Live Safe! Work Smart!

ERGONOMICS

Health and Safety Resources for Ontario Secondary School Teachers

Produced by a partnership of:

Ontario

WSIB ONTARIO CSPAAT
Workplace Safety & Insurance Board
Commission de la sécurité professionnelle et de l'assurance contre les accidents du travail

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SECTION I
Ergonomics
Grade 11

ARTS

Dance, Grade 11, University/College; Open

TECHNOLOGICAL EDUCATION

Construction Technology, Grade 11, College; Workplace
Hairstyling and Aesthetics, Grade 11, Workplace
Manufacturing Technology, Grade 11, Workplace
Manufacturing Engineering Technology, Grade 11, College
Computer and Information Science, Grade 11, University/College
Computer Engineering, Grade 11, University/College; Workplace
Health Care, Grade 11, College

BUSINESS STUDIES

Information Technology Applications in Business, Grade 11, Open

Teacher's Note:

Before you begin this section you may want to review the Grade 9/10 Live Safe! Work Smart! binder, Ergonomics p. 2-6. That section will remind students what ergonomics is and how injuries progress in stages.

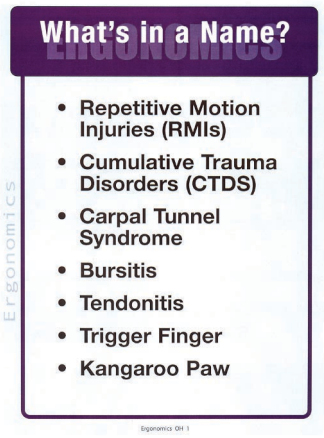
Overhead | **Teacher's Notes**

HOW DO INJURIES HAPPEN?

Repetitive Strain Injuries (RSIs) are among the most common ways workers are injured.

These injuries happen because of the constant use of and wear and tear on the same parts of the body. For example, computer users are susceptible to wrist injuries, cashiers to arm and shoulder injuries, and assembly line operators to elbow and back problems because they repeatedly do the same kinds of movements over and over where they have to use the same parts of the body.

No matter what occupation, activity, or sport, if the RSI risk factors are there, then there is a risk of injury. Understanding how the injuries happen helps to know what steps to take to prevent them.



Ergonomics – Slide 1

Repetitive Strain Injuries (RSIs) is an umbrella term and includes many different injuries such as:

- **Repetitive Motion Injuries (RMIs)** – another umbrella term
- **Cumulative Trauma Disorders (CTDs)** – another umbrella term
- **Carpal tunnel syndrome** – injury in the wrist
- **Bursitis** – injury in the "bursa" – a part of the joints
- **Tendonitis** – injury in the tendons
- **Trigger finger** – injury usually to forefinger from operating triggers on tools
- And in Australia – it was once called **Kangaroo Paw!**

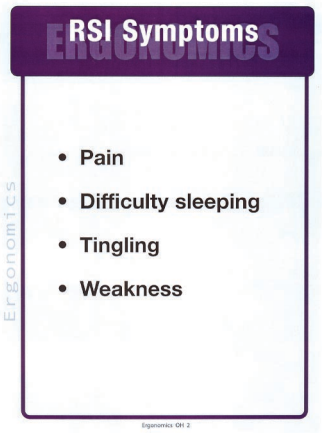
No matter what you call them, RSIs can involve inflammation, swelling, and pain in the affected area. They can range from a minor nuisance to severe disability. You should realize that a severe RSI can mean that you are unable to carry out day to day routines like brushing teeth, doing up buttons, and being able to work. Once you have one, they can be very difficult to cure. Prevention is the best route. You must learn how to recognize the risk factors and how to avoid them.

If you start having symptoms, you should see your doctor immediately, tell your supervisor and look into ways to eliminate the risk factors.

Overhead — Teacher's Notes

Teacher's Note

Early Warning Symptoms may be used to help students recognize the first signs of RSI and know what they could do about them. If RSIs are recognized early and something is done about it, the damage can be minimized. If they are ignored and the risk factors continue, then the injury can become disabling and life altering. It can mean living with constant pain, being unable to perform certain jobs and can have serious impacts on home and family life.



Ergonomics – Slide 2

Early symptoms include:

- Pain only while at work and then gradually all the time
- Difficulty sleeping
- Tingling
- Weakness

Things workers do when they have an RSI:

- Modify tools and seats to try and make themselves comfortable
- Frequently shake or rub their hands and fingers
- Guard, hold or support the affected area
- Grip tools using awkward postures
- Use quick, jerky movements

Things workers say when they have an RSI:

- "My hands fall asleep while driving the car"
- "My arms feel weak and heavy"
- "I am much more sensitive to cold now"
- "I think I have arthritis"
- "My hands seem to be cramping a lot"
- "My fingers seem to swell in the morning"
- "It hurts to move my thumb"
- "I have a lump on my hand"
- "My hands turn white with cold"
- "It hurts to bend my wrists"

Overhead | **Teacher's Notes**

Reality Check: Early Warning Symptoms

Have students review the early warning symptoms for an RSI. Discuss what they would do if they started to have any of these symptoms from a job they were doing. Who would they tell and what would they do to protect themselves? The answer would be that they would first tell their supervisor or employer and, if there is one, the JHSC or health and safety representative in the workplace, and:

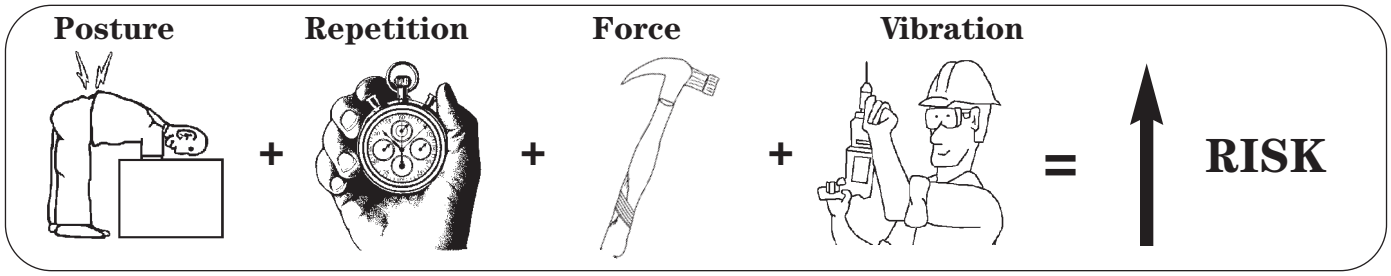
- ask for an ergonomic opinion
- learn how to adjust their workstation
- learn how to arrange materials to minimize risk
- ask for introduction of job rotation and variation of tasks
- ask for a different tool that vibrates less or one that could be used from a better body position.

What are the risk factors for RSIs?

RSIs are caused by the following major risk factors:

1. Awkward or static posture
2. Repetition
3. Excessive force
4. Vibration

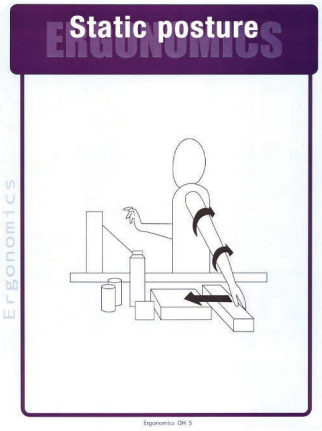
Whenever these risk factors happen in combination, they are even more hazardous.



Ergonomics – slide 3

Overhead | **Teacher's Notes**

Ergonomics – Slide 4



Ergonomics – Slide 5

Awkward or Static Posture

An **awkward body posture** is any change of all or part of the body from the neutral position. Standing straight with arms hanging by the side of the body or using a keyboard without bending the wrist are examples of neutral body positions.

Bending over to lift a pail off of the floor is an example of an awkward low back posture. Working with the upper body bent forward, backward or twisted can place too much stress on the lower back.

Other examples of poor body positions include reaching above shoulder level, reaching behind the body, rotating the arms and bending the wrist forward, backward or side to side.

When using a neutral body position, you work with maximum efficiency and use the least amount of energy.

Static posture is any posture, neutral or awkward, that is held for an extended period of time. The same parts of the body must be used continuously and they become tired and overused. Examples are constant standing at a cashier checkout, and twisting your neck to see a poorly placed computer monitor.

Whether awkward or static, when body positions are near the extremes of their range of movement, stretching and compression of tendons and nerves occur. When muscles stay contracted for too long, blood flow can be affected. The longer or more often a static or awkward body position is used, the more likely the person will be injured.

Repetition

Repetitive movements are especially hazardous when they involve the same joints and muscle groups over and over and when we do the same motion too often, too quickly and for too long. This type of work is very tiring because the worker cannot fully recover in the short periods of time between movements. Eventually, it takes more effort to perform the same repetitive movements. When the work activity continues in spite of the fatigue, injuries can occur.

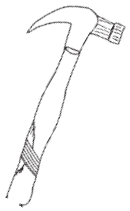
Overhead | Teacher's Notes

Ergonomics – Slide 6

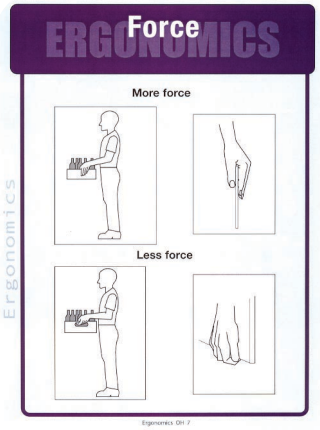
No one really knows at what point a repetitive job will cause an injury. However, as a general rule, jobs or tasks are considered repetitive when:

- A task has a cycle time of less than 30 seconds. For example, packing a box of jars every 20 seconds.
- A task requires repeating the activity more than 50% of the time. For example, a computer operator who enters data more than 50% of the day.

Force



Force is the amount of effort our bodies must exert to lift objects, to use tools, or to move. All work requires us to exert some force. If the force required to perform the work overloads the muscles, joints, tendons and other soft tissues, it is considered to be excessive force.



Ergonomics – Slide 7

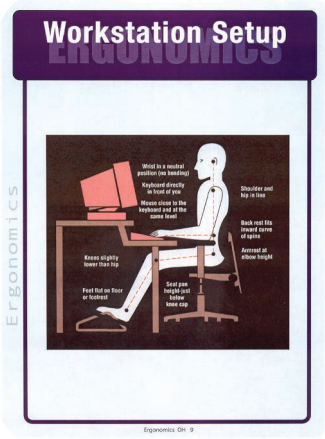
Excessive forces can be created by:

- Long reaches: working with outstretched arms or handling objects away from the body.
- The weight of the object and how it is handled: any amount of weight can create excessive force if it is difficult or awkward to handle.
- Awkward or improper hand grips: using a pinch position requires more force than in a hook position.
- High contact forces: high amounts of force applied over a small area creating pressure points. Red marks and dents in the skin are signs of excessive contact force. They can be caused by a wrist coming into contact with the sharp edge of the desk when keying, or by carrying a heavy bag over one shoulder.

Just like repetition, using a lot of force is a problem because it does not allow time for the body to fully recover between movements.

Overhead | Teacher's Notes

Ergonomics – Slide 8



Ergonomics – Slide 9

Vibration

There are two types of vibration that can contribute to an RSI:

- Hand/Arm Vibration can affect those who operate power driven hand tools such as jack hammers, air guns and chain saws.
- Total Body Vibration affects the whole body. It is common among heavy equipment operators, such as long haul truck drivers. This type of vibration often contributes to lower back pain.

Vibration is a problem because more force than normally needed may have to be used to control a vibrating hand tool or hold onto a vibrating steering wheel.

Once the ergonomic risk factors have been identified, it is important to assess the hazards and do what you can to eliminate them. Assessing ergonomic hazards may require an expert to do a proper task analysis, take measurements and make recommendations.

Examples of things to do to minimize ergonomic risk factors are:

- Adjust the workstation to fit your needs.
- Lay out work materials to minimize awkward body postures such as reaching, twisting and bending — place the things you use most often closest to you.
- Do not work for too long in the same body position or doing the same movements. Take small breaks of even a few seconds or minutes to stretch and change body position. Take turns with someone else to do something different. Think ahead and plan your tasks so you can break up long periods of doing the same thing with other tasks.
- Watch yourself and be aware of awkward body positions you might be using.

Overhead | **Teacher's Notes**

- Ask for training on the proper use of equipment and tools.
- Select tools that minimize vibration, have good hand grips and that you can use with a good body position.
- Learn how to lift safely and what to do to minimize the risk from lifting.

Reality Check

The risk factors for RSI can occur in many different types of jobs. Some of the more common examples are:

- Supermarket cashiers — stand and repetitively handle groceries. Sometimes they have to twist and overreach to do the job.
- Tree planters — repetitively bend and apply force to dig earth and plant trees in the ground. They have to carry their trees in a pouch and this can be heavy. They are often paid according to the number of trees they plant so they are encouraged to work very quickly which further increases the repetition and force used.
- Assembly line operators — do repetitive work, sometimes in awkward body positions and controlled by the speed of the assembly line.
- Computer operators — do highly repetitive motions with hands while holding arms, shoulders and the rest of the body in a static position. If the workstation is not adjusted properly, the chance of poor body position increases.

Think of some other occupations where the RSI risk factors might occur.

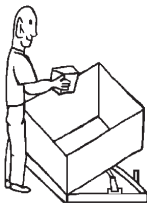
Teacher's Note: Optional Activity

Find the Awkward Posture may be used to help students learn to recognize awkward body postures. This will help them when it comes time to learn how to set up a workstation to avoid awkward postures. The answers for this activity are provided here for your reference. A handout for students is included in Section III – Resources.

Activity: Find the Awkward Posture

Look at the following pictures. Pick out which ones show good postures and which ones are poor. Discuss your reasons for your choices. What could you do to correct the poor ones?

Poor: bending
–place objects on higher surface
–use a scissor lift

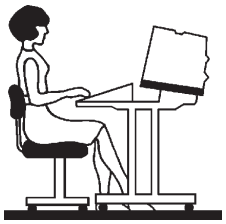


Good: straight back, elbows by side of body

Good: straight wrist

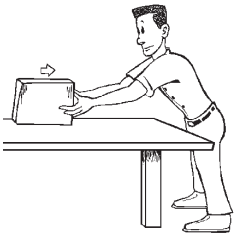
Poor: bent wrist
–provide wrist support/rest
–adjust workstation height

Good: straight back, elbows by sides



Good: good sitting posture, elbows by side, no bent wrists

Poor: twisting at waist
–look at where boxes are placed
–make more space to move around
–train worker in lifting techniques



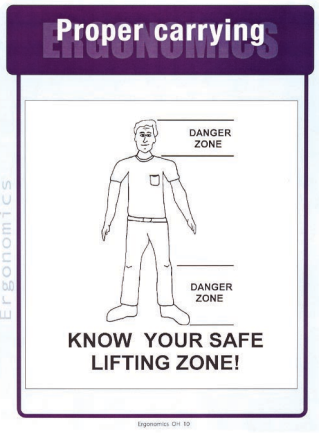
Poor: extended reach, bending forward
–do not place boxes so far back on table
–replace table with one that is narrower

TECHNOLOGICAL EDUCATION
Construction Technology, Grade 11, College; Workplace
Manufacturing Technology, Grade 11, Workplace
Manufacturing Engineering Technology, Grade 11, College
Health Care, Grade 11, College

Teacher's Note:

It is essential that students know how to lift an object, but it's even more important that they know how to eliminate the hazards when lifting and carrying objects. The Grade 9/10 Live Safe! Work Smart! materials include a step-by-step on how to lift. See the Ergonomics section of Grade 10, pages 33-34. The following material will help students recognize opportunities to eliminate the hazards of lifting.

Overhead



Ergonomics – Slide 10

Teacher's Notes

Lifting, Carrying, Pushing and Pulling

Injuries from lifting occur when lifting and carrying tasks involve:

- too much weight
- objects that are too low (below knees) or too high (above shoulders)
- objects that are too far away — causes bending and overreaching
- repeating the movement too often
- twisting or bending
- handling objects without handles or a way to grasp them properly
- handling objects that are too large to grasp easily.

Before you lift an object ask yourself three questions:

1. **Does it really have to be moved by hand?** Sometimes it's possible and easier to move other things closer to the load and then complete your task. Sometimes you can place several items on a pallet or in a bin and move them all at once using a mechanical device like a lift truck or hand cart.
2. **Can the load be broken into smaller loads?** Instead of moving one large box, it may be possible to move the contents of the box with several trips, carrying smaller loads.

Overhead | **Teacher's Notes**

3. **Can I get help to lift the load?** If you really have to lift a heavy or awkward load by hand you may need a second person to help you.

Another point about lifting is to **think ahead**. Do not place things on the floor that will have to be lifted later. Use a shelf, table or a bin with a spring bottom that rises as the load is removed. Do not stack material past your shoulder height.

Pushing and Pulling

Ergonomics – Slide 11

Objects are not only lifted and carried, they are also pushed and pulled on dollies, carts, and other wheeled devices. Pushing and pulling tasks can increase the risk of back and shoulder disorders.

Important things to do are:

- Push rather than pull carts.
- Look at the wheels on the cart. If there is a set of wheels at one end that swivels, and the other set doesn't, push the cart from the end where the swivelling wheels are located.
- Keep your back straight at all times.
- Face the direction of travel.

Other considerations that can affect your safety when pushing or pulling include:

- How slippery is the floor?
- Are wheels large enough to move easily over bumps in the floor or terrain?
- Are handles at a height that can be reached without straining or overreaching?
- Is the floor surface or ground in good condition? Are there hills or slopes?
- How heavy is the load and how much force is required to get it moving and keep it moving?
- How often do you have to push or pull?
- How far do you have to push or pull a load?
- How much of the day do you spend pushing or pulling?

Optional Activity: Little Boxes

The activity called "Little Boxes" will help students begin to think about ways to minimize lifting hazards by using a workplace example involving a shoe store. You should encourage them to discuss their own examples of lifting in their part-time jobs and think about how they might minimize the hazards. The version with answers is provided here for your reference. A student handout is in Section III, Resources.

Activity: Little Boxes

Discuss the following scenario and brainstorm ideas to complete the chart.

You are working in a shoe store. A new shipment of 100 shoe boxes has just arrived and your supervisor has asked you to move them from the loading dock to the storeroom. There are several ways to do this. Think about each one in the chart below and list the advantages and disadvantages of each option.

Option	Advantages	Disadvantages
Move one box at a time	-light and easy to lift	-make a lot of trips
Move 4 boxes at a time	-fewer trips	-awkward to carry 4 loose boxes
Place 10 boxes in a larger box	-fewer trips	-box is a little awkward and hard to hold onto
Place 20 boxes at a time on a cart and push the cart to the storeroom	-fewer trips -easier to push cart than carry boxes -easy to load/unload cart because it's at a good height	-may have uneven floor surface to go over -may have to go find the cart -overstacking of boxes could obstruct view

TECHNOLOGICAL EDUCATION
Health Care, Grade 11, College

Teacher's Note:

Before doing this section, students should understand the basics of how to lift as outlined on pages 33-34 of the Ergonomics section of Live Safe! Work Smart! Grade 9/10.

Important: Reinforce with students that they must NOT attempt to move people unless they are sure they have the training and knowledge to do it safely. They MUST follow the procedures and policies of the organization they are working for.

Overhead	Teacher's Notes

MOVING PEOPLE

Helping a person to move is the same as moving a box in that the same body mechanics are used — bend the knees, get close to the person etc. (see p. 33-34 of Grade 9/10, Ergonomics).

Moving people, however, is very different because people make decisions, every person is different and they can change position from one moment to the next — they can be unpredictable. The following are some of the things to consider before assisting a person to move.

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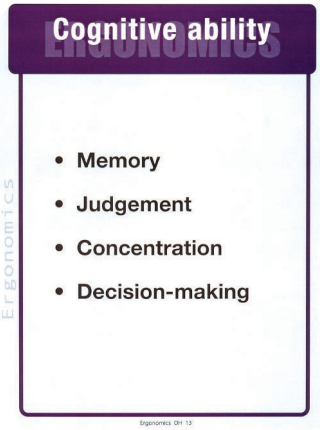
The person's ability or inability to communicate may affect his or her ability to follow instructions or let you know when something is wrong. You should consider:

- Speech – can they communicate with you?
- Vision – are they aware of their surroundings; can they see you and what you're going to do?
- Hearing – can they hear your instructions?
- Understanding – are they able to follow your instructions?
- Language barrier – do they speak the same language as you; is there someone present who could speak to the client in their own language to explain what is going to be done?

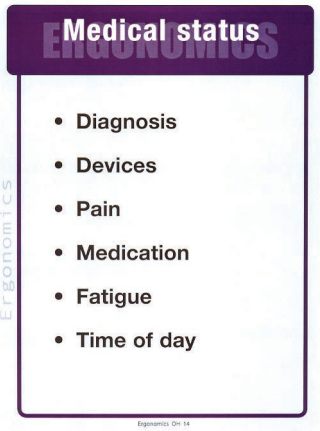
Overhead	Teacher's Notes



Ergonomics – Slide 13

The person's cognitive ability may be affected by age or medical condition. This may mean that short-term memory is poor and thus their ability to follow instructions or make simple decisions may be decreased. They may be confused and frustrated. Consider the person's:

- Memory – how is their short-term memory?
- Judgement – are they demonstrating good judgement for the situation?
- Concentration – are they able to think clearly?
- Decision-making ability – can they make simple decisions appropriately?

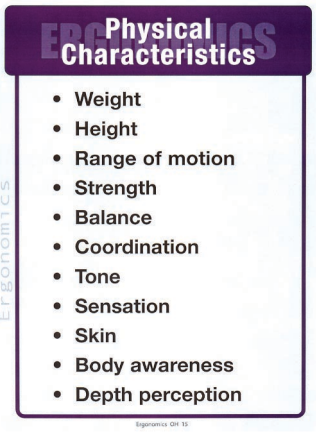


Ergonomics – Slide 14

The person's medical status will have a direct impact on their ability to co-operate with a lift or transfer. Also, any medication the person has been given may make them drowsy and fatigued. Consider:

- Diagnosis – what is the person's medical condition; will it interfere with their ability to move?
- Devices – do they have an IV, a heart monitor, etc. that you will have to be careful of?
- Pain – is the person in pain?
- Medication – are they drowsy or over-stimulated?
- Fatigue – are they particularly tired and therefore less able to help than they might be at another time?
- Time of day – is it very early or very late in the day?

Overhead	Teacher's Notes



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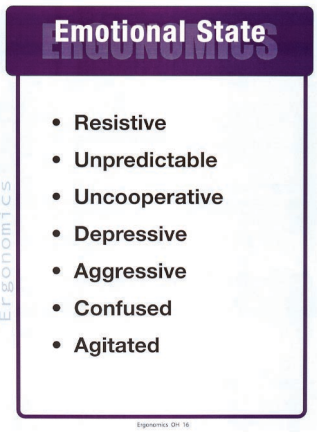
The person's physical characteristics will affect your decision about how to assist them to move. You may need a second person to assist if the person is larger than you or their balance and co-ordination are poor. People with poor skin condition must be handled very carefully as you may damage or tear the skin easily. You should consider the following factors:

- Weight – is the person heavier than you?
- Height – are they significantly taller than you?
- Range of motion – do they have restricted joint movement?
- Strength – are they weak?
- Balance – is their balance off?
- Co-ordination – are they unco-ordinated?
- Sensation – do they have function in their feet and hands?
- Skin – is their skin fragile?



Ergonomics – Slide 16

The person's emotional state may be excited and in a hurry or depressed and unco-operative. People who are confused may strike out, but not in an aggressive fashion. Consider:

- Resistive – is the person frightened?
- Unpredictable and unco-operative – is the person likely to do something you don't expect?
- Aggressive – are they likely to strike out in an aggressive way?

Lifts and Transfers

There are two basic ways to help clients/patients move from one place to another, such as from a bed to a chair. These are "lifts" and "transfers".

Lifts: lift or carry the entire weight of a person who is physically unable to help. It is highly recommended to use a lifting device and not manually lift people.

Overhead | Teacher's Notes

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Examples of Lifting Methods	When to Use
Mobile lifting device	To move a person who is not physically able to move or mentally able to help. Requires two caregivers.
Front and back lift	To move from a bed to a chair a person who is unable to bear weight through at least one leg or help with his or her arms. Requires two caregivers.
Side-by-side lift	To move a person who is unable to bear weight through the legs but is able to use his or her arms and is able to sit.

Transfers: used to assist a client who can bear some weight and can follow instructions to help with the move. Equipment such as a transfer belt, or a transfer board should be available.

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Examples of Transfer Methods	When to Use
Repositioning/Turning Sheet	To move/slide a person up or down in bed or to turn from one side to the other.
Transfer/Walking Belt	To transfer people with mild balance problems.
Transfer Board	To transfer a person from one surface to another surface of equal height.

When do you lift and when do you transfer?

Use a lift when client cannot bear weight and:

- Client may be very heavy
- Client may be in pain
- Client may not be able to sit
- Client may have poor skin condition

Use a transfer when client can bear weight and:

- Client can help
- Client co-operates
- Client understands instructions
- Enough caregivers are available to assist
- Appropriate equipment is available
- Client is not in too much pain
- Client's skin condition is ok

Reality Check

Ask students if they have ever worn a cast, used crutches or had their arm in a sling. Has someone in their family had to cope with living in a wheelchair? What adaptations or frustrations did they encounter?

The same kinds of difficulties they experienced are what the person they are to assist in moving face every day — except that their medical problem may be permanent. The frustration the person feels is real and needs to be handled with care. Doing this will help minimize the risk to the health care worker from frustrated, agitated and sometimes aggressive people.

Teacher's Note: Optional Activity – People are NOT Boxes

In this activity ask students to brainstorm and contrast the difference between moving a person and moving a box. Also, ask them to share their experience of assisting a disabled or elderly person to get from one place to another and to identify the barriers they faced. This activity will help raise their awareness of the challenges that are involved. Answers are provided below for your reference.

People

-move

-can be unpredictable and change at any time

-can be awkward in size and shape

-do not come with hand grips

Boxes

-stay where you put them

-don't change from one minute to the next

-can often be changed to be a suitable size and shape

-often have hand grips

Examples of barriers:

- Not enough space to move such as in a small bathroom
- Equipment not available
- Small vehicle doors
- Not enough help to move safely
- Unco-operative person
- Slippery floors
- Curbs and steps

Grade 11 Ergonomics Review Questions

Arts, Technological Education, Business Studies

1. What does the term RSI stand for?

a. Repetitive Strain Inquest
b. Repetitive Strain Injury
c. Repetitive Stress Identification
d. Repetitive Stress Injury

2. True or False? Performing the same task over and over (repetition) causes RSIs?

3. RSI can also be referred to as:

a. carpal tunnel syndrome
b. tendonitis
c. kangaroo paw
d. all of the above

4. True or False? Difficulty sleeping can be a symptom of an RSI.

5. If you were an employer, which of the following symptoms would prompt you to think your employee has an RSI?

a. his/her hands turn white with cold
b. he/she has a runny nose
c. his/her hands cramp a lot
d. a and c

6. Tasks are considered repetitive when a task requires repeating the activity for more than:

a. 50% of the time
b. 70% of the time
c. 40% of the time
d. 60% of the time

7. An example of something that would cause hand-arm vibration is:

a. using a jackhammer
b. writing a lot
c. talking on the phone
d. none of the above

Technological Education – Health Care

1. True or False? Hazards from lifting include lifting too often, but carrying objects long distances isn't considered a hazard.

2. Which one of the following would be a barrier to helping someone move?

a. their speech

b. their vision

c. their mood

d. all of the above

3. True or False? A person's range of motion can be a barrier to helping them move.

4. True or False? A lift is used to assist a client who can bear some weight and can follow instructions to help with the move.

5. A lift can be used when

a. the client is heavy

b. the client understands the instructions

c. equipment is available

d. all of the above

6. A transfer can be used when:

a. the client is heavy

b. the client understands the instructions

c. equipment is available

d. a and c

7. The first thing you should do if you are asked to assist in moving an individual is

a. determine their mood

b. estimate their weight

c. ask for training

d. look for equipment

Grade 11 Ergonomics Review Questions (with answers)

Arts, Technological Education, Business Studies

1. What does the term RSI stand for?

a. Repetitive Strain Inquest
b. Repetitive Strain Injury
c. Repetitive Stress Identification
d. Repetitive Stress Injury
(answer b)

2. True or False? Performing the same task over and over (repetition) causes RSIs?

(answer T)

3. RSI can also be referred to as:

a. carpal tunnel syndrome
b. tendonitis
c. kangaroo paw
d. all of the above
(answer d)

4. True or False? Difficulty sleeping can be a symptom of an RSI.

(answer T)

5. If you were an employer, which of the following symptoms would prompt you to think your employee has an RSI?

a. his/her hands turn white with cold
b. he/she has a runny nose
c. his/her hands cramp a lot
d. a and c
(answer d)

6. Tasks are considered repetitive when a task requires repeating the activity for more than:

a. 50% of the time
b. 70% of the time
c. 40% of the time
d. 60% of the time
(answer a)

7. An example of something that would cause hand-arm vibration is:

a. using a jackhammer
b. writing a lot
c. talking on the phone
d. none of the above
(answer a)

Technological Education – Health Care

1. True or False? Hazards from lifting include lifting too often, but carrying objects long distances isn't considered a hazard.

(answer F)

2. Which one of the following would be a barrier to helping someone move?

a. their speech

b. their vision

c. their mood

d. all of the above

(answer d)

3. True or False? A person's range of motion can be a barrier to helping them move.

(answer T)

4. True or False? A lift is used to assist a client who can bear some weight and can follow instructions to help with the move.

(answer F)

5. A lift can be used when:

a. the client is heavy

b. the client understands the instructions

c. equipment is available

d. all of the above

(answer d)

6. A transfer can be used when:

a. the client is heavy

b. the client understands the instructions

c. equipment is available

d. a and c

(answer d)

7. The first thing you should do if you are asked to assist in moving an individual is:

a. determine their mood

b. estimate their weight

c. ask for training

d. look for equipment

(answer c)

SECTION II
Ergonomics
Grade 12

TECHNOLOGICAL EDUCATION
Construction Technology, Grade 12, College; Workplace
Medical Technologies, Grade 12, College
Child Development and Gerontology, Grade 12, College
Manufacturing Technology, Grade 12, Workplace
Manufacturing Engineering Technology, Grade 12, College

Teacher's Note

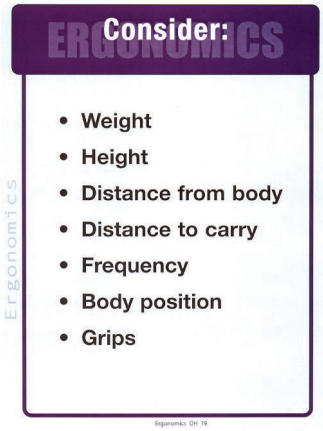
The Grade 9/10 Live Safe! Work Smart! Ergonomics chapter includes information on how to lift objects. The Grade 11 lesson includes material to raise students' awareness about ways to minimize the hazards of lifting. In Grade 12, the material becomes more workplace focussed and uses workplace examples to help them get started on learning how to eliminate lifting and carrying hazards.

Overhead	Teacher's Notes

LIFTING, PUSHING AND PULLING

Lifting and carrying properly is very important. Before you lift, you should consider whether there is anything you can do to eliminate the lift altogether or at least make it easier.

Here are things you should think about:



Ergonomics – Slide 19

- How heavy is the object?

  - Can it be broken down into more than one piece?

  - Can you get help from a second person to assist with the lift?

- At what height does the lift start?

  - Can objects be placed on a surface that is around waist height so you don't have to lift them from the floor?

- How far is the object from your body at the start of the lift?

  - Can you move things to get closer to the object?

- How far do you have to carry the objects?

  - Can you shorten this distance?

Overhead | Teacher's Notes

- How often do you have to lift?

  - Can you break up long sessions of lifting with other tasks?

- Do you have to twist your body to lift the object?

  - Can you move your feet and face the new direction instead of twisting?

- How well can you grasp the object?

  - Is it too large to grasp easily?

  - Does it have good grips?

Hazards from lifting, pushing and pulling can be controlled through:

- Minimizing weight and duration of lift

  - Divide load into smaller containers

  - Ask for assistance and a TEAM lift

  - Use equipment such as carts and dollies instead of carrying objects

  - Adjust or change the shape of loads to make them easier to handle

  - Maintain floor surfaces so they are not slippery or too rough

- Minimize reaching and lifting distances

- Look at where objects are placed that have to be lifted and where they are placed at the end of the lift — keep the heights between knee and shoulder height

- Use devices, such as spring-loaded tables, that raise objects to an appropriate height

- Use bins where the sides drop down to allow easy access without bending

- Training on how to lift safely and how to appropriately use lifting devices is essential.

Teacher's Note: Optional Activity – Let's Move It!

The purpose of this activity is to help students begin to strategize on how to minimize the hazards of two specific lifting and carrying tasks. Use the opportunity to discuss different strategies and generate ideas on how to use good body positions and proper lifting techniques. The class could be divided into two groups, with a scenario assigned to each group. The groups could brainstorm a plan to safely move the objects and then each group could present their plan to the class. The exercise could also be done as a homework assignment. The student handout is located in Section III, Resources and the answers for each scenario are provided below for your reference.

Scenario A:

About once an hour Larry has to move a smooth piece of metal from a table to the stamping machine that is 5 metres away. The metal weighs 75 kilograms and is .5 metres square. His co-workers are not far away and can help him if he asks.

How heavy is the object? Can it be broken down into more than one piece? Can you get help from a second person to assist with the lift?	75kg No Yes
At what height does the lift start? -Can objects be placed on a surface that is around waist height so you don't have to lift them from the floor?	Just below waist height.
How far is the object from your body at the start of the lift? -Can you move things to get closer to the object?	A little more than arm's length into the table. Move to side of table to get closer.
How far do you have to carry the objects? -Can you shorten this distance?	5m No
How often do you have to lift? -Can you break up long sessions of lifting with other tasks?	7 times per shift. No
Do you have to twist your body to lift the object? -Can you move your feet and face the new direction instead of twisting?	Yes
How well can you grasp the object? -Is it too large to grasp easily? -Does it have good grips?	There are no real hand grips and metal is smooth (i.e. slippery).

Recommended Plan to Move:

Option 1: ask a co-worker to assist and team lift the object.

Option 2: use a sturdy cart and slide the object off of table onto cart and push cart.

Scenario B:

Paul has been asked to move a bag of feathers from the floor 3 metres to the loading dock and place it on a shelf. The bag is .1 metre wide and 3.5 metres long. It weighs 2 kilograms. This task is completed every 5 minutes throughout the shift.

How heavy is the object? -Can it be broken down into more than one piece? -Can you get help from a second person to assist with the lift?	2 kg No Yes
At what height does the lift start? -Can objects be placed on a surface that is around waist height so you don't have to lift them from the floor?	Floor Maybe in the future, but not right now.
How far is the object from your body at the start of the lift? -Can you move things to get closer to the object?	Within easy reach.
How far do you have to carry the objects? -Can you shorten this distance?	3 m No
How often do you have to lift? -Can you break up long sessions of lifting with other tasks?	12 times per hour
Do you have to twist your body to lift the object? -Can you move your feet and face the new direction instead of twisting?	No Yes
How well can you grasp the object? -Is it too large to grasp easily? -Does it have good grips?	Awkward to grasp bag. Yes No

Recommended Plan to Move:

Option 1: ask a co-worker to assist and team lift the object.

Option 2: use a sturdy cart and slide the object off of table onto cart and push cart.

Reality Check – How much can I be asked to lift?

The question is often asked, "What is the maximum weight that I can be asked to lift?" Unfortunately there is no simple answer to this question. There are no regulations regarding "maximum weight". This is because the weight of an object is just one point to consider. (See overhead 19 on page 24.) In addition, the physical size and condition of the person has a lot to do with how much an individual can lift safely.

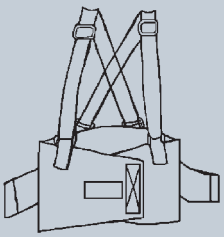
If you are not sure that you can safely lift an object — don't do it. Ask for help or use a safety device. Do something to make the job safer.

Teacher's Note: Optional Activity

Backbelts, similar to what weight lifters use, have started to be used in retail stores, on construction sites, and in lumber yards. Some of the students in the class may have been asked to use one in their part-time jobs.

There are varying opinions as to their effectiveness for back injury prevention.

Students could complete a short research assignment on backbelts and their effectiveness. The issue could then be discussed in class.



The following websites include information to get the students started:

U.S. National Institute for Occupational Safety and Health (NIOSH)

www.cdc.gov/niosh/backbelt.html

Canadian Centre for Occupational Health and Safety

www.ccohs.ca

British Columbia Workers' Compensation Board

www.worksafebc.com

Students could also surf the web for information on backbelts by using a search engine like www.google.com

TECHNOLOGICAL EDUCATION
Medical Technologies, Grade 12, College
Child Development and Gerontology, Grade 12, College

Teacher's Note:

The Grade 11 Live Safe! Work Smart! Ergonomics material included a section on lifts and transfers and what factors to consider when deciding how to assist a person to move. In Grade 12, the material becomes more workplace focussed and uses workplace examples to help students get started on learning how to assess the client, caregiver and environment prior to assisting a client to move and in order to decide what type of assistance to offer.

Learning these skills will make the job safer for the caregiver and for the client.

Important note: Reinforce with students that they must NOT attempt to move people unless they are sure they have the training and knowledge to do it safely. They MUST follow the procedures and policies of the organization they are working for.

Overhead	Teacher's Notes

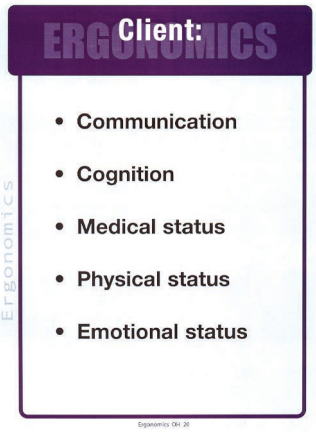
Helping people to move or transfer

When working in a hospital, nursing home or a day care, it is often necessary to assist people to move from one place to another, such as from a chair to a bed. Helping people to move can be hazardous for both the person helping and the person being helped. The caregiver MUST have the necessary knowledge and training BEFORE attempting to help someone.

One of the most important things to learn to prevent injury is how to assess the client, caregiver and environment. The assessment will give you the information needed to make a good decision about whether to assist the person at all and what type of assistance to provide.

Overhead

Teacher's Notes

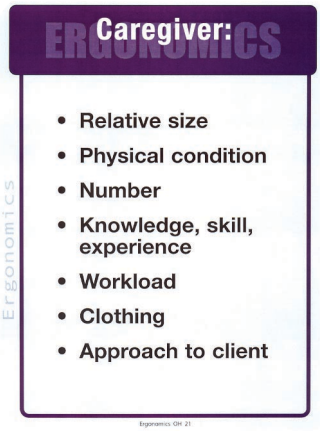


Ergonomics – Slide 20

The client to be moved is assessed for:

- Communication – speech, vision, hearing, understanding, language barriers
- Cognition – memory, judgement, concentration, decision-making
- Medical status – diagnosis, devices, pain, medication, fatigue, time of day
- Physical status – weight, height, range of motion, strength, balance, co-ordination, tone, sensation, skin, body awareness, depth perception
- Emotional status – resistive, unpredictable, unco-operative, depressive, aggressive, confused, agitated.

These factors help determine the client's ability to understand and follow instructions.



Ergonomics – Slide 21

The caregiver who will make the lift is assessed for:

- Relative sizes of the caregiver versus the person being assisted
- Physical condition of the caregiver
- Number of caregivers available to assist
- Knowledge, skill and experience
- Workload considerations – time to assist without being rushed
- Caregiver's clothing – footwear should be non-slip soles to decrease the risk of slips and falls
- Caregiver's approach – how they approach an aggressive client.

Overhead | Teacher's Notes

Ergonomics – Slide 22

Remember that in the community, such as in a home care situation, the environment may be more difficult to control and the equipment and people not available for safely moving a person.

The environment is assessed for:

- Room size and layout – enough space to move safely, and it is free of clutter and obstacles
- Equipment – e.g. intravenous tubing may have to be moved, adjustable beds make moving people easier
- Time of day – some people may become more agitated at certain times of the day.

People can be moved using different techniques. Which method is used depends on the outcome of the assessment.

Teacher's Note: Optional Activity – Mary's on the Move

In this activity students have a chance to work with a workplace scenario where Mary, an agreeable, alert 80-year-old woman, requires assistance to move from her bed to her wheelchair. The students are asked to use the information provided and identify what questions they would ask in assessing the client, caregiver and environment and make a recommendation on how to help Mary.

A student handout for this exercise can be found in Section III, Resources and possible answers are provided on the next page for your reference.

Possible questions students could ask in assessing a move for Mary and their answers:

Client:	
Can Mary communicate effectively?	Yes
How is Mary's memory, judgement, concentration and decision-making?	Mary is spry and alert.
How is Mary's medical status?	Weak
What is Mary's physical status?	Mary weighs 175 pounds, sometimes weak.
What is Mary's emotional status?	Mary is agreeable. (i.e. co-operative)
Caregiver:	
What are the relative sizes of Alan and Julie to Mary?	Alan weighs about 180 pounds, Julie about 130 and Mary 175.
What is the physical condition of the caregivers?	Julie is in good physical condition, Alan can only do limited lifting because of a back injury.
How many caregivers are available?	2
What is their knowledge, skill and experience?	Good
Do they have time to help without being rushed?	Yes
What kind of clothing and footwear are they wearing?	Running shoes and uniforms.
What kind of approach should they use with Mary?	Mary is co-operative and agreeable – Julie and Alan should be kind and patient and let Mary help as much as possible.
Environment:	
Is the room large enough to move about safely? Is it free of clutter and obstacles?	Mary's room is spacious so there is adequate room. Her visitors' chairs must be moved first.
Is there any medical equipment to move or work around?	No.
What time of the day is it?	Just before lunch.

Recommendation: Transfer Mary using a transfer belt and two caregivers. Let Alan take a minor role to protect his back from further injury.

ARTS
Media Arts, Grade 12, Open

Overhead | Teacher's Notes

Ergonomics – Slide 23

GET READY! – Before you begin any work

- Make sure you have been TRAINED to do the job safely.
- Know and understand your RIGHTS AND RESPONSIBILITIES under the law.
- ASK your supervisor about anything you are not sure of.

GET SET! – Prepare for the task

- PREPARE YOUR BODY:

  - Stretch and warm up your muscles before starting physical activity like lifting and carrying heavy or bulky equipment.

  - Eat properly so you have the fuel to keep on going.

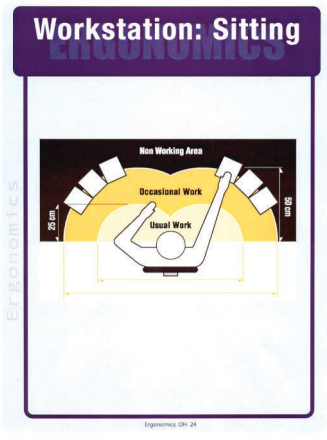
- PLAN what you are doing:

  - Make sure you have everything you will need where you need it.

- ADJUST the workstation for your needs.

For sitting tasks:

1. Adjust chair height for your height.
2. Adjust work surface height so it is at about elbow height.
3. Adjust footrests, wrist rests and elbow rests so you use good body positions as much as possible.
4. Place items you will use most often closest to you.

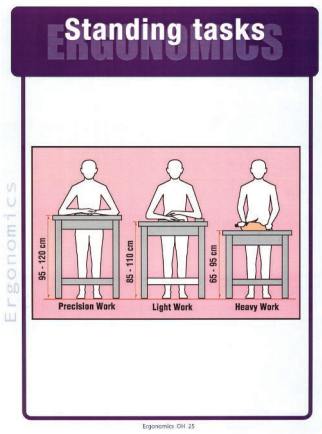


Ergonomics – Slide 24

For standing tasks

- Adjust the height of the work using elbow height and type of work you are doing as a guide. Generally the work surface should be around elbow height. If more precise work is being done, the work surface should be a little higher than elbow height.

Overhead | Teacher's Notes



Ergonomics – Slide 25

- Place the things used most often close by and things used less often further away. Do not overreach — move your body closer and then reach for object.
- Place work right in front so there is no need to twist to see or reach.
- Use a foot rail or footrest to place one foot on periodically. This helps shift some of the body weight and rest the muscles.
- Wear shoes that fit well and are appropriate for the workplace.
- Use an anti-fatigue mat — this is a floor mat made of a special rubber material that helps provide some, but not too much, cushioning on hard floors.
- Tell your supervisor about floors that are in poor condition or slippery.

GO! – Do the work

- Break up long sessions of doing the same thing with other kinds of activities. Try taking turns with someone else.
- Take small breaks, even for a few seconds, to change body position and stretch your muscles.
- Avoid awkward body positions like twisting and bending.

Teacher's Note

Section III, Resources includes student handouts for general ergonomics topics with:

- exercises to do before starting any type of physical work that will help protect the back
- exercises to do before and while working on a computer that will help relieve muscle strain and tension
- a generic ergonomics checklist
- a computer workstation checklist.

TECHNOLOGICAL EDUCATION
Computer and Information Science, Grade 12, University/College
Computer Engineering, Grade 12, University/College

Overhead	Teacher's Notes

Ergonomics – Slide 23

GET READY! – Before you begin any work

- Make sure you have been TRAINED to do the job safely.
- Know and understand your RIGHTS AND RESPONSIBILITIES under the law.
- ASK your supervisor about anything you are not sure of.

GET SET! – Prepare for the task

- PREPARE YOUR BODY:

  - Stretch and warm up your muscles before starting.

- PLAN what you are doing:

  - Make sure you have everything you will need where you need it.

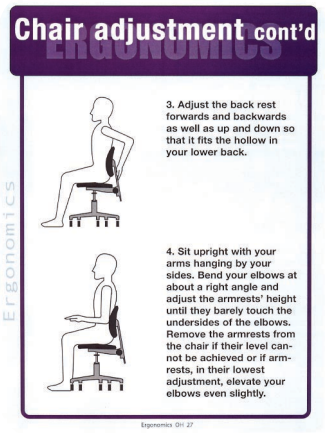
- ADJUST the workstation for your needs.

Ergonomics – Slide 26

STEP 1: Adjust the chair.

The chair should always be considered as an integral part of the workstation. The chair, desk, and computer all affect the worker's body position. They make it possible to work in a balanced body position. Adjustable chairs are strongly recommended for the workplace — they accommodate different people and can be adjusted throughout the day to allow for small changes in body position. Ideally, the chair should have controls to allow for easy adjustment of the seat height and tilt and backrest height and angle.

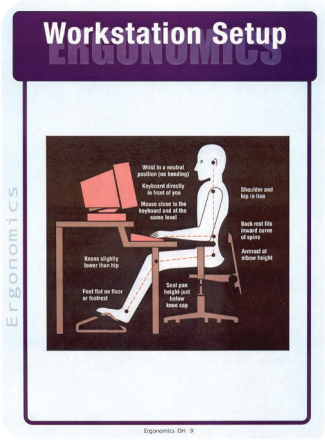
Overhead | Teacher's Notes



Ergonomics – Slide 27

How to adjust a chair:

1. Stand in front of the chair. Adjust the height so the highest point of the seat is just below the knee cap.
2. Sit on the chair and keep your feet flat on the floor. Check that the clearance between the front edge of the seat and the lower part of the legs fits a clenched fist.
3. Adjust the back rest forwards and backwards as well as up and down so that it fits the hollow in your lower back.
4. Sit upright with your arms hanging by your sides. Bend your elbows at about a right angle and adjust the height of the arm rests until they barely touch the undersides of the elbows. Remove the armrest from the chair if their level cannot be achieved or if armrests, in their lowest adjustment, elevate your elbows slightly.



Ergonomics – Slide 9

STEP 2: Adjust the work surface.

If adjustable height work surface: adjust work surface height so it is at about elbow height.

If non-adjustable height work surface: adjust chair height so your elbows are at about the height of the work surface and then use a foot rest if your feet do not sit flat on the floor or if there is pressure on the back of your thighs.

STEP 3: Position the monitor so that:

- It's about arms-length away from you

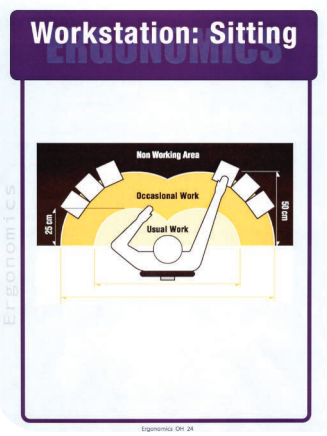
- The top of the first line of text on your screen is at eye level or slightly below

- It's directly in front of you so you are not twisting your neck to see it

- Overhead lights do not reflect in it causing glare.

Overhead | Teacher's Notes

Ergonomics – Slide 28



Ergonomics – Slide 24

STEP 4: Position your mouse, footrest, and wrist rest so you use neutral body positions as much as possible.

Place your document holder beside the monitor or at an angle between the keyboard and the monitor.

STEP 5: Place items you will use most often closest to you in the usual work area and those used less often further away.

GO! – Do the work

- Break up long sessions of doing the same thing with other kinds of activities. If possible, try taking turns with someone else.
- Take small breaks, even for a few seconds, and stand up, move around and stretch.

Teacher's Note

Section III, Resources includes student handouts for general ergonomics topics with:

- exercises to do before starting any type of physical work that will help protect the back
- exercises to do before and while working on a computer that will help relieve muscle strain and tension
- a generic ergonomics checklist
- a computer workstation checklist

TECHNOLOGICAL EDUCATION
Construction Technology, Grade 12, College; Workplace

Teacher's Note

The Construction Safety Association of Ontario has a training program called "Back Care and Material Handling", which is available on compact disc. It provides excellent examples from the construction industry along with things you can do to protect yourself. See "Where to Get More Information" in Section III, Resources for complete information on how to contact CSAO.

Overhead	Teacher's Notes

Ergonomics – Slide 23

GET READY! – Before you begin any work

- Make sure you have been TRAINED to do the job safely.
- Know and understand your RIGHTS AND RESPONSIBILITIES under the law.
- Make sure you have the appropriate personal protective equipment, that it is clean and in good shape and that you know how to use it properly.
- ASK your supervisor about anything you are not sure of.

GET SET! – Prepare for the task

- PREPARE YOUR BODY:

  - Stretch and warm up your muscles before starting physical activity. (See the student handout, Back Care Stretching Exercises in Section III.)

  - Eat properly so you have the fuel to keep on going.

Overhead | Teacher's Notes

Ergonomics – Slide 29

- PLAN what you are doing:

  - Make sure you have everything you will need where you need it.

- USE the right tool for the job. Consider the following when selecting a tool:

  - Is the grip the right size and comfortable for my hand?

  - Does the tool vibrate? Is there a tool that can do the job and has anti-vibration features?

  - Can I use this tool with a good posture?

- Adjust the height of the work using elbow height and type of work as a guide. Generally the work surface should be around elbow height. If more precise work is being done, the work surface should be a little higher than elbow height. If work is heavier then the work surface should be a little lower than elbow height so more force can be used.

- Place the things used most often close by and things used less often further away. Do not overreach — move the body closer and then reach for an object.

- Place work right in front of you so there is no need to twist to see or reach.

- Wear footwear that fits well and is appropriate for the site.

GO! – Do the work

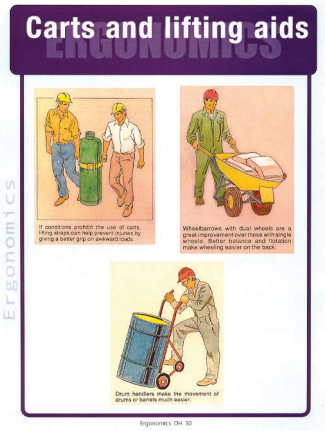
- Break up long sessions of doing the same thing with other kinds of activities. Try taking turns with someone else.

- Take small breaks, even for a few seconds, to stretch and change body position.

  Backward Stretch: When working in a crouched, bent or stooping position for a prolonged period, take regular breaks by standing up and bending backwards three times. This will help to relieve muscle tension.

  Forward Stretch: When working overhead in an arched position for prolonged periods, take regular breaks by returning to ground level and bending forward three times.

Overhead | Teacher's Notes



Ergonomics – Slide 30

- Watch for and avoid awkward body positions like twisting and bending.
- Follow all of the rules about safe lifting. (See the section on lifting.) Use carts and lifting aids whenever possible.

Optional Activity

Some of the students may already have jobs in construction. Ask these students to describe their jobs to the class and brainstorm how a worker could assess the particular situation, identify what the problems are at the site and offer suggestions for improvement. Some common examples would be:

- installing flooring
- cutting wood without a table saw
- doing clean-up where you're constantly bending and picking up.

Teacher's Note

Section III, Resources includes student handouts for general ergonomics topics with:

- exercises to do before starting any type of physical work that will help protect the back
- exercises to do before and while working on a computer that will help relieve muscle strain and tension
- a generic ergonomics checklist
- a computer workstation checklist.

TECHNOLOGICAL EDUCATION
Hair Styling and Aesthetics, Grade 12, Workplace

Overhead	Teacher's Notes

Ergonomics – Slide 23

GET READY! – Before you begin any work

- Make sure you have been TRAINED to do the job safely.
- Know and understand your RIGHTS AND RESPONSIBILITIES under the law.
- ASK your supervisor about anything you are not sure of.

GET SET! – Prepare for the task

- PREPARE YOUR BODY:

  - Stretch and warm up your muscles before starting physical activity. (See the student handout on hand and wrist, neck and shoulder exercises.)

- ORGANIZE your work area:

  - Make sure you have all the things you will need, such as combs, scissors, and a blow dryer, where you need them.

  - Minimize reaching by placing things you will need most often within close reach and move things you will not need as often further away.

- ADJUST what you can so you can use a good body position as much as possible. For example:

  - Cutting hair: adjust client's chair height so that your elbows are close to the sides of your body while you work.

  - Move your feet to face a new direction instead of twisting or leaning.

Ergonomics – Slide 31

Overhead | **Teacher's Notes**

- Washing hair: move out of the way any obstacles that prevent you from standing close to the client.

- Stand up straight and stretch between clients.

- Manicuring Nails: adjust chair height so your feet are flat on the floor and your back is supported. Adjust table height so your elbows can be supported by the table without hunching your shoulders.

- Beware of bending over to do pedicures and try to avoid leaning and stooping over.

For standing tasks:

- ADJUST the client's chair height so that your elbows are close to the sides of your body while you work.
- SPREAD feet apart slightly and distribute your weight evenly on both feet. Do not lean.
- WEAR shoes that fit well and are appropriate for the work-place. Shoes should have a 2-inch or less heel, shock absorbent pads, and skid-resistant soles.
- TELL your supervisor about floors that are in poor condition or slippery.
- SIT on a stool to cut long hair instead of bending to reach the middle of the client's back.

GO! – Do the work

- Break-up long sessions of doing the same thing with other kinds of activities. If possible, take turns with someone else.
- Take small breaks, even for a few seconds, to change body position and stretch.
- Avoid awkward body positions like twisting and bending.
- Use scissors that are sharp and in good condition.

Overhead — Teacher's Notes

- Sweep up hair cuttings and spills frequently — they will make the floor slippery.
- Pay attention to pain in shoulders, arms, wrists and hands — especially if it does not go away after a good night's sleep or wakes you up in the night — report it to your employer and see your doctor immediately.

Teacher's Note

Section III, Resources includes student handouts for general ergonomics topics with:

- exercises to do before starting any type of physical work that will help protect the back
- exercises to do before and while working on a computer that will help relieve muscle strain and tension
- a generic ergonomics checklist
- a computer workstation checklist

TECHNOLOGICAL EDUCATION
Manufacturing Technology, Grade 12, Workplace
Manufacturing Engineering Technology, Grade 12, College

Overhead	Teacher's Notes

Ergonomics – Slide 23

GET READY! – Before you begin any work

- Make sure you have been TRAINED to do the job safely.
- Know and understand your RIGHTS AND RESPONSIBILITIES under the law.
- ASK your supervisor about anything you are not sure of.

GET SET! – Prepare for the task

- PREPARE YOUR BODY:

  - Stretch and warm up your muscles before starting physical activity. (See the student handout on exercises.)

  - Eat properly so you have the fuel to keep on going.

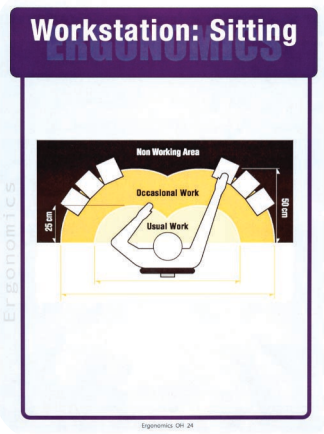
- PLAN what you are doing:

  - Make sure you have everything you will need where you need it.

- ADJUST the workstation for your needs.

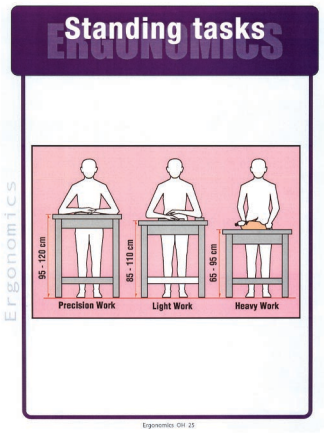
For sitting tasks:

1. Adjust chair height for your height.
2. Adjust work surface height so it is at about elbow height.
3. Adjust footrests, wrist rests and elbow rests so you use neutral body positions as much as possible.
4. Place items you will use most often closest to you.



Ergonomics – Slide 24

Overhead | Teacher's Notes



Ergonomics – Slide 25

For standing tasks:

- Adjust the height of the work using elbow height and type of work you are doing as a guide. Generally the work surface should be around elbow height. If more precise work is being done, the work surface should be a little higher than elbow height. If work is heavier and requires strength then the work surface should be a little lower than elbow height so more force can be used.
- Place the things used most often close by and things used less often further away. Do not overreach — move your body closer and then reach for an object.
- Place work right in front of you so there is no need to twist to see or reach.
- Use a foot rail or footrest to place one foot on periodically. This helps shift some of the body weight and rest the muscles.
- Wear shoes that fit well and are appropriate for the workplace.
- Use an anti-fatigue mat — this is a floor mat made of a special rubber material that helps provide some, but not too much, cushioning on hard floors.
- Tell your supervisor about floors that are in poor condition or slippery.

GO! – Do the work

- Break up long sessions of doing the same thing with other kinds of activities. If possible, take turns with someone else.
- Take small breaks, even for a few seconds, to stretch and change body positions, and sit if you are standing most of the time or stand if you are sitting most of the time.
- Avoid awkward body positions like twisting and bending.
- Use tools that are right for the task.

  - Choose tools that you can use in a good body position and that do not vibrate.

Grade 12 Ergonomics Review Questions

Technological Education

1. When moving materials, you can reduce the risk of injury by:

a. adjusting or changing the shape of the load

b. carrying a heavy load a long distance without breaking it down so you only have to carry it once.

c. never using team lifts as lifting should be done individually

d. none of the above; you can't reduce your risk of injury

2. True or False? There is a maximum weight you're allowed to lift in a workplace.

Arts

1. True or False? Work surfaces should be at waist height.

2. True or False? Anti-fatigue mats help to make you less tired because they give off electrical impulses to keep you awake.

Technological Education (Computer and Information Science and Computer Engineering)

1. Which of the following affects the worker's body position?

a. chair

b. desk

c. computer

d. all of the above

2. True or False? You should always adjust workstation height to waist level.

3. True or False? Computer monitors should be at arm's length away.

4. True or False? The top of the tenth line of text on the computer screen should be at eye level or slightly below.

Technological Education (Construction Technology)

1. The height of your workstation should be at:

a. eye level

b. elbow level

c. waist level

d. shoulder level

Technological Education (Hair Styling and Aesthetics)

1. True or False? When cutting a client's hair, you should adjust the chair so that your elbows are resting on the chair.

2. True or False? When doing a manicure on a client, adjust the height of the table so that your shoulders are hunched over the client.

Technological Education (Manufacturing Engineering and Technology)

1. The height of your workstation should be at:

a. eye level

b. elbow level

c. waist level

d. shoulder level

2. True or False? If work is heavier and requires strength, then the work surface should be a little higher than elbow height so more force can be used.

3. True or False? Anti-fatigue mats help to make you less tired because they give off electrical impulses to keep you awake.

Grade 12 Ergonomics Review Questions (with answers)

Technological Education

1. When moving materials, you can reduce the risk of injury by:

a. adjusting or changing the shape of the load

b. carrying a heavy load a long distance without breaking it down so you only have to carry it once.

c. never using team lifts as lifting should be done individually

d. none of the above; you can't reduce your risk of injury

(answer a)

2. True or False? There is a maximum weight you are allowed to lift in a workplace.

(answer F)

Arts

1. True or False? Work surfaces should be at waist height.

(answer F)

2. True or False? Anti-fatigue mats help to make you less tired because they give off electrical impulses to keep you awake.

(answer F)

Technological Education (Computer & Information Science, Computer Engineering)

1. Which of the following affects the worker's body position?

a. chair

b. desk

c. computer

d. all of the above

(answer d)

2. True or False? You should always adjust workstation height to waist level.

(answer F)

3. True or False? Computer monitors should be at arm's length away.

(answer T)

4. True or False? The top of the 10th line of text on the computer screen should be at eye level or slightly below.

(answer F)

Technological Education (Construction Technology)

1. The height of your workstation should be at:

a. eye level

b. elbow level

c. waist level

d. shoulder level

(answer b)

Technological Education (Hair Styling and Aesthetics)

1. True or False? When cutting a client's hair, you should adjust the chair so that your elbows are resting on the chair.

(answer F)

2. True or False? When doing a manicure on a client, adjust the height of the table so that your shoulders are hunched over the client.

(answer F)

Technological Education (Manufacturing Engineering Technology)

1. The height of your workstation should be at:

a. eye level

b. elbow level

c. waist level

d. shoulder level

(answer b)

2. True or False? If work is heavier and requires strength, then the work surface should be a little higher than elbow height so more force can be used.

(answer F)

3. True or False? Anti-fatigue mats help to make you less tired because they give off electrical impulses to keep you awake.

(answer F)

SECTION III
Resources

Where to Get More Information

Student Handouts

Overheads

Where to Get More Information

Health and Safety Associations:

The Health and Safety Associations have many publications, guides and training programs on ergonomics at no or minimal cost. Here are a few examples:

OSH for Everyone: a CD produced by the WSIB in partnership with the Canadian Centre for Occupational Health and Safety and Ontario's Health and Safety Associations that contains a wide variety of health and safety information. It can be obtained by calling 1-800-663-6639 or by visiting www.oshforeveryone.org/wsib

Industrial Accident Prevention Association

Ergonomics for People at Work: This guide clearly explains the basic principles of ergonomics. It discusses layout, seating, work surfaces, manual materials handling, lighting, and other factors to consider when designing or evaluating work tasks. It also includes two case studies based on real-life situations that illustrate how to apply ergonomic principles at work.

Construction Safety Association of Ontario

Back Care and Manual Materials Handling in Construction: a booklet with many examples of how to lift and carry in the construction industry.

Safety Talk: Back Care, *Basic Lifting:* a one page fact sheet on what workers can do to minimize hazards from lifting.

Homebuilders' Safety Training, *Back Care and Material Handling:* training on CD including many real life examples and solutions for lifting and carrying situations.

Education Safety Association of Ontario

Safety Info – Lifting and Moving General

Safety Information Sheet – Safe Lifting

PC Workstation Assessment Checklist

These short information sheets and tools are available on ESAO's website at www.esao.on.ca

Health Care Occupational Health and Safety Association

Health and Safety in the Home Care Environment: a short booklet published with the WSIB includes a section on employer and worker strategies for musculoskeletal injury prevention.

Ontario Service Safety Alliance

Ergo Quickcheck for Computer Users: A quick guide, with clear illustrations on how to set up a computer workstation to fit you.

Ergo Check: a series of short illustrated sheets that describe what can happen and how to prevent ergonomics-related injuries. Topics include: Cleaning Guest Rooms, Preventing Musculoskeletal Injuries, Preparing Food, Loading and Unloading Trucks, Working While Using a Hoist, Working as a Sales Representative, Working at a Reception Desk, and Working at an Office Desk.

Occupational Health Clinics for Ontario Workers Inc.

Office Ergonomics Workbook: a comprehensive illustrated booklet with information on using work rest schedules, and setting up your workstation to fit you.

London Occupational Safety and Health Information Service (LOSH)

When Aches Become Injuries, A Guide to Preventing and Managing Repetitive Strain Injuries in the Workplace: a comprehensive handbook that can be obtained by calling 519-433-4156.

Focus on Facts: Repetitive Strain Injuries: a one page information sheet describing who is at risk, what RSIs are, and what can be done to prevent them.

Canadian Centre for Occupational Health and Safety

Office Ergonomics Safety Guide: an on-the-job reference tool that helps employees identify ergonomic hazards and take remedial action. It includes criteria for job design and an adequate office environment, and explains how to design a workstation, select and adjust an office chair and organize tasks to prevent discomfort and injury.

The *OSH Answers* section of CCOHS's website (www.ccohs.ca) contains extensive information, free of charge, on ergonomics including:

Ergonomics

Anti-fatigue Mats

Back Belts

Back Injury Prevention

Hand Tool Ergonomics

Manual Materials Handling (MMH) Health Hazards

Office Ergonomics

Pushing & Pulling - General

Pushing & Pulling - Handcarts

RMI – Risk Factors

Shovelling

Working in a Sitting Position

Working in a Standing Position

Working Space

Canadian Standards Association (CSA)

Office Ergonomics, *A National Standard of Canada.* This is the second version of the only national ergonomics standard. It is available in most libraries or directly from the CSA.

Ontario Physical and Health Education Association (OPHEA)

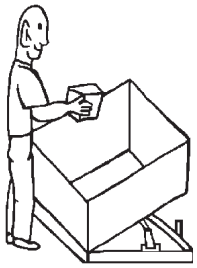
OPHEA develops, manages and executes a series of projects in the areas of physical activity and health. A project may be a single-year initiative or a multi-year strategy ranging from playground safety to community development in the area of substance abuse. Through service contracts, government grants, and/or corporate sponsorship, OPHEA works with many partners in delivering quality programs. Visit OPHEA at www.ophea.org

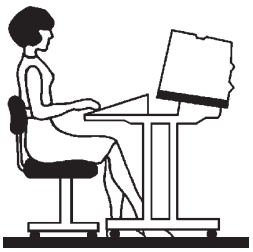
STUDENT HANDOUT-Grade 11

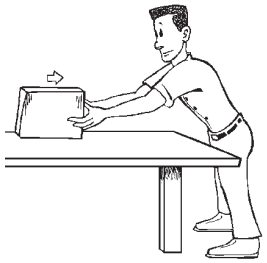
ERGONOMICS

Activity: Find the Awkward Posture

Look at the following pictures. Pick out which ones show good postures and which ones are poor. Discuss your reasons for your choices. What could you do to correct the poor ones?







Live Safe!
Work Smart!

STUDENT HANDOUT-Grade 11

ERGONOMICS

Activity: Little Boxes

Discuss the following scenario and brainstorm ideas to complete the chart.

You are working in a shoe store. A new shipment of 100 shoe boxes has just arrived and your supervisor has asked you to move them from the loading dock to the storeroom. There are several ways to do this. Think about each one in the chart below and list the advantages and disadvantages of each option.

Option	Advantages	Disadvantages
Move one box at a time.		
Move 4 boxes at a time.		
Place 10 boxes in a larger box.		
Place 20 boxes at a time on a cart and push the cart to the storeroom.		

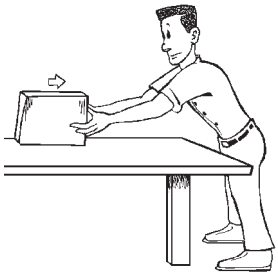
Live Safe!
Work Smart!

STUDENT HANDOUT-Grade 12

ERGONOMICS

Activity: Let's Move It! Scenario A

Scenario A:



Read the following scenario. Using the questions as a guide identify the things Larry should consider BEFORE he moves the object. Record your answers and then make a recommendation about how Larry should move the object safely.

About once an hour Larry has to move a smooth piece of metal from a table to the stamping machine that is 5 metres away. The metal weighs 75 kilograms and is .5 metres square. His co-workers are not far away and can help him if he asks.

How heavy is the object? Can it be broken down into more than one piece? Can you get help from a second person to assist with the lift?	
At what height does the lift start? -Can objects be placed on a surface that is around waist height so you don't have to lift them from the floor?	
How far is the object from your body at the start of the lift? -Can you move things to get closer to the object?	
How far do you have to carry the objects? -Can you shorten this distance?	
How often do you have to lift? -Can you break up long sessions of lifting with other tasks?	
Do you have to twist your body to lift the object? -Can you move your feet and face the new direction instead of twisting?	
How well can you grasp the object? -Is it too large to grasp easily? -Does it have good grips?	

Recommended Plan to Move:

Live Safe!
Work Smart!

ERGONOMICS

Activity: Let's Move It! Scenario B

Scenario B:

Read the following scenario. Using the questions as a guide identify the things Paul should consider BEFORE he moves the object. Record your answers and then make a recommendation about how Paul should move the object safely.

Paul has been asked to move a bag of feathers from the floor 3 metres to the loading dock and place it on a shelf. The bag is 1 metre wide and 3.5 metres long. It weighs 2 kilograms. This task is completed every 5 minutes throughout the shift.

How heavy is the object? Can it be broken down into more than one piece? Can you get help from a second person to assist with the lift?	
At what height does the lift start? -Can objects be placed on a surface that is around waist height so you don't have to lift them from the floor?	
How far is the object from your body at the start of the lift? -Can you move things to get closer to the object?	
How far do you have to carry the objects? -Can you shorten this distance?	
How often do you have to lift? -Can you break up long sessions of lifting with other tasks?	
Do you have to twist your body to lift the object? -Can you move your feet and face the new direction instead of twisting?	
How well can you grasp the object? -Is it too large to grasp easily? -Does it have good grips?	

Recommended Plan to Move:

Live Safe!
Work Smart!

STUDENT HANDOUT-Grade 12

ERGONOMICS

Activity: Mary's on the Move

Mary is an agreeable, spry and alert 80-year-old woman. She has been living in the Kind Care Nursing Home for three years. Mary can stand and walk a few steps but she has weak moments and is concerned about going too far, so she uses a wheelchair to go to the dining room for lunch. Mary weighs 175 pounds.

Both Julie and Alan have been working at the nursing home for the three years it has been open. They are both available to help Mary move from her bed to her wheelchair. Alan has just returned to work after a back injury and can only do limited lifting. Alan weighs about 180 pounds and Julie about 130 pounds. They both wear standard issue uniforms and running shoes every day.

The nursing home is only 3 years old, has all of the latest equipment, and is in good repair. The rooms are spacious but Mary has just had visitors and the chairs they used are still beside her bed.

Pretend you are doing an assessment of how to assist Mary. What questions would you ask to assess the client, caregiver and environment? How would you recommend helping Mary move from her bed to her wheelchair?

Questions to ask about the client:

Questions to ask about the caregiver:

Live Safe!
Work Smart!

ERGONOMICS

Mary's on the Move, continued

Questions to ask about the environment:

Recommendation:

Live Safe!
Work Smart!

STUDENT HANDOUT-Grade 12

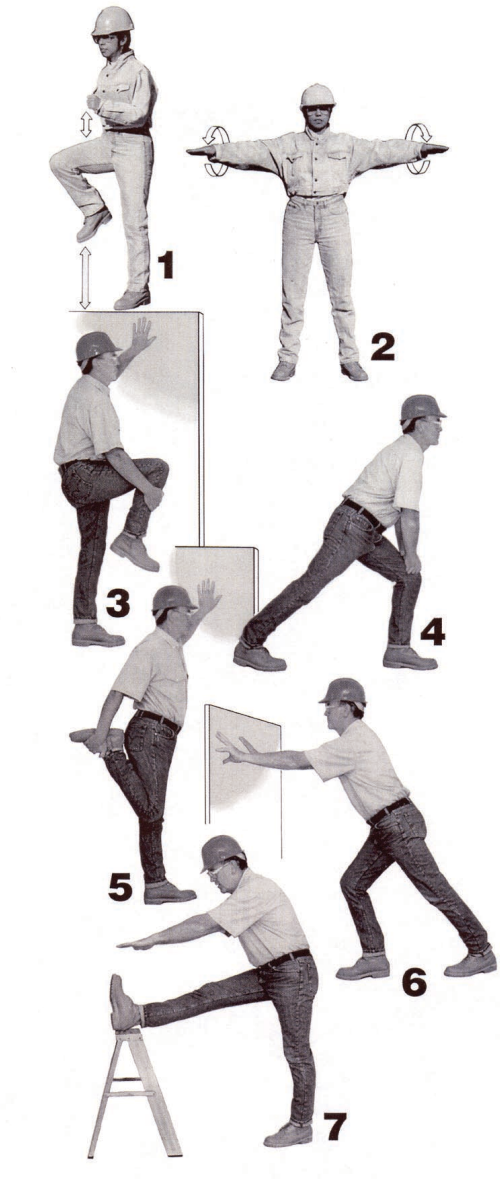
ERGONOMICS

Back Care Stretching Exercises

Getting ready for the job means more than lining up tools and material.

We should get our muscles ready too. Exercising before work can help prevent back, neck, and shoulder injuries.

Warm up first. This helps to get your muscles warm and loose. A warm muscle is a lot less likely to tear than a cold one.



1. **March in Place**
   Stand in position. Pump arms and legs in opposite directions. Make sure that your heels touch the ground. Continue 3 to 5 minutes.

2. **Arm Circles**
   Stand with arms raised horizontally and slightly in front of shoulders, palms down, and feet shoulder-width apart. Rotate arms in forward circular motion for 15 seconds. Relax. Repeat 3 to 5 times.

3. **Knee to Chest**
   Support yourself securely with one hand. With your free hand, pull your knee toward your chest and hold it for 30 seconds. Lower your leg to the ground and repeat with the other leg. Repeat three times for each leg.

4. **Hip Stretch**
   Stand with one foot in front of the other. Place your hands just above the knee of your front leg. Gently bend your front knee. Keep your back foot flat on the floor. Hold 20 to 30 seconds. Repeat with other leg. Repeat three times for each leg.

5. **Thigh Stretch**
   Support yourself securely with one hand. With your free hand, bend your leg back and grasp your ankle. Gently pull your ankle towards your body. Keep your trunk straight. Hold 20 to 30 seconds. Then repeat with the other leg. Repeat three times for each leg.

6. **Calf Stretch**
   Stand slightly away from a solid support and lean on it with your outstretched hands. Bend one leg forward and extend the other leg straight behind you. Slowly move your hips forward. Keep the heel of your back leg on the ground. Hold 30 seconds, relax, and repeat with the other leg. Repeat three times for each leg.

7. **Hamstring Stretch**
   Put the back of your heel on a platform at a comfortable height. Bend your supporting leg slightly. Looking straight ahead, slowly bend forward at the hips until you feel a good stretch at the back of your raised leg. Hold 30 seconds and repeat with other leg. Repeat three times for each leg.

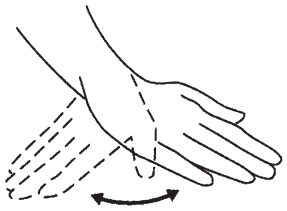
Source: Construction Safety Association of Ontario

Live Safe! Work Smart!

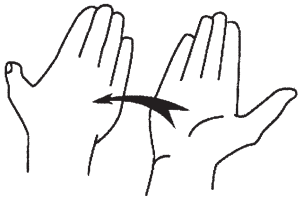
STUDENT HANDOUT-Grade 12

ERGONOMICS

Hand and Wrist Exercises

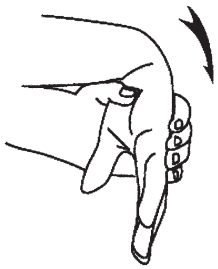


Gently bend wrist from side to side as far as possible. Hold 3-5 seconds. Repeat 3 times.



Start with arm in hand-shaking position and slowly rotate palm down until you feel a stretch.

Hold 3-5 seconds. Then rotate palm up until you feel a stretch. Repeat 3 times.



Keeping elbow straight, grasp involved hand and slowly bend wrist down until you feel a stretch.

Hold 3-5 seconds. Relax. Repeat 3 times.

With hand in a handshake position, grasp and slowly turn it to a palm down position until you feel a stretch.

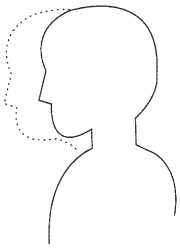
Hold 3-5 seconds. Relax. Repeat 3 times.

Live Safe!
Work Smart!

STUDENT HANDOUT-Grade 12

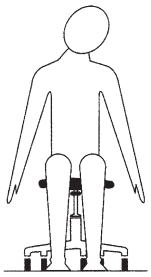
ERGONOMICS

Neck and Shoulder Exercises



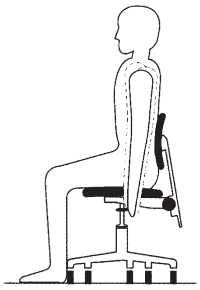
HEAD GLIDE
Purpose: To stretch chest, neck and shoulder muscles.

Sit or stand upright. Without lifting your chin, glide your head straight back. You know you're doing this exercise right if it gives you the feeling of a double chin. Hold for 20 seconds and repeat 5-10 times.



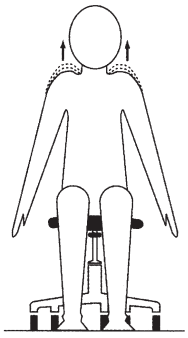
NECK RELAXER
Purpose: To relax neck muscles.

Drop your head slowly to the left, trying to touch your left ear to your left shoulder. Repeat on the right side. Slowly drop your chin to your chest, turn your head all the way to the left, then turn all the way to the right.



SHOULDER ROLL
Purpose: To relax shoulder muscles.

Slowly roll your shoulders backward five times in a circular motion, then roll your shoulders forward.



SHOULDER SHRUG
Purpose: To relieve early symptoms of tightness or tension in the shoulder and neck area.

Raise the top of your shoulders toward your ears until you feel slight tension in your neck and shoulders. Hold this feeling of tension for 3-5 seconds, then relax your shoulders downward into their normal position. Do this 2-3 times.

Live Safe!
Work Smart!

ERGONOMICS

Ergonomics Checklist

PPHSA ERGONOMICS CHECKLIST
WORK-RELATED MUSCULOSKELETAL DISORDERS

ANALYST'S NAME _____ **DATE** _____ **TIME** _____

COMPANY _____ **DEPARTMENT NAME** _____

JOB NAME _____

BRIEF DESCRIPTION OF SPECIFIC TASK _____

_____

_____

If the answer to any of the following questions is "YES", can changes be made to the work area or organization to reduce or eliminate the identified risk factor?

Does the job/task require:

	YES	NO
Static Efforts		
▪ postures, exertions, grasps held without movement for > 30 seconds?	❑	❑
Frequent/Repetitive Efforts		
▪ repetitive or many similar motions (2-4+ motions/min)?	❑	❑
▪ a short, repeated cycle time (< 2 minutes)?	❑	❑

Do any job activites/tasks require:	YES	NO
▪ the worker to sit or stand for long periods without a posture change?	❑	❑
▪ extended reaches away from the body?	❑	❑
▪ moving the arm or hand above shoulder height?	❑	❑
▪ reaching arm behind the body?	❑	❑
▪ rotation/twisting of lower arm?(flipping hand between palm-up & palm-down)	❑	❑
▪ bending and/or twisting while lifting/lowering/pushing /pulling?	❑	❑
▪ using difficult grips (wide grasps, finger & thumb pinches)?	❑	❑
▪ bending wrist up or down (wrist flexion/extension)?	❑	❑
▪ bending wrist to either side (wrist deviation)?	❑	❑
▪ tipping/tilting head back or to the side (neck extension)?	❑	❑
▪ turning/twisting neck to either side?	❑	❑
▪ bending head forward frequently or for a long time?	❑	❑
▪ awkward leg/knee postures?	❑	❑
▪ unsupported use of foot pedals/switches?	❑	❑
▪ lifting/lowering from/to below knee height or above shoulder height?	❑	❑
▪ lifting/lowering objects using a pinch grip?	❑	❑
▪ awkward or difficult lifting postures? I.e. Bending, crouching, lying on back/side	❑	❑

ERGONOMICS

Ergonomics Checklist, continued

Handtool and Work Station Design	YES	NO
▪ do handtools transfer vibration to the user's hand?	☐	☐
▪ are handtool grips made of metal, smooth and/or slippery?	☐	☐
▪ are handtools unbalanced and/or heavy (> 4 kg in weight)?	☐	☐
▪ do handtools force user to bend or twist the wrist or use pinch grips?	☐	☐
▪ are tool handles small, sharp or hard so that they dig into fingers or palms?	☐	☐
▪ are tools in need of maintenance, sharpening, or replacement?	☐	☐
▪ have workers modified tools or their workstation in anyway?	☐	☐
▪ does the workstation design force workers to adopt awkward or static postures?	☐	☐
▪ do workers stand on hard surfaces (concrete/metal) for long periods?	☐	☐
Loads/Forces		
▪ are loads of more than 4 kg lifted/grasped with one hand?	☐	☐
▪ are pinch grips of more than 1 kg force/weight required?	☐	☐
▪ are items held in one hand while being worked on?	☐	☐
▪ is any lifting required with arms above shoulder height or behind the body?	☐	☐
▪ is frequent lifting, pushing or pulling required?	☐	☐
▪ is infrequent heavy lifting, pushing or pulling required?	☐	☐
Environmental conditions:		
▪ is the task performed in cold conditions?	☐	☐
▪ do tools exhaust cold air onto the hands?	☐	☐
▪ is the lighting poor in the work area?	☐	☐
▪ is the worker standing/sitting on a vibrating surface?	☐	☐
Work organization factors:		
▪ is the pace of work machine controlled?	☐	☐
▪ does the pace of work vary greatly over a shift?	☐	☐
▪ do workers sit or stand continuously for > 2 hours steady or for > 4 hours in total during the entire shift?	☐	☐
▪ workers do piece work or work under an incentive program?	☐	☐
Other Factors:		
▪ do workers wear gloves to do this job/task?	☐	☐
▪ is the palm or base of hand used for striking?	☐	☐
▪ do work station components or worker habits result in contact pressure points (elbows, wrists, under-arms, etc.)?	☐	☐
▪ does the job have a history of muscle strain, tendonitis, tennis elbow, carpal tunnel syndrome or other WMSDs?	☐	☐
▪ do workers complain of pain, discomfort or fatigue?	☐	☐
▪ do workers avoid doing this task?	☐	☐

If the answer to any of the checklist questions is "YES", further investigation should be conducted (questions, discussions, analysis) to determine whether the identified risk factor is of sufficient size, frequency and/or duration to require reduction or elimination.

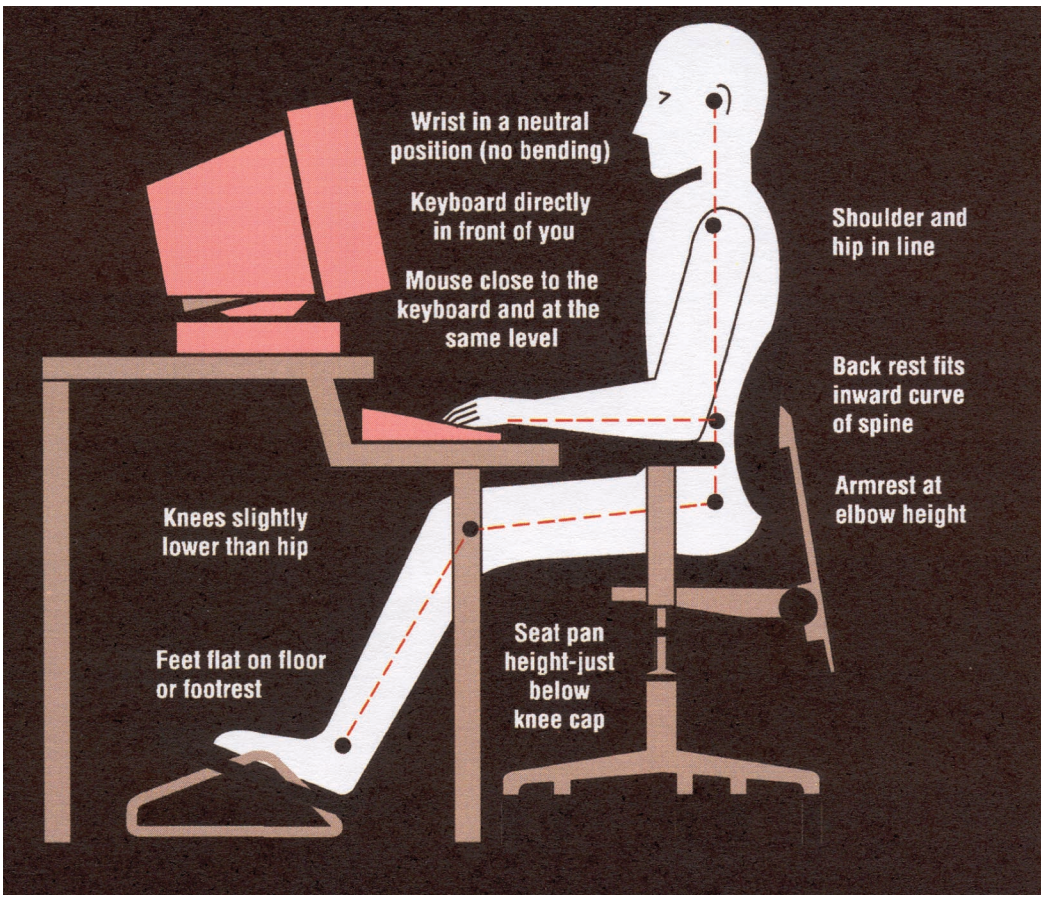
PPHSA WMSD Checklist, Page 2

Live Safe!
Work Smart!

STUDENT HANDOUT-Grade 12

ERGONOMICS

Office Ergonomics Checklist



If the answer to any of the following questions is 'NO', can changes be made to the work area or organization to reduce or eliminate the identified risk factor?

	YES	NO
Chair Adjustments		
When sitting in your chair, are your upper legs parallel with the floor?	❑	❑
Do your feet rest flat on the floor or footrest?	❑	❑
Is the seat bottom angle adjusted to comfort?	❑	❑
Is your back in full contact and firmly supported by the backrest?	❑	❑
Do the arm rests support your elbows but not interfere with arm movement?	❑	❑
Is your chair in good condition and fully adjustable?	❑	❑
Work Surface/Keyboard		
With your chair adjusted properly, is your keyboard at about your elbow height?	❑	❑

ERGONOMICS

Office Ergonomics Checklist continued

	YES	NO
Are your arms resting at your sides?	❑	❑
Are your shoulders relaxed and not hunched?	❑	❑
When keying, is there approximately a 90° angle between your forearms and upper arm?	❑	❑
When keying, are your wrists in line with your forearm?	❑	❑
Workstation		
Are frequently used items within easy reach?	❑	❑
Are infrequently used items stored elsewhere?	❑	❑
Is the floor area and undersurface of your desk clear of obstructions?	❑	❑
Computer		
Is the viewing distance to your monitor at arm's length (between 16 and 24 inches)?	❑	❑
Is the top of your monitor at or just below eye level?	❑	❑
Are your fingers relaxed while keying and mousing?	❑	❑
Is your head held in an upright position with chin tucked in?	❑	❑
Is your mouse at the same level as your keyboard?	❑	❑
Chair		
Is your chair height adjustable?	❑	❑
Are your thighs parallel to the floor?	❑	❑
Do both feet rest flat on the floor or a footrest?	❑	❑
Is your back in full contact with the backrest while working?	❑	❑
Is there room between the front edge of the seat pan and the back of your knees?	❑	❑
Do arm rests support elbows but not cause hunching shoulders?	❑	❑
Work Practices		
Are your tasks rotated regularly?	❑	❑
Do you frequently change body positions while working?	❑	❑
Do you take microbreaks, especially if a task or activity is performed for a lengthy time?	❑	❑
Do you give your eyes regular breaks from computer work?	❑	❑
Do you avoid cradling the phone between your neck and shoulder?	❑	❑

Live Safe!
Work Smart!