a common table to see if they have been "infected." The teacher adds a couple of drops of phenolphthalein to each beaker. Any students with sodium hydroxide should turn a bright pink indicating they were "infected." Using the list of student exchanges, students try to work backwards from the last exchange to the first to try to determine the two people who were infected at the first exchange, the source of the outbreak.

During the SARS outbreak in North America in 2002/2003, the WHO were able to trace the source of the outbreak in Canada back to Hong Kong. Students can calculate the number of people who could be infected in an eight hour work period if a person made physical contact on average every 30 minutes. (answer = 65,536)

Extension: Students research a viral disease that can reach epidemic or pandemic proportions. Examples: Norovirus, H1N1, Influenza, Chicken pox, Measles, HIV, West Nile.

Cast Iron Chef Bio Hazard

Biological Hazards
Pages 11–16, F-Controlling.ppt Slides 1–9

Knowledge and Employability Science 20–4
POS Learning Outcome: Unit C: Disease Defence and Human Health
Show concern for safety when conducting and reviewing activities (e.g., follow proper food-handling and preparation processes when working in the kitchen, show consideration when ill by limiting the exposure of others to disease-causing agents).

Student Activity: Students will write a narrative short story scenario for a meal preparation where multiple biological hazards are encountered along the way.

Time Required: 45–60 minutes

Resources/Equipment Needed:

- introductory video of an Iron Chef Spoof—an example from Sesame Street: Jason Schwartzman sneak peek! (1 minute): www.youtube.com/watch?v=94rDM7Bf9qo
- computer/internet and projector
- student notebooks

Lesson Outline:

Students have studied the types of biological hazards, types of communicable and non-communicable diseases and how they are transmitted. A review of how different biological hazards can be ingested should precede this activity. A short video clip that is a parody/spoof of the popular cooking shows such as "Iron Chef" can be shown to get the students thinking about a food preparation scenario.

Students will write a short story that describes a chef preparing to cook a meal for a situation such as the popular television show "Iron Chef." As the chef in the short story assembles the food and contacts various surfaces, the writer as narrator will point out all of the possible examples where a biological hazard is entering the food. The student writer should aim for a minimum of 5–10 biological hazards.

Knowledge and Employability Science 20–4

For example, the following biological hazards could be included: cold virus from a sneeze, hepatitis "B" from fecal contamination incubated in melons, salmonella from cracked egg, blood from a knife cut, E.coli from a dirty dish rag/plates not dried, etc. The story can be humorous and exaggerated. An additional criterion could require students to identify the preventative step that should have been attended to at each biological hazard example mentioned in the story. Students could also choose to write a script and act out the scenario given more time. Students with lower reading and writing skills would benefit from using a cartoon sequence to demonstrate their knowledge of biological hazards in food preparation.

Pathogen Memory Card Match

Science 30

Biological Hazards

Pages 3–10, C-Types.ppt Slide 1, D-HowEnter.ppt Slides 1–5, E-HowSpread.ppt Slides 1–3

Grade 12 Science 30

POS Learning Outcome: Unit A: Living Systems Respond to Their Environment 30–A2.1k
Describe how pathogens in the environment (e.g., mosquito-borne parasites, bacteria, viruses) enter the circulatory system and may have an adverse affect on health.

Student Activity: Using 20 or more pairs of cards representing the name of a pathogen and their method of entry into the body, students spread out the cards face down. Each player turns over two cards at a time trying to find a match. Players watch each turn to remember where the matching cards are. Optional third category could include a specific method of control.

Time Required: 20–30 minutes

Resources/Equipment Needed:

- 20 to 30 matching cards per small group of students (see the following example of 10)
- scissors to cut out the cards from the template columns
- one zip lock bag per student group to store the cards

Lesson Outline:

Students will have covered the Four Basic Routes Pathogens prior to this activity. Students will need to cover the Types of Biological Hazards and examples from Biological Hazards pages 3–4.

The teacher prepares cards using two columns, the first card in the row is an example of a pathogen (example: Hantavirus). The second card in the same row is an example of a method of how that pathogen is transferred from one host to another and/or enters the body (example: Inhalation of dry mouse droppings).

See the following example of ten pairs of matching cards. Use the same coloured dot or symbol in a corner to represent a correct match. The method of transfer should be a specific example in order to avoid more than one method card matching a pathogen card type. Some method cards may need two symbols indicating they are correct matches for two specific pathogen examples (see the following example for Mono and Hepatitis A). Use the examples on pages 8–9 of Chapter 6 to create matching cards and/or references on: viruses, bacteria, fungal and diseases caused by single-celled organisms in order to prepare 20 or more cards. Cut the cards apart for the game and place in one ziplock bag per team.

To play the game, the students place all the cards blank side up and move them around on a table to "shuffle" the cards. The first person is allowed to pick up two cards. If they match, the player keeps the cards in their "points" pile. If they don't match, the player turns them back to blank side up. Each player takes only one turn each until all the cards have been matched. Player with the most cards wins.

Pink Eye Bacteria	*Absorption through hand to eye human contact*
Hepatitis A Virus	*Ingestion: Sharing pop and food*
Hantavirus	*Inhaling dry mouse droppings*
Lyme Disease	*Insect bite from deer tick*
West Nile Virus	*Insect bite from mosquito*
Athlete's Foot Fungus	*Shared footwear/skin contact*
Mononucleosis Virus	*Ingestion, saliva from humans*
HIV	*Injection from tattoo needles*
Salmonella Bacteria	*Ingestion of undercooked chicken*
Tetanus Bacteria	*Ingestion of agricultural soil on unwashed hands*

Simon Says Lift!

Ergonomics

Pages 25–28, I-MaterialsHandling.ppt Slides 9, 11–13

HCS1050: Musculoskeletal System

POS Learning Outcome: 4.4.3 – Proper lifting techniques and ergonomics to musculoskeletal health.

Student Activity: One student from each small group is given the task of lifting a medium sized box containing a mass equal to two textbooks to three different height lines on the wall chart. For trial #2, the student is given a directive from the group ("Simon Says") to demonstrate a specific negative posture. The group records positive points on a checklist after each trial. The "lifter" also gives feedback to the group after each trial. For trial #3, the group gives the "lifter" an example of a correct posture to demonstrate. Groups can rotate lifters and give different negative and positive posture directions for "Simon Says."

Time Required: 20–30 minutes

Resources/Equipment Needed:

- one medium sized box per small group of students
- two or three textbooks with a total mass of 5 kg or less to place in the box
- masking or packing tape to seal the box and secure the bottom
- large newsprint or roll of "banquet table paper" for wall chart
- marker pens for wall chart

Lesson Outline:

Tape paper to the wall approximately 30 cm higher than the height of the average student. Draw three horizontal lines, the first line at knee height or slightly lower, the next at waist height and the third above shoulder height. These lines can be redone in a different colour for subsequent students to adjust for their individual height.

The students demonstrating the lift techniques are given a medium-sized box with one to two large textbooks inside up to 5 kg mass maximum. The mass should not be easy to lift with one hand and can be free to shift in the box forcing the student to control the box when lifting. The mass should not be too difficult for a student to lift with two hands. The box should be placed at least one metre away from the wall to force the lifter to decide how to bring the box to the line (twist body?) One student completes three trials while the rest of the small group uses a checklist to evaluate the lifting process for positive qualities as for a checklist.

For the first trial, students are not given any specific advice on lifting technique from the group. The student must lift the box containing the mass from the ground first to a low position, about knee height, as marked on the wall. The bottom of the box should reach the horizontal line before the student replaces the box on the ground. The same student then lifts the box to the medium position and back to the ground, and lastly to a high position before replacing on the ground.

For the second trial, the student is given some bad advice as for lifting posture, "Simon Says" from the group (the opposite of the four key points for lifting as for page 26–27, I-MaterialsHandling.ppt Slide 10). For the second trial, the student will repeat the three lifts following the bad advice. The "lifter" then gives feedback to the group as to the ease or awkwardness of completing the lifts.

For the third trial, the student group gives the lifter some good advice from the four key points to lifting. The student then follows the good advice and gives feedback to the group as to ease or awkwardness in completing the task. Following the activity, all students in the group should discuss factors in a work environment that could lead to injury even if correct ergonomic posture is used. Examples of factors are on pages 27–28.

Checklist for lifting:	**Good points observed**	**Student A Performer/Lifter feedback**
Trial 1 No advice	_____	_____
Trial 2 Negative advice	_____	_____
Trial 3 Positive advice	_____	_____

Overall Feedback from performer/lifter:
Most comfortable position(s) and reason _____

Most awkward position(s) and reason _____

Four Key Points to Lifting:

1. Keep the natural curve in your lower back. When standing straight, the lower back naturally curves to create a slight hollow.

2. Contract your abdominal muscles. This improves spine stability and reduces the likelihood of injury.

3. Avoid twisting. Twisting the back can make it less stable, increasing the likelihood of injury.

4. Hold it close. Hugging the load in tight to the body reduces the strain on back muscles and trunk.

Extension: Students use a partner and paper wall chart to draw their best and worst lifting zones as for page 25 in the OHS reference.

HCS3010: Workplace Safety Practices

Psychosocial Jeopardy

Psychosocial Hazards
Pages 4–21, B-Overview.ppt Slide 1, C-Types.ppt Slides 1–8

HCS3010: Workplace Safety Practices
POS Learning Outcome: 2.1 – Describe the principles and practices of workplace health and safety related to the following five hazard identification categories: (2.1.3) psychosocial.

Student Activity: A class of students compete in two teams to play a question and answer game similar to Jeopardy. This game can be played in electronic or paper version for a group of about 20–30 students.

Time Required: 30–45 minutes

Resources/Equipment Needed:

Electronic Version

- one set of 5 or more questions and answers per category for psychosocial hazards (see the following table of 25 example questions and answers provided)
- one computer with one projection device
- one downloaded Jeopardy-like Powerpoint template: www.powerpointgames.wikispaces.com/PowerPoint+Game+Templates

  Several examples are available and easy to set up. Simply type in the question and answer on slides. Electronic buttons for progressing between question, answer and jeopardy game board are already programmed.

Alternate Paper version

- One card sized piece of paper for each student in the class. Premark 25 cards cut from note paper with the letter A, B, C, D or E discretely in the corner of the paper. Have 5 cards per letter for a game of 25 questions. These numbers correspond to the question category on the Game Board. A = Types of Hazards, B = Fatigue, C = Stress, D = Shift work and E = Bullying and Violence. Preparation time is reduced if each card also has a key word (answer) provided for the student to write their own original question.

- One large newsprint paper or white board hand drawn question board grid. Categories are written as column headings, point values 100 to 500, for example, are written in the top to bottom spaces below headings. Display game board prior to playing the game. **Sample game board below**.

Types of Hazards	Fatigue	Stress	Shift Work	Bullying & Violence
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500

Lesson Outline:

After the electronic version is prepared, students can start the game as soon as two teams are arranged to compete for the most points. Each side has one turn to answer one question correctly to win the points. Student teams select the lowest point values first before the question is revealed. When using the electronic version, use a light coloured whiteboard marker to cross off point value boxes. Dark markers will obscure questions and answers on future slides. Students are more engaged if they are allowed to answer only one question each, but they may coach other students before they answer. This prevents a few students from dominating the game, and encourages cooperative learning.

For the paper version, each student will write a question based on the key word provided on the card. Use two coloured pencil crayons, one for Team 1 and the other for Team 2. Give out half of the words from one category to each team. Encourage students to create multiple choice or true/false questions so that only one key word answer can be true. Students should avoid creating "fill in the blank" type questions as a variety of true answers can occur and creates confusion in the game. Instead of using the true Jeopardy style (where a player answers in the form of a question), use traditional questions and answers. Have students write their name on the card and collect the cards. Organize into piles A, B, C, D and E as labelled.

When students from Team 1 select Category A, pick the opposite coloured question card to read out to avoid having teams receive their own questions.

As the game progresses keep score where all students can see the scores. Encourage opposing teams to hum the theme song from Jeopardy to limit the time for the team answering. Keep track of the person who answers by insisting on hands up and select a person who has not yet answered a question. If one team begins to widen the gap, provide a final Jeopardy question for enough points to even out the game at the end.

Sample Jeopardy type questions for electronic version of Psychological Hazards

Types of Hazards	Fatigue	Stress	Shift Work	Bullying & Violence
Q. This hazard could involve working outside regular Monday to Friday daytime hours	Q. True or False: The effects of fatigue can be similar to the effects of alcohol.	Q. What is an example of stress relating to the worker's role in the organization?	Q. What term represents the normal internal body clock that controls our urge to sleep at night and work in daylight?	Q. True or False: Taxi drivers have an increased chance for exposure to workplace violence.
A. Shift work	A. True	A. Role conflict, ambiguity or level of responsibility	A. Circadian Rhythm	A. True, they deal with public in a mobile workplace.
Q. Boring or repetitive tasks can intensify feelings of what type of hazard?	Q. True or False: Giddiness and loss of appetite are signs of fatigue.	Q. True or False: Stress can provide motivation to meet our daily challenges.	Q. What are the two stages of predicable sleep patterns?	Q. What factor exposes nurses, social workers, home visitors to more workplace violence?
A. Fatigue	A. True	A. True. This is called good stress.	A. REM and NREM (rapid-eye movement and non rapid eye movement).	A. Community based setting work

Q. This hazard involves any emotional, physical, social, economic or other factor that requires a response or change.	Q. True or False: An alcoholic beverage will improve your sleep.	Q. What type of health effect of stress include these symptoms; anger, sadness and mood swings?	Q. True or False: Musicians and other night workers are commonly called "Larks."	Q. What type of geographic locations increase the risk of work related violence?
A. Stress	A. False. Alcohol can disrupt your sleep.	A. Psychosocial	A. False. Night workers are called night owls.	A. Isolated or business associated with or close to areas of crime.
Q. The threatened, attempted or actual conduct of a person that causes or is likely to cause physical injury is what type of hazard?	Q. A breathing disorder that disrupts sleep patterns and can lead to fatigue is called what?	Q. What type of health effects can result in symptoms such as grinding of teeth and trouble sleeping?	Q. What is the recommended number of hours of sleep each person should have each night?	Q. True or False: 17 year olds are not permitted to work from midnight to 6 a.m. in a place that sells food or drink.
A. Violence	A. Sleep apnea	A. Physical	A. 8 hours	A. True
Q. This hazard involves verbal comments that could mentally hurt or isolate a person in the workplace.	Q. True or False: Increased tendency for risk taking is not a sign of fatigue.	Q. What type of health effect of stress include these symptoms: changes in hygiene and changes in close family relationships?	Q. True or False: Negative effects of shift work can be lessened if tasks are repetitive.	Q. True or False: According to the legislation, violence must involve injury to a worker.
A. Bullying	A. False	A. Behavioural	A. False	A. False. Threat or attempt to injure is considered violence.

HCS1050: Musculoskeletal System

Body Mechanics and Injury Prevention Pantomime

Ergonomics

Pages 19–28, H-BodyMechanics.ppt Slides 1–3, I-MaterialsHandling.ppt Slide 10

HCS1050: Musculoskeletal System

POS Learning Outcome: 5.1 – Summarize the signs and symptoms of common conditions of the musculoskeletal system, including conditions caused by (5.1.6) overuse or underuse, including strains and sprains.

Student Activity: Students are in small groups or two teams. Each student from the group takes a turn to pull from a container one written example of the types of Musculoskeletal Injuries/MSIs. The student then tries to communicate this example to their team mates given a short time limit (30 seconds).

Time Required: 30 minutes

Resources/Equipment Needed:

- a few props for lifting such as: empty medium size boxes, small objects the size of pencil cases, and cardboard cut outs of various tools such as screwdrivers, electric drills, scissors, etc.
- prepared cards of different examples of specific types of MSI injuries from page 19 of the Ergonomics section one per student, total number equals the maximum size of the largest group
- small containers to hold cards for students to draw from in each group
- timer device with buzzer to limit pantomime time

Lesson Outline:

Students have studied and discussed the cause and effects of the following similar terms: repetitive strain injuries (RSIs), repetitive motion injuries (RMIs) and/or cumulative trauma disorders (CTDs).

The teacher or individual students prepare a list of activities common to a job, home or school activity that could result in a repetitive motion injury. The list of activities are cut into separate examples and put in a container. Students are arranged in small groups or two opposing teams. Depending on the size and group dynamics, small groups will encourage more performers to participate and fewer different examples of repetitive injuries need to be prepared.

This game is similar to a game called "Charades." To start the activity, one student from each group will draw an injury example from the container. They are given a few seconds to study the example and then they will begin to pantomime the type of physical action representing the Musculoskeletal Injuries (MSIs). The student can use a prop to facilitate their pantomime. If the teammates correctly guess the type of injury, the team wins a point. The next member of the team draws the next random injury from the container and begins the pantomime.

Musculoskeletal Injuries and Work Related Examples:

- **Carpal tunnel syndrome**: (CTS) injury to the wrist. **Work related examples**: typing, grocery store checkout, engraving tool vibration, lifting and folding laundry or any repetitive hand motion.
- **Bursitis**: injury causing inflammation to the bursa—a part of the joints. **Work related examples**: Carpet and floor layers, painters and tile setters that require kneeling are at risk for bursitis to the knees. Working with the arms above shoulder level can give rise to shoulder bursitis. Stocking high shelves, moving heavy building materials and cleaning windows.
- **Tendonitis**: inflammation in the tendons; e.g., tennis elbow. **Work related examples**: simultaneous rotation of the forearm and bending of the wrist using heavy frying pans, heavy cleaning, stressful gripping of an object in combination with inward or outward movement of the forearm using a hand tool in construction, jerky, throwing motions, movements to hit objects with the hand.
- **Trigger finger**: injury usually to forefinger from operating triggers on tools. **Work related examples**: Jobs that require repetitive pinching, grasping or heavy lifting can cause the fingers to lock or catch. Often occurs in assembly work, manual labour, and environmental cleaning occupations.
- **Hand/arm vibration syndrome**: (HAVS) numbness and whitening of fingers. **Work related examples**: operating hand-held power tools such as road breakers, hand-guided equipment such as lawn mowers, holding materials being processed by machines such as pedestal grinders.

HCS1100: Infection & Immunity 1

Knowledge and Employability Science 20-4

Ten Minute Epidemic

Biological Hazards

Pages 6–8, 17–18, C-Types.ppt Slide 1, D-HowEnter.ppt Slides 1–4

Knowledge and Employability Science 20-4

POS Learning Outcome: Unit C: Disease Defence and Human Health
Examine the relationship between human health and environmental disease-causing agents. Describe how different communicable diseases are transmitted and how they affect human health.

HCS1100: Infection & Immunity 1

POS Learning Outcome: 1.6 – Explain how communicable infections occur (chain of infection), including (1.6.3) discussing person-to-person direct contact.

Student Activity: This activity demonstrates how communicable diseases spread through everyday contact. Students will be given a small container of about 20 mL of clear liquid (water) and an eyedropper to exchange "sneezes," etc. with other students. One student is given the "diseased" container of 20 mL of 1.0 M sodium hydroxide. After students have rotated through different partners, a chemical indicator is added to all student liquids to reveal if they contracted the "disease."

Time Required: 30–45 minutes

Resources/Equipment Needed:

- one clear plastic cup or 80 or 100 mL beaker per student (Even number of cups, teacher joins in if odd number of students.)
- one eyedropper per student
- one pair of eye protection per student
- one 10–15 mL supply of phenolphthalein base indicator with eyedropper
- 10 mL of 1 molar sodium hydroxide
- student note paper

Lesson Outline:

This lesson demonstrates how epidemics and pandemics occur. Prior to the activity, prepare the student equipment. Fill the small cups with about 20 mL of water and add one eyedropper. In one of the cups, add only the aqueous 1 molar sodium hydroxide. When students select a cup at random, they should spread out and wait to start at the same time. Students are not aware of the identity of the chemical in any container. Students wear eye protection as sodium hydroxide is caustic at high concentrations. (1 molar is classified as an irritant.) Students are instructed to use the eyedropper to share liquids to represent a typical sneeze, cough or contact with another person.

Declare different areas of the room as examples of different locations either in a business or another country. For the first round, students are asked to keep to one location. At the same time, students exchange one or two eyedroppers of liquid from their own container to one other person. Record the name of that person as "first exchange." Students are then asked to move to a different location and exchange with only one other person. Again, record the name of the person. Continue exchanging until the probability of students contaminated by the diseased beaker is less than the number of students in the class.

The probability of the maximum number of students "infected": after the first exchange = 2, after the second = 4, after the third = 8, after the fourth = 16, after the fifth = 32. When you have finished the set number of exchanges, students should gather around a common table to see if they have been "infected." The teacher adds a couple of drops of phenolphthalein to each beaker. Any students with sodium hydroxide should turn a bright pink indicating they were "infected." Using the list of student exchanges, students try to work backwards from the last exchange to the first to try to determine the two people who were infected at the first exchange, the source of the outbreak.

During the SARS outbreak in North America in 2002/2003, the WHO were able to trace the source of the outbreak in Canada back to Hong Kong. Students can calculate the number of people who could be infected in an eight hour work period if a person made physical contact on average every 30 minutes. (answer = 65,536)

Extension: Students research a viral disease that can reach epidemic or pandemic proportions. Examples: Norovirus, H1N1, Influenza, Chicken pox, Measles, HIV, West Nile.