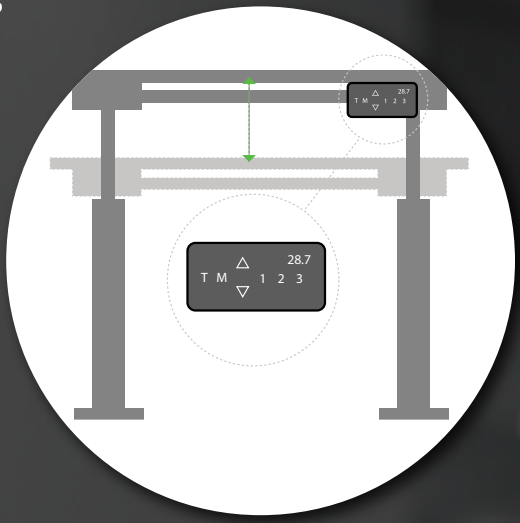
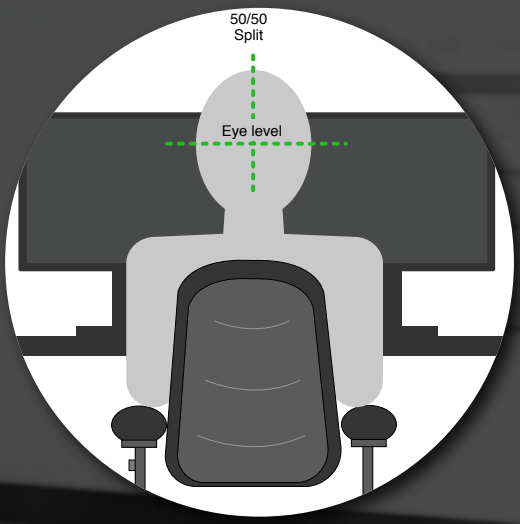
Occupational Health Clinics
for Ontario Workers



Office Ergonomics

Reference Guide



The practice of fitting the work to the worker

Updated for the modern workplace, remote (mobile) workstations, and new technology

Occupational Health Clinics
for Ontario Workers
(OHCOW)

Published June 2021

Office Ergonomics
Reference Guide

Additional Resources

OHCOW also offers more ergonomic information, such as assessment tools and cellular device applications, available on our website.

www.ohcow.on.ca

Every effort has been made to ensure the accuracy of the information in this Reference Guide. OHCOW assumes no responsibility for how this information is used.

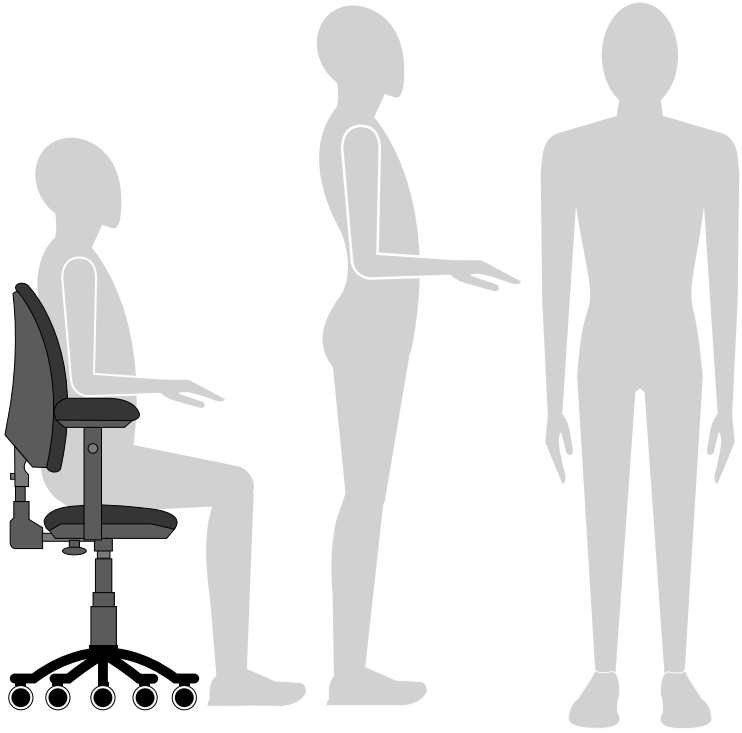
Contents

Section
1

Introduction to Ergonomics

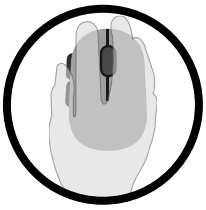
Ergonomics can be defined as fitting the job to the worker.

Not all workers are the same size and everyone has limits. Ergonomics aims to design workstations, work processes, equipment, and tools to fit you. If a job does not fit a worker, the worker is more likely to be exposed to risk factors that may lead to musculoskeletal injury. As a worker, it is important that you know how to adjust your office workstation to suit your needs.

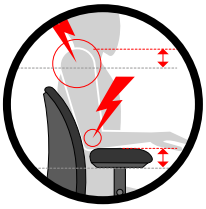


Neutral Body Postions

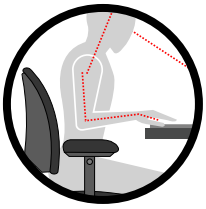
Main Ergonomic Risk Factors in the Office



REPETITION
Tasks or body movements carried out over and over such as constant mousing without adequate rest.



AWKWARD POSTURES
Body positions which deviate from neutral such as twisting your neck to view your monitor or reaching to use your mouse.



STATIC POSTURES
Maintaining a position for a prolonged period of time (e.g. prolonged sitting, viewing a computer monitor with a flexed neck, or reaching for a keyboard).

Every person responds to ergonomic risk factors in different ways. For example, one worker may have symptoms of an injury while another worker performing the same tasks may not. Ergonomic risk factors should be identified and reduced to lower the risk of injury for all workers. Even those workers who are not experiencing pain should take ergonomics seriously to reduce the risk of developing an injury.

In Ontario, no legislated standard exists that specifically addresses office ergonomics. However, a "general duty clause" exists in the Occupational Health and Safety Act (OHSA, 2020). Section 25(2)(h) states:

> "An employer shall take every precaution reasonable in the circumstances for the protection of a worker."

https://www.ontario.ca/laws/statute/90o01%0D#BK47

Office ergonomics is widely accepted as a "reasonable precaution", and the Workplace Safety and Insurance Board (WSIB) readily accepts injury claims produced from office work.

There are other sections under the OHSA (2020) and regulations that apply to musculoskeletal disorders (MSD) prevention and ergonomics in an office environment:

- **OHSA Section 25(2)(a)** – provide information, instruction and supervision to a worker to protect the health and safety of the worker.
- **OHSA Section 25(2)(d)** – acquaint a worker or a person in authority over a worker with any hazard in the work.
- **OHSA Section 25(2)(l) and (m)** – provide the Joint Health & Safety Committee (JHSC) or health & safety representative with the results of health and safety reports and advise workers of the reports.
- **OHSA Section 25(1)(b**) – Employer shall ensure that equipment provided by the employer is maintained in good condition.
- **Industrial Establishment Regulation (IER) (O.Reg. 851), Section 45(a)** – The employer shall ensure that the objects required to be lifted, carried or moved, shall be lifted, carried or moved in such a way and with such precautions and safeguards as will ensure that the lifting, carrying or moving of the material does not endanger the safety of any worker.

https://www.ontario.ca/laws/regulation/900851#BK12

Ontario

"An employer shall take every precaution reasonable in the circumstances for the protection of a worker."

www.ontario.ca/laws/statute/90o01

Note: Employers have a legal responsibility to provide a safe workplace under the OHSA. This includes improving the workplace and implementing measures to protect workers from all hazards*, including those related to Musculoskeletal Disorders.

* including awkward postures, force, static postures, repetition.

There is a 'standard' for Office Ergonomics that was published in 2017. The Canadian Standards Association **Office ergonomics – An application standard for workplace ergonomics, (CSA) Z412-17**, supersedes the previous editions under the title of ***Guideline on Office Ergonomics***. This new standard reflects new technology and work practices, and "is now presented in the form of a standard rather than a guideline".

Musculoskeletal Disorders (MSD) in the Office

MSD are disorders of muscles, tendons, nerves, and other soft tissue. Carpal tunnel syndrome, tendonitis, tension neck syndrome, and low back disorders are examples. These disorders typically develop gradually over time and are generally caused by overuse.

Repeated work requiring the use of the arms and hands can lead to MSD of the hands, wrists, neck, and shoulders. Sitting for prolonged periods of time in a chair may lead to MSD of the back, hips, and legs. The table below outlines occupational risk factors and symptoms for common disorders of the upper body associated with the office environment.

Identified Disorders, Occupational Hazards and Symptoms

Disorders	Occupational Hazards	Symptoms
Tendonitis/tenosynovitis	• Repetitive wrist motions • Repetitive shoulder motions • Sustained hyper extension of arms • Prolonged load on shoulders	• Pain, weakness, swelling, burning sensation or dull ache over affected area
Epicondylitis (elbow tendonitis)	• Repeated or forceful rotation of the forearm and bending of the wrist at the same time	• Same symptoms as tendonitis
Carpal Tunnel Syndrome	• Repetitive wrist motions	• Pain, numbness, tingling, burning sensations, wasting of muscles at base of thumb, dry palm
De Quervain's Disease	• Repetitive hand twisting and forceful gripping	• Pain at the base of thumb
Thoracic Outlet Syndrome	• Prolonged shoulder flexion • Extending arms above shoulder height • Carrying loads on the shoulder	• Pain, numbness, swelling of the hands
Tension Neck Syndrome	• Prolonged restricted posture	• Pain

Source: CCOHS, 2019

Before Purchasing Office Equipment

- Ensure the equipment provided fits the user (i.e. one chair may be too large for one user yet too small for another user).
- Try Before You Buy. Arrange to get samples of equipment from your supplier for users to trial if possible.
- Develop a standard for purchasing based on the **CSA Z412-17 Office Ergonomics Standard** to ensure that equipment will 'fit' the workers and be suitable to the tasks they perform.
- If the workstation is being shared, you may want to consider more adjustability (e.g. height adjustable workstation).

Purchasing Considerations

One must proceed with caution when purchasing equipment labelled as "ergonomic" since there is no legislation governing the use of this term.

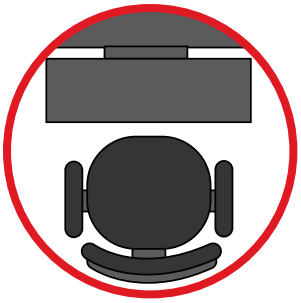
When selecting office products
adjustability is essential.

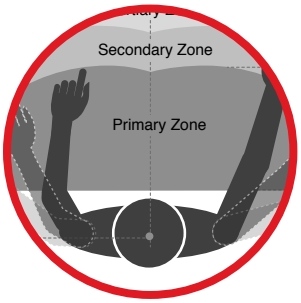
For more information on purchasing the correct equipment contact an OHCOW Ergonomist.
ergo@ohcow.on.ca

Section
2

Work Surfaces

Choosing the correct work surface is an integral part of the overall workstation setup.





In choosing a work surface the following should be considered. The work surface should:

- be **solid enough** to support all of the equipment and materials the user requires.
- provide **adequate space** to house and utilize all external equipment required.
- provide **enough clearance** beneath the work surface to allow the user to sit or stand directly in front of, or close to, the work surface in an upright posture without obstruction.
- allow the user to **move freely** through multiple postures while seated (including extending the lower legs), or to stand (CSA Z412-17).
- be **high enough** to allow the user to sit and/or stand with their feet comfortably supported on the floor while maintaining neutral postures for sitting and/or standing, and without exposing the user to contact stress.

It is also important to ensure storage cabinets and drawers (beneath or above) do not impede the movement of the user, reduce leg space, create pinch points, or cause the user to work outside neutral posture.

Neutral Postures

Workstation Configurations

There are four common “shapes” of desks that are used in the office environment:

- Straight
- Corner
- L-shaped
- U-shaped

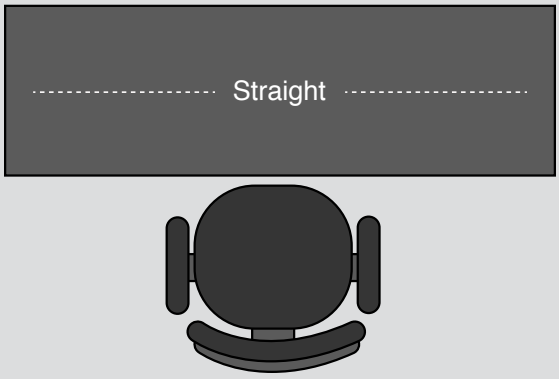
• Straight

Merits:

- Good when the user performs only one task (computer or paperwork).

Limitations:

- Often there is insufficient space to house all the required computer components.
- Prevents or restricts the ability of an individual to perform multiple tasks.



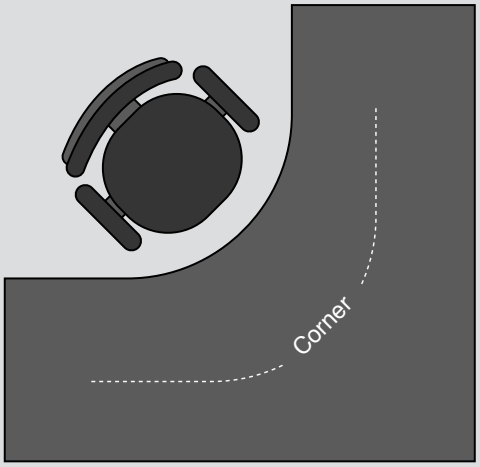
- **Corner**

Merits:

- May allow workspace on either side of the computer.

Limitations:

- Paperwork area potentially limited by length of straight sides.
- Often curve is too small to position keyboard and mouse correctly to maintain neutral postures.
- Leg clearance is often limited by desk supports.
- Limited by available workspace and the size of office.



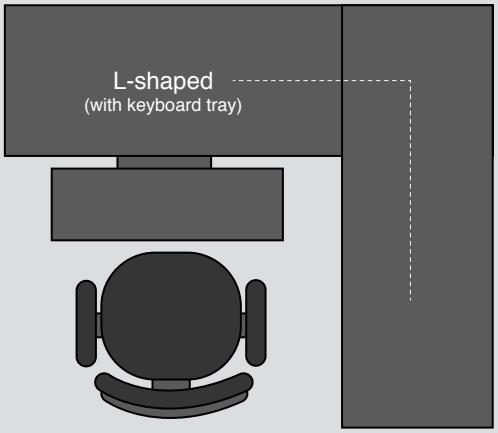
- **L-Shaped**

Merits:

- Provides dedicated workspace on one side of the computer to perform paperwork or utilize as meeting space.

Limitations:

- Limited by available workspace and the size of office.
- Setup is dictated by the dominant hand (standard right hand configuration illustrated).



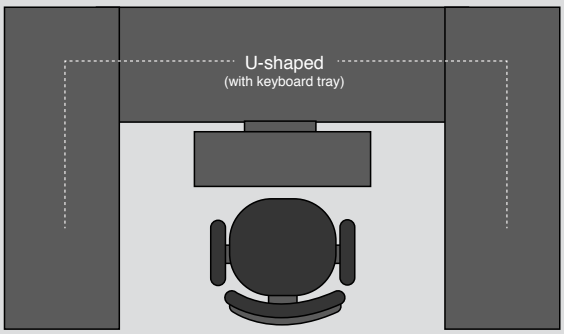
- **U-shaped**

Merits:

- Provides dedicated workspace on each side of the computer to perform paperwork or utilize as meeting space.

Limitations

- Limited by available workspace and the size of office.
- Size of workstation may increase reach requirements.



Desk configuration will be dictated by the available space and tasks the user is required to perform.

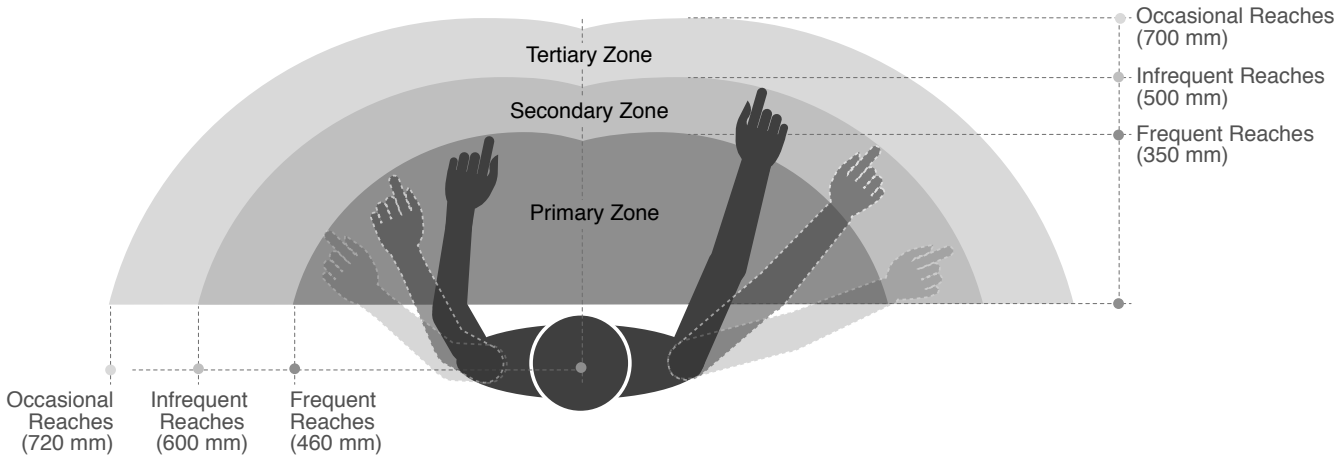
Workspace Envelope

Regardless of the desk type, it is important to ensure that the equipment sitting upon it is positioned properly. A **workspace envelope** is a measure of the maximum and normal ranges of the motion of the arm. The workspace envelope is divided into three zones:

1. **Primary Zone:** frequently used objects should be located within the primary zone, approximately elbow to fingertip away from the midline of the body. Such items would include the keyboard, mouse, and telephone (depending on usage).

2. **Secondary Zone:** items that are used less frequently should be located in the secondary zone, approximately arm's length away from the midline of the body. Such items would include the telephone (depending on usage), pens, stapler, etc.

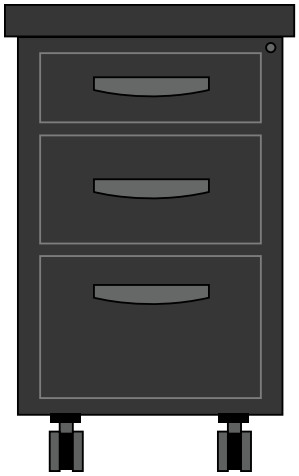
3. **Tertiary Zone:** items touched rarely may be located in the tertiary zone, greater than an arm's length away from the midline of the body. Such items would include the monitor (due to viewing distance requirements) and infrequently used books/ documents, etc.



The Workspace Envelope

Storage within the Office

- Filing cabinets/drawers under the workstation should not interfere with the user's ability to properly adjust the keyboard tray or perform paperwork.
- Filing cabinets should be equipped with a locking system so that no more than one drawer can be opened at one time.

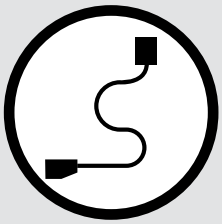


- File and desk drawers should be kept closed when not in use to avoid potential injury.
- Arrange cabinets so frequently used files are in the middle drawer (or closest to elbow level) to reduce bending or reaching.

Additional Considerations

Allow adequate space for maintenance of equipment.

Equipment such as printers or fax machines should not obstruct movement and should be located in an alternate space other than the desk.



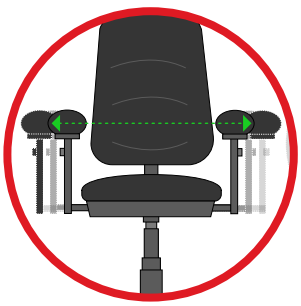
Cables and cords* should be long enough to accommodate the user's needs and workstation mobility as required (e.g. sit/stand workstation).

*power cords, monitor cables, mouse and keyboard cords, etc.

Section
3

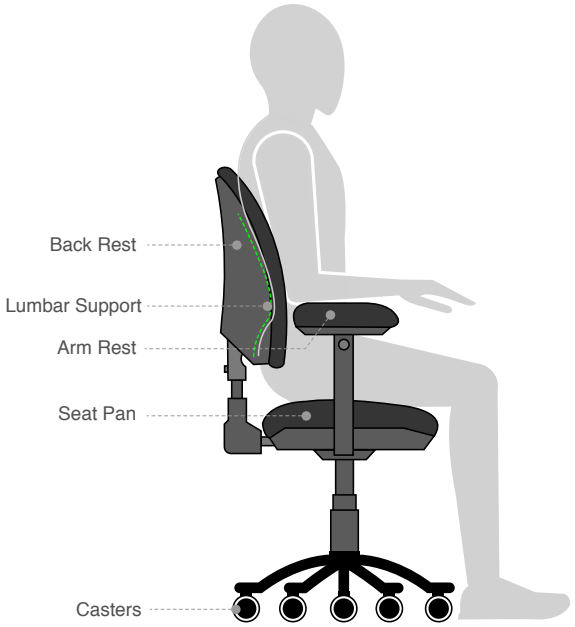
Chairs

The chair must fit the user, as well as suit the tasks to be performed. One style of chair may not suit every user. The chair should provide support and stability to the user and allow movement through multiple positions.



What Makes a Chair Ergonomic?

A chair is only “ergonomic” if the user can adjust it to fit their own personal dimensions.



Seated Neutral Posture in an Adjustable Chair

In order to do this, the following parts of a chair need to be adjustable:

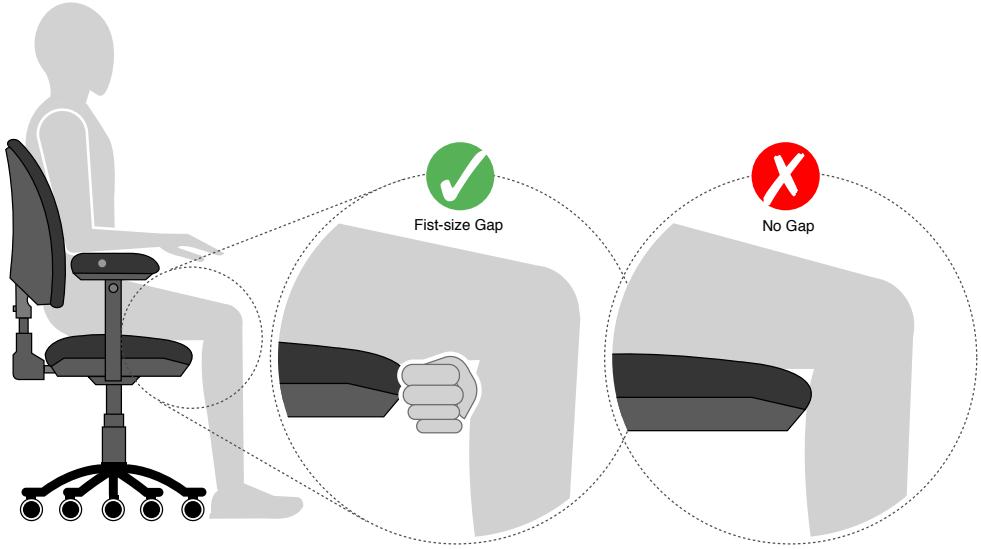
- **Seat pan** – height and depth
- **Backrest** – height and angle
- **Lumbar Support** – height and depth
- **Armrests** – height, width, and ability to rotate

It is important that the user understands the proper positioning of these features to allow for optimal support and to maintain neutral sitting postures. Each of these features is discussed in detail below:

Seat Pan

Seat Pan Depth

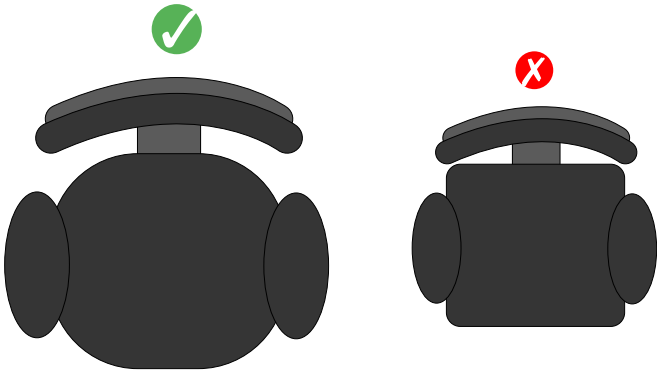
- Having a seat pan that is the correct size is an essential feature.
  If the seat is too deep, it will create a pressure point on the back of the legs. This will not only reduce blood flow and nerve supply but also cause the user to slide forward, reducing the effectiveness of the lumbar support.



The “Fist” Test

- The simplest way to determine if the seat pan is too deep is to perform the “fist” test. Sitting properly in the chair the user should be able to place their fist (maximum) or two fingers (minimum) between the front edge of the seat pan and the back of their legs.
- If this cannot be achieved, the seat pan depth is either too deep (less than two fingers), or too short (more than fist):
  - If the chair has seat pan depth adjustability, make the required adjustments.
  - If the seat pan cannot be adjusted, and is too large for the user, then the seat pan or chair must be replaced with one that is the correct size for the user.

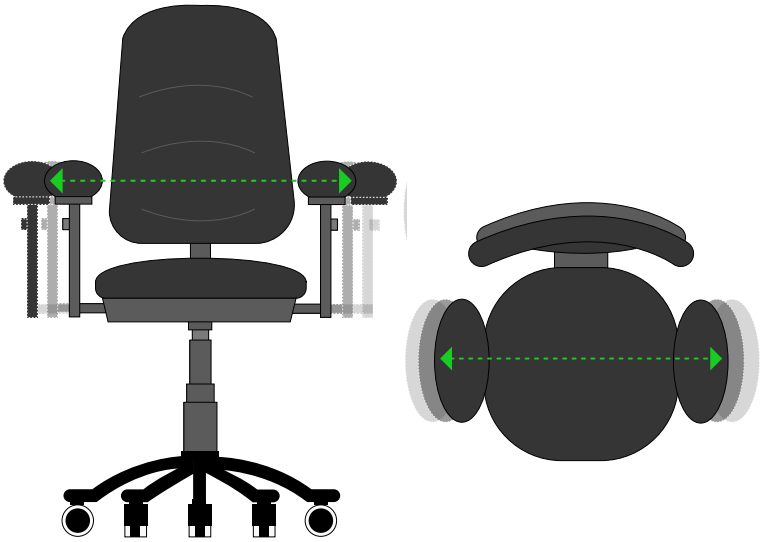
- The front edge of the seat pan should be rounded to avoid pressure points.



Rounded Seat Pan

Seat Pan Width

- Ensure that the correct seat pan size is provided to the user based on their physical size and dimensions. Chairs can be provided in various sizes to accommodate different users. The width can be further accommodated by making changes to the armrests (rotated or adjusted in width from the base).
- If armrests have width adjustability, position them to fit the user. (See page 17).



Adjustable Armrests

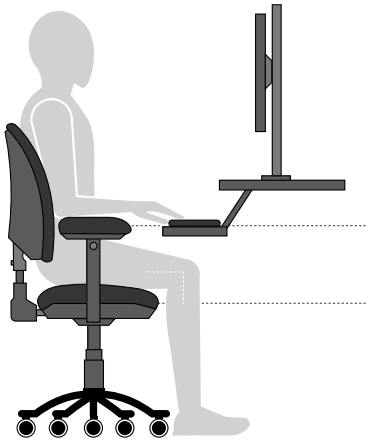
Seat Height

The seat height is dependent on the physical size and dimensions of the user. The user's working height (on the desk, height adjustable workstation, or on a height adjustable keyboard tray) also dictates the height at which the seat is positioned.

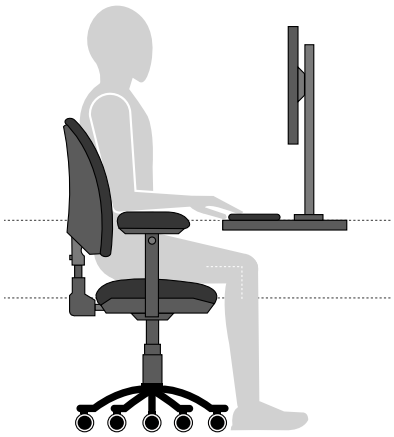
The seat height should allow the user to:

- Sit with their feet resting comfortably on the floor or a footrest.
- Work with their upper extremities in neutral postures.
- Make easy adjustments to allow for postural variation and different footwear.

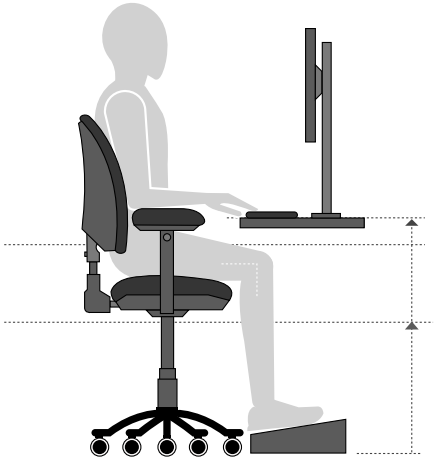
There are three simple ways to ensure your seat is at the correct height:



1. Keyboard on keyboard tray

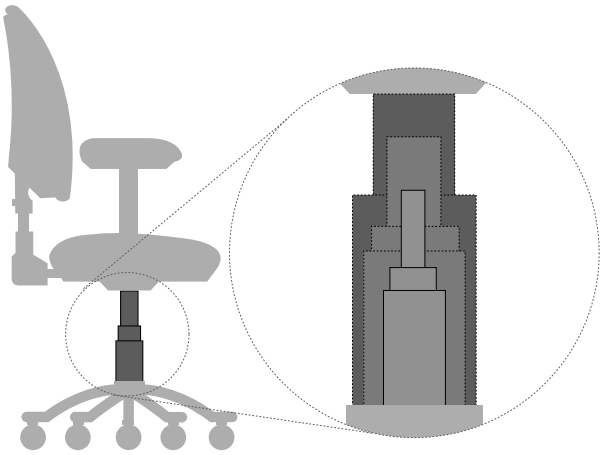


2. Keyboard on workstation (no footrest)



3. Keyboard on workstation utilizing footrest

If your seat cannot be lowered or raised to the proper height, then the cylinder may be replaced with one that allows for the proper adjustments.

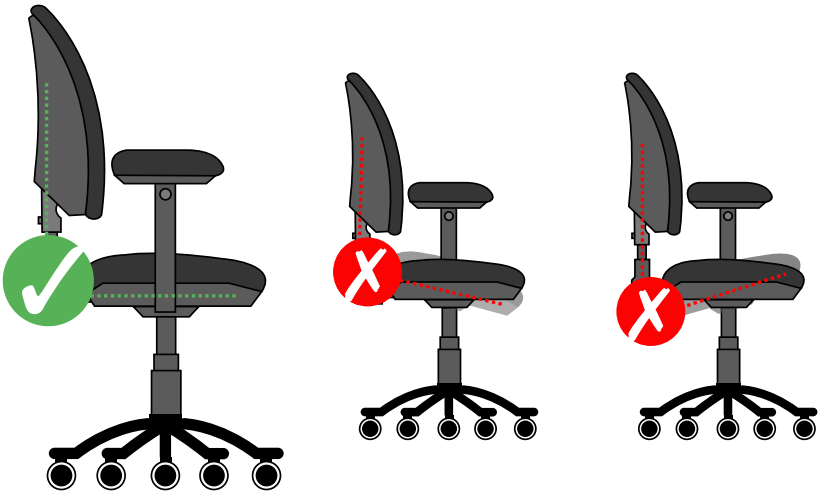


Adjustable Cylinder

Seat Angle

The seat pan angle should:

- Be adjustable and independent of the backrest adjustments.
- Allow the user to maintain support of their feet on the floor or footrest.



Adjustable Seat Pan

Backrest

Backrest Height

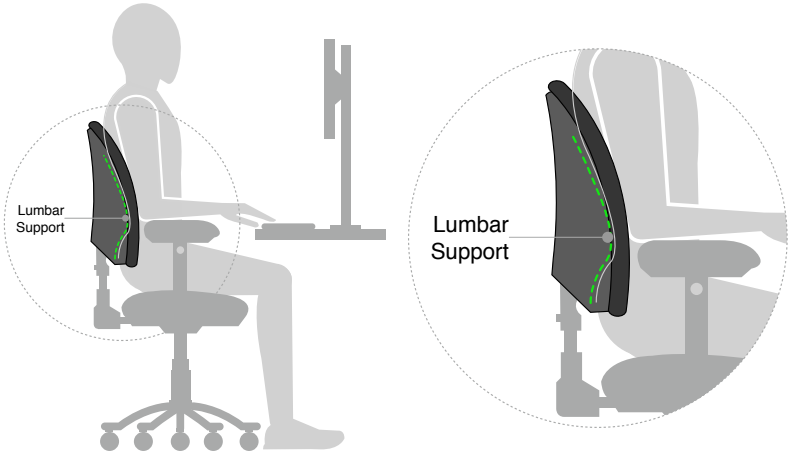
The backrest height should be:

- High enough to support the users back, shoulders, and neck.

Lumbar Support

The lumbar support helps maintain the natural curvature of the spine. The lumbar support should:

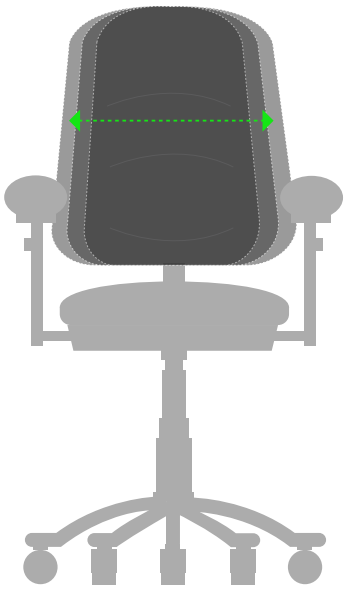
- Be height adjustable in order to accommodate the user.
- Be shaped to accommodate the user.
- Not cause any localized pressure points.



Backrest Width

The backrest should:

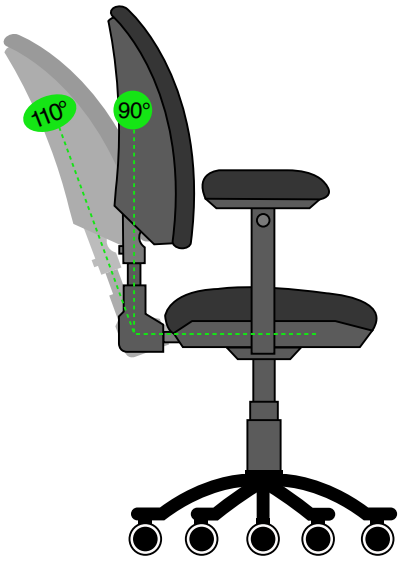
- Be wide enough to provide adequate support to the user's back.
- Not cause any localized pressure points.



Backrest Angle

The backrest angle should:

- Be positioned 90 to 110 degrees depending on personal preference.
- Ensure the lumbar support is positioned in the curvature of the user's lower back.



Chair Backrest Angles

Armrests

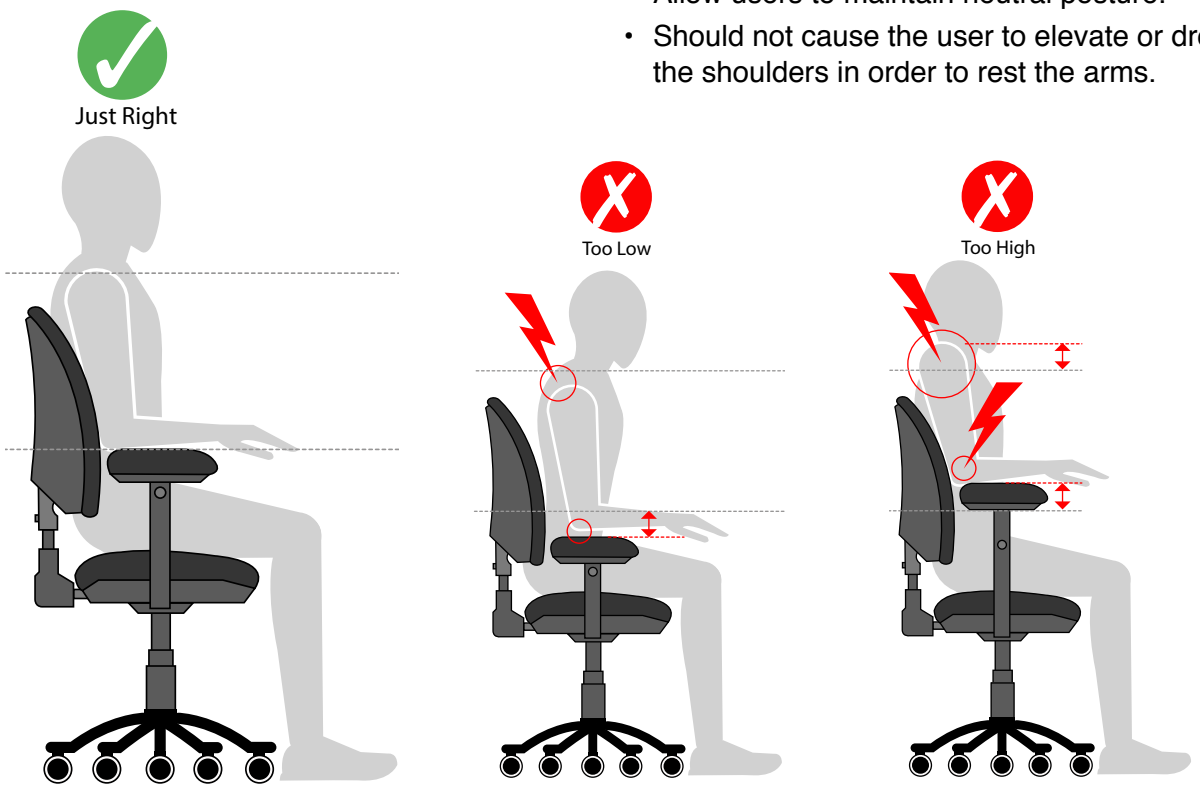
The armrests on a chair should:

- Support the arms.
- Allow access to the workstation.
- Distribute forces evenly.
- Allow the user to sit in a variety of postures.

Armrest Height

The armrest height should:

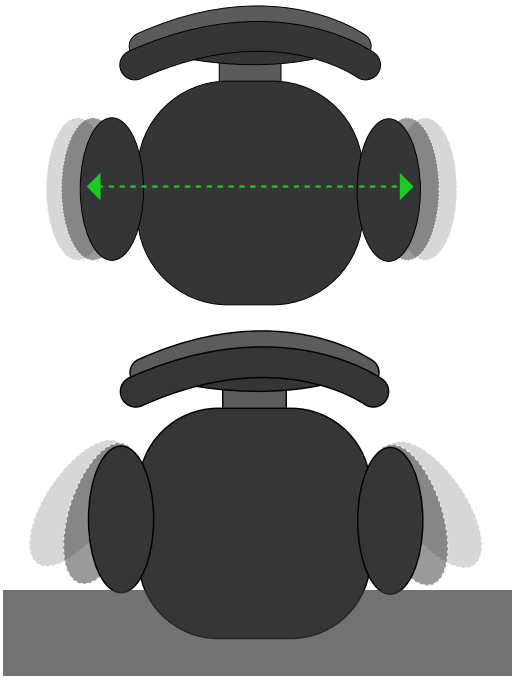
- Be adjustable and support the user's forearms and/or elbows.
- Allow users to maintain neutral posture.
- Should not cause the user to elevate or drop the shoulders in order to rest the arms.



Armrest Length, Width, and Positioning

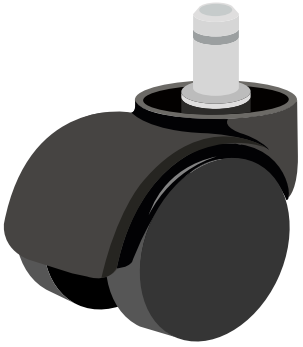
The length, width, and positioning of the armrests should:

- Allow users to maintain a neutral posture.
- Support the user's forearms and not cause excess contact stress.
- Not impede the user's ability to access the workstation.
- Allow for width adjustability.
- Pivot or rotate to allow chair to be positioned as close as possible to the workstation.
- Allow the user to enter and exit the chair easily.

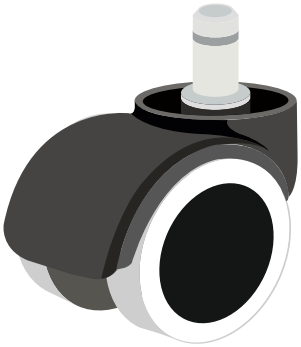


Casters

The casters on the chair should be appropriate to the type of flooring.



Hard Casters
- Lower rolling resistance
- Recommended for soft surfaces (carpeted floors)



Soft Casters
- Higher rolling resistance
- Recommended for hard-surface floors (tile, laminate)

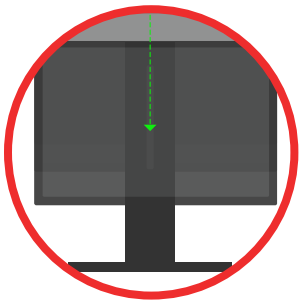
Important Considerations

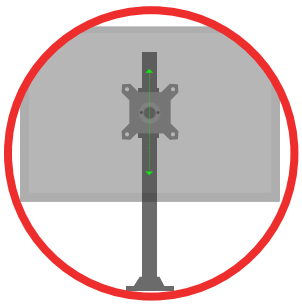
Preventative maintenance (e.g. cleaning and lubricating) is suggested to ensure ease of operation.

Section
4

Computer Screens/Monitors

When selecting one or more monitors, there are a number of factors that need to be considered.





Choosing a Monitor:

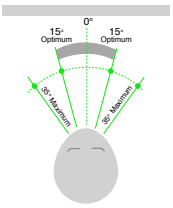
- should allow the user to view information correctly and easily
- size should be based on:
  - tasks to be performed
  - average viewing time
  - distance from which the user will be viewing it:
    - **smaller screens** may cause the user to lean forward with excess neck flexion
    - **larger screens** may not be placed far enough away from the user and may result in vision issues or eye discomfort
- should have separate controls for brightness and contrast to allow for individual adjustability
- should (preferably) be height adjustable with swivel and tilt capacity
- number of monitors required should be based upon the tasks to be performed

Positioning and Adjusting Monitors

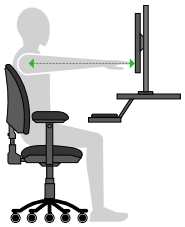
When positioning and adjusting a monitor consider:

• Screen height

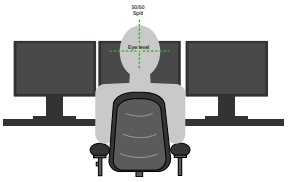
• Viewing angle



• Horizontal placement



• Viewing distance

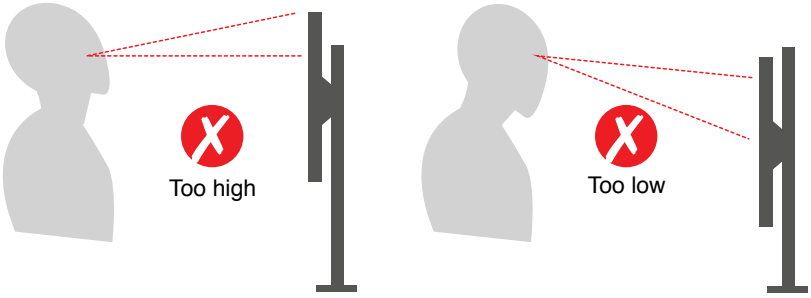


• Number required

Screen Height

The top of the viewing area of the monitor should be positioned at the user's horizontal eye height while maintaining a neutral neck posture.

Note: Location and size of viewing area can vary depending on monitor design.



For individuals that wear corrective lenses such as bifocal or trifocal eye glasses the height of the monitor (or the active viewing area on the screen) should be adjusted as required in order to maintain neutral neck postures.

Screen Height Adjustment Devices

There are different ways the screen height can be manipulated in order to allow the user to maintain neutral neck postures:

1. **Height adjustable monitors** allow the user to raise or lower the screen from the base.
2. **Monitor risers** allow the user to increase the screen height by placing the monitor on a platform.
3. **Monitor arms** attach directly to the monitor and allow the user to raise and lower the screen to the desired height.

It is important when purchasing monitor risers or arms that the monitor can be positioned at the correct height for the user.

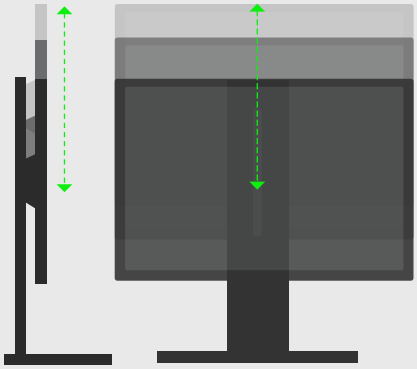
• Height Adjustable Monitors

Merits:

- Easily raised and lowered by pulling up or pushing down on the monitor.
- Minimal additional desk space required.

Limitations:

- Height range may not accommodate all users.



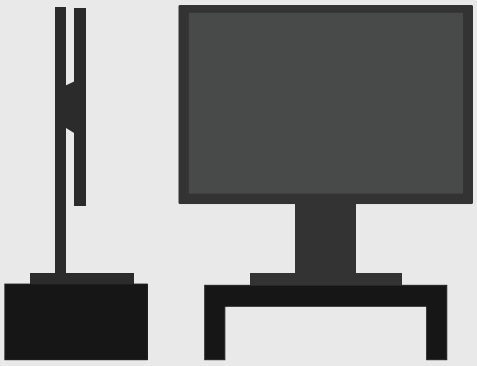
• Monitor Risers

Merits:

- Easy to use.
- Cost effective.

Limitations:

- Cannot make precise adjustments.
- Only allows the user to raise the monitor.
- Takes up additional space on the workstation.
- Does not allow for quick monitor height adjustment.



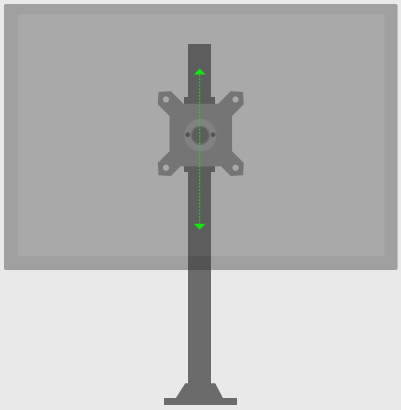
• Stationary Monitor Arms

Merits:

- Can adjust monitor in a wide range of heights.
- Ideal with a single user.

Limitations:

- May be difficult to adjust (some require the use of tools).
- Difficult to configure if used with multiple monitors.



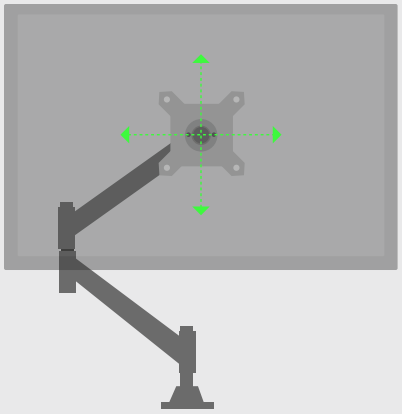
• Articulating Monitor Arms

Merits

- Can adjust monitors in a wide range of heights, angles, and configurations.
- Can be easily manipulated.
- Can relocate the monitor when not in use.
- Ideal for single monitor use.

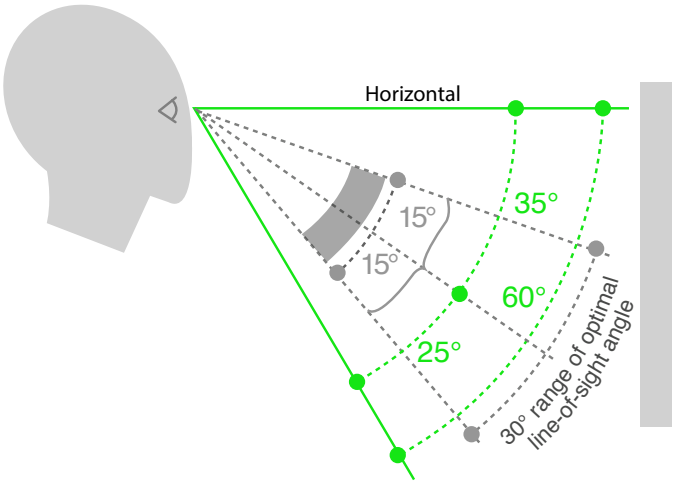
Limitations:

- Can take up a large portion of the workstation.
- Difficult to configure if used with multiple monitors.



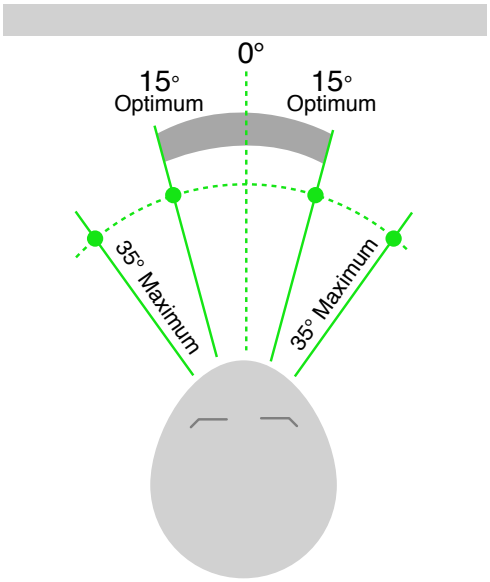
Viewing Angle

The entire area of the visual display, including the keyboard and mouse should be located between horizontal eye level (0°) and below eye level (60°) when in neutral posture.



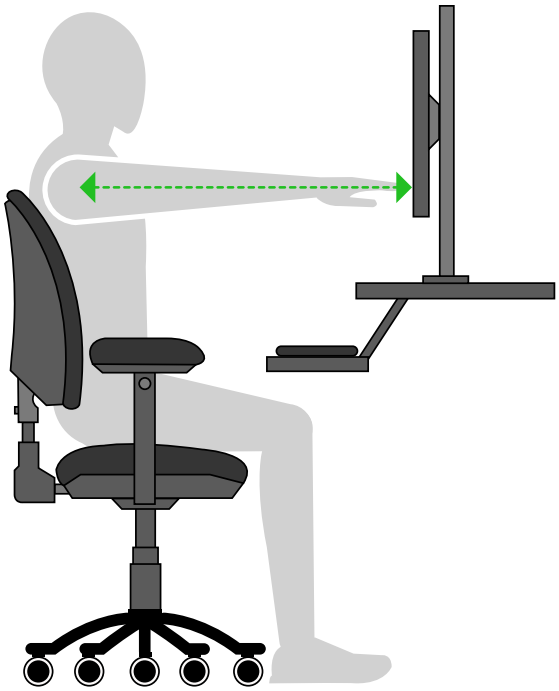
Horizontal Placement

A single monitor should be centred directly in front of the user so that there is limited twisting of the neck and/or torso.



Viewing Distance

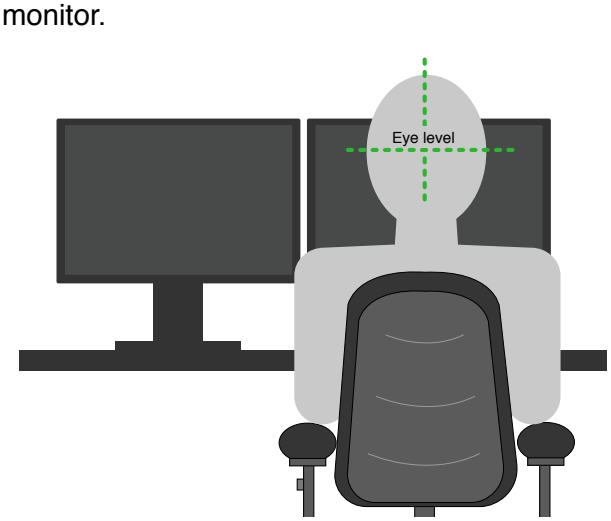
The monitor should be at approximately one arm's length away from the user so that the user may view the full contents of the monitor without excess eye strain while maintaining a neutral neck posture.



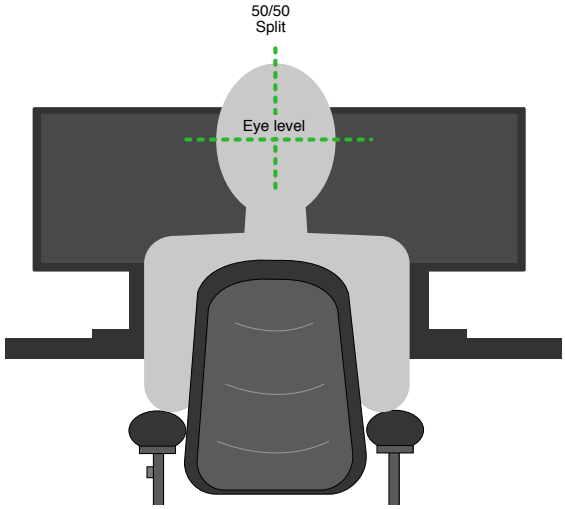
Multiple Monitor Placement

If multiple monitors are required to perform the computer tasks, consider the following during set up:

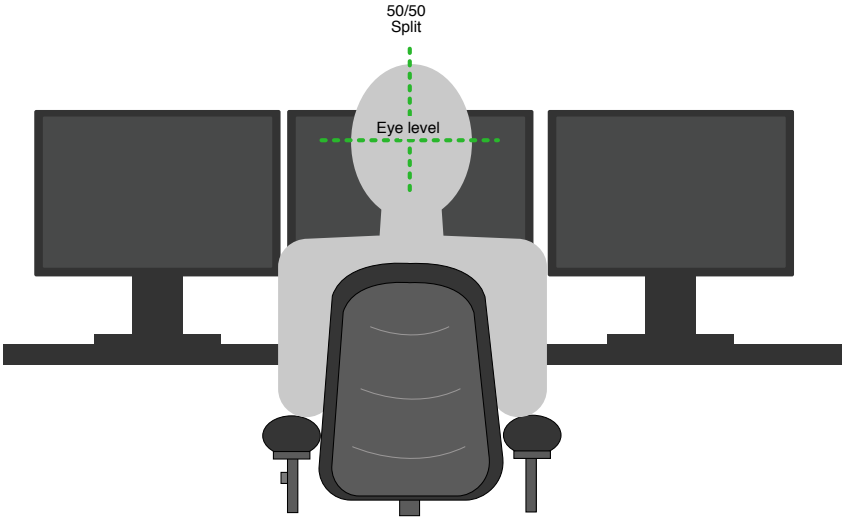
- The top of the viewing areas of each monitor should be positioned at the user's horizontal eye height while maintaining a neutral neck posture.
- **If two monitors are present and one is utilized more frequently than the other**, this primary monitor should be centred directly in front of the user, with the secondary monitor located adjacent to one side of it. The viewing distance is similar to when utilizing only one monitor.



- **If two monitors are present and both are utilized equally,** both monitors should be positioned adjacent to each other, with their meeting point located directly in front of the user. The viewing distance should be slightly farther away than when utilizing only one monitor to decrease potential twisting of the neck and/or torso.



- **If three monitors are present,** they should all be placed adjacent to each other with the middle monitor centred directly in front of the user. The middle monitor should be considered the primary monitor, and should be used most frequently if possible. The viewing distance should be far enough away to decrease potential turning or twisting of the neck and/or torso while being able to adequately view the contents of all monitors and maintaining a neutral neck posture.



Section

5

External Equipment and Accessories

This section deals with input devices (keyboard and mouse), keyboard trays, footrests, document supports, and telephones.

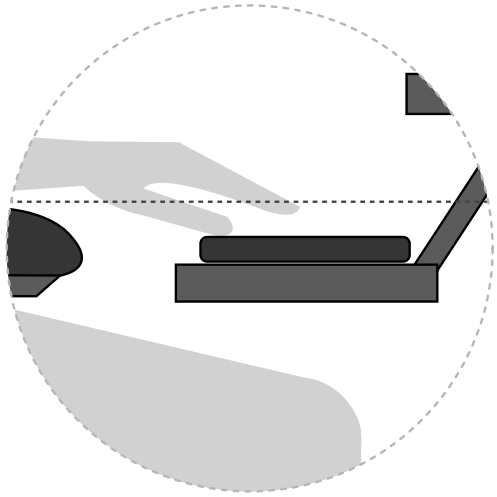
Keyboard

Before selecting a keyboard, it is important to consider how the user interacts with the device. The following information regarding the user should be obtained:

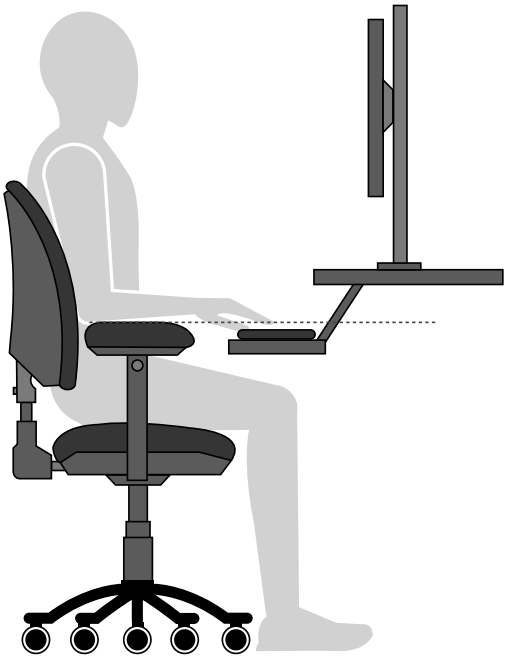
- Right or left hand dominant.
- Numeric key pad usage.
- Keyboarding proficiency; touch typist or not.
- Physical characteristics.

Placement of the keyboard:

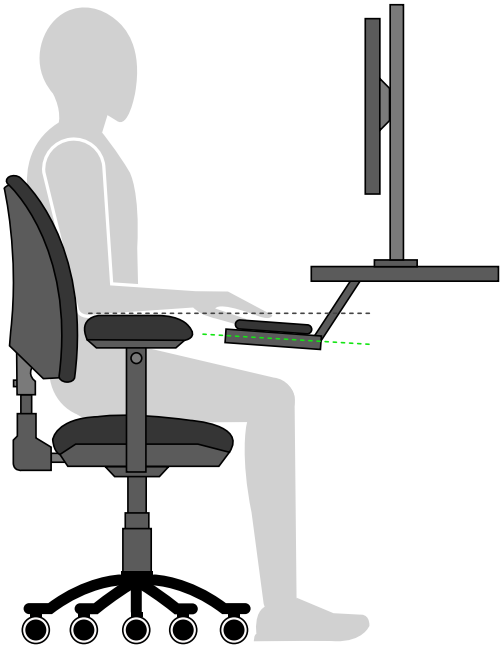
- The keyboard should be positioned slightly below elbow height and close to the body in order to maintain neutral postures. This may require increasing the height of the chair or adjusting the keyboard tray.
- The keyboard should be placed on the work surface (flat or slight negative tilt) such that neutral wrist postures are maintained.
- The user should be able to move the keyboard so that the most frequently used keys can be centred directly in front of the user.
- Typing should be performed with the hands “floating” above the keyboard. The heel/pad of your hand should only be resting when taking a break from typing.



Hands “floating” above the keyboard



Keyboard positioned slightly below elbow height and close to the body



Keyboard placed on work surface (flat or slight negative tilt)

- **Straight Keyboard**

Merits:

- Easily usable for those who require visual input of the keyboard.

Limitation:

- Increased reach requirements due to attached numeric key pad.

- **Contoured Keyboard**

Merits:

- Allows for more neutral wrist and hand postures.
- Typically, have built in palm/wrist supports.

Limitations:

- Difficult to utilize if not a proficient typist.
- Orientation may require additional workstation depth.
- Some designs may result in awkward postures.

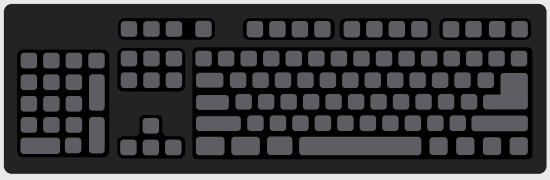
- **Inverse Keyboard (left side numeric key pad)**

Merits:

- Left side numeric key pad reduces lateral reach for users who mouse with their right hand by allowing mouse to be positioned closer to the alphabetic key pad.

Limitations:

- Ideal for right handed users, not left handed users.
- May be difficult to transition to left handed numeric key pad use.



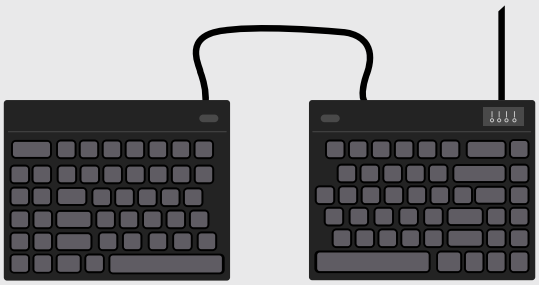
- **Split Keyboard**

Merits:

- Allows for more neutral wrist, hand, and elbow postures.
- Independent placement of each component allows for preferred configuration by the user.

Limitations:

- Difficult to utilize if not a proficient typist.
- Orientation may require additional workstation depth.



- **Compact Keyboard**

Merits:

- Optimal mouse placement.
- Decreases lateral reach requirements.

Limitation:

- No numeric key pad.

Additional Keyboard Considerations:

- A wireless keyboard allows the user to freely relocate keyboard as required.
- Keyboards can be equipped with either low or high profile keys. **Low profile keys** require less force to depress and are often preferred by touch typists. **High profile keys** require more force to depress and are often preferred by typists who require visual and tactile feedback.
- Palm/wrist supports can be incorporated into, or separate from, the design of the input device. The use of palm/wrist supports should place the hands and wrists in neutral postures.
- Independent numeric keypads may be utilized with compact keyboards to allow placement of each component as required.

Key Profiles

Wrist Rest

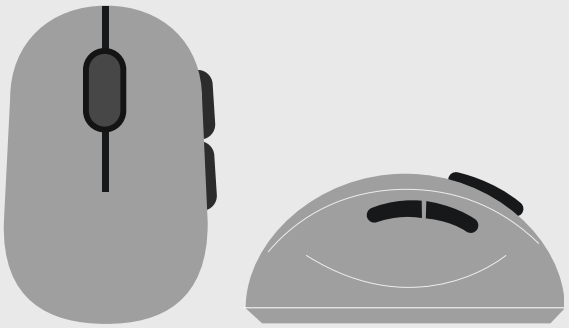
Compact Keyboard with Numeric Keypad

Mouse

The mouse is generally utilized with the user's dominant hand and should be positioned on the same plane as the keyboard (tray or desktop) and located directly adjacent to it.

- While utilizing the mouse the user should maintain neutral upper body postures.
- Utilize the forearm to move the mouse rather than the wrist alone.
- When using the mouse for extended periods, it may be beneficial to support the arm, or utilize keyboard shortcuts (See Keyboard Shortcuts, page 55).

• Standard Mouse



Merits:

- May accommodate both left and right hand users.

Limitations:

- Does not allow for neutral postures of the hand, wrist, and elbow.
- May lead to contact stress.

• Vertical Mouse

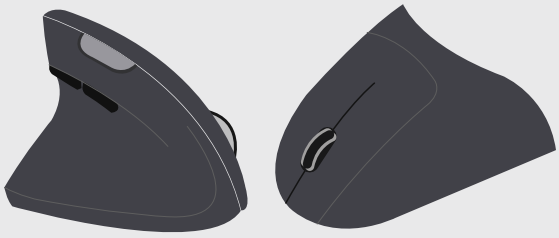
Merits:

- Allows for neutral postures of the hand, wrist, and elbow.
- Minimizes contact stress.

Limitations:

- May be difficult for user to transition from a standard mouse.
- May require additional forearm/elbow support.

• Right/Left-handed Mouse



Merits:

- Slight curve allows for a more neutral posture of the hand, wrist, and elbow.
- Minimizes contact stress.

Limitations:

- May be difficult for user to transition from a standard mouse.

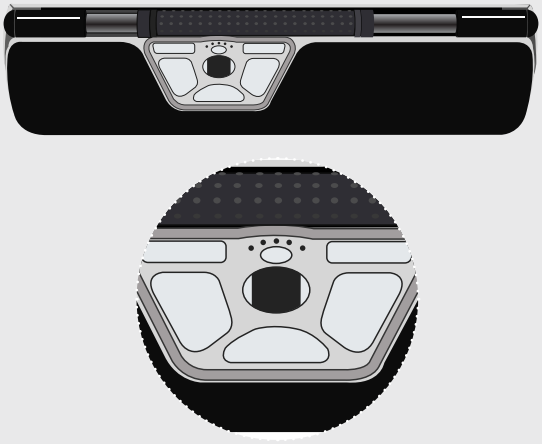
- **Rollermouse™**

Merits:

- Allows for left and right hand use.
- Eliminates lateral reach.
- Programmable to accommodate user's needs.

Limitations:

- May be difficult for user to transition from a standard mouse.
- Requires a training period to become proficient.
- May increase horizontal reach to the keyboard.
- May result in awkward postures.



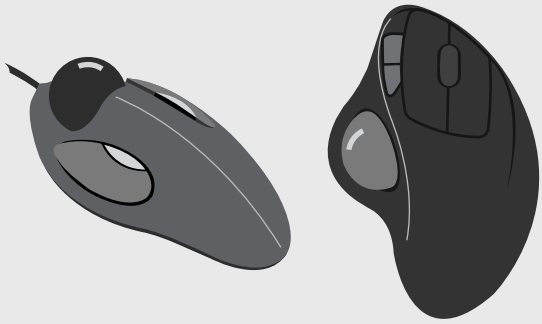
- **Trackball Mouse**

Merits:

- Allows the thumb or multiple fingers to scroll depending on design.
- Does not require wrist movements.

Limitations:

- May be difficult for user to transition from a standard mouse.
- May not be as effective for tasks requiring precision.
- Potential for overuse and fatigue of finger/thumb muscle groups.



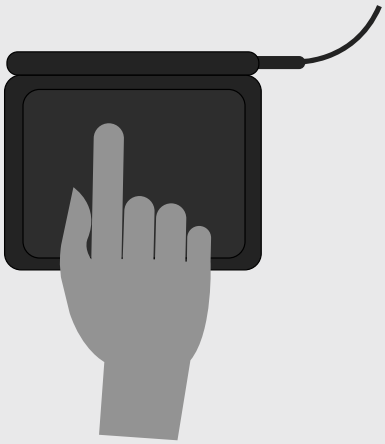
- **Touchpad Mouse**

Merits:

- Allows for left and right hand use.
- May be of benefit for creative tasks (drawing, etc.).

Limitations:

- May be difficult for user to transition from a standard mouse.
- May be overly sensitive.
- May lead to awkward postures and contact stress.



Additional Mouse Considerations

FIT

The mouse is not one size fits all; ensure that the mouse fits the user's hand.

GRIP

The user should not squeeze the mouse, but should hold it loosely in their hand.

CONNECTION

A wireless mouse allows for optimal placement/movement on the workstation, and assists with cable management by eliminating the requirement of a cord.

Keyboard Tray

When a work surface is too high, or there is not adequate space, a keyboard tray can be utilized to position the mouse and keyboard at a working height that allows the user to obtain neutral postures.

A keyboard tray should:

- Be easy to adjust.
- Move freely beneath the work surface.
- Lock into place.
- Have a solid, stable surface.
- Have angle and height adjustability.
- Be wide enough to accommodate both the mouse and keyboard.
- Allow for both mouse and keyboard to be at the same height.
- Allow clearance between the top of the user's thighs and the tray.

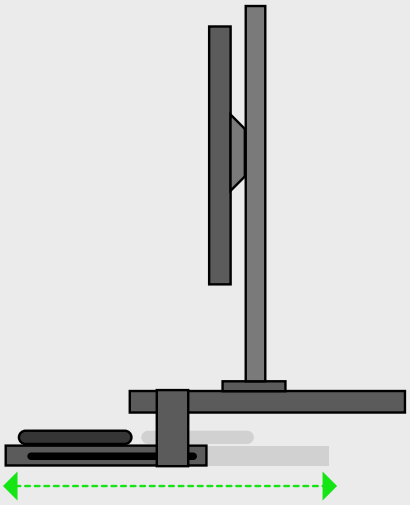
- **Non-height Adjustable Slide-out Tray**

  Merits:

  - Allows for limited height reduction of input devices.

  Limitations:

  - Does not accommodate most users.
  - Does not allow for angle and height adjustability.
  - Often does not lock into place.
  - May not accommodate the keyboard and mouse on the same platform.
  - Thigh clearance may be limited dependent upon the user.
  - May result in increased reach requirements.



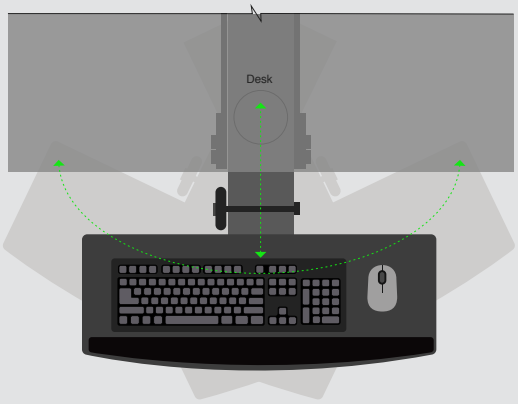
- **Fully Adjustable Keyboard Tray**

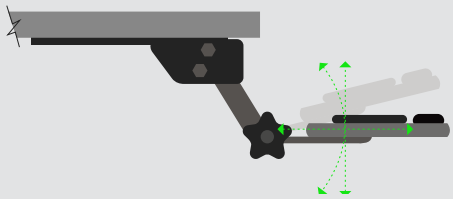
Merits:

- Allows user to lock into place.
- Allows for height and angle adjustability.
- Accommodates both the mouse and keyboard at the same height (dependent on the tray top width).

Limitations:

- May result in increased reach requirements.





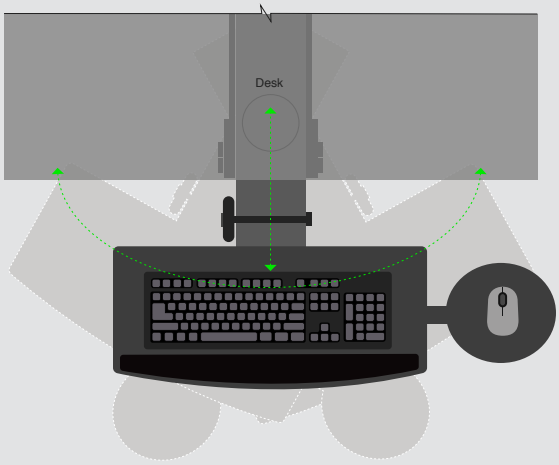
- **Fully Adjustable Keyboard Tray with Independent Mouse Platform**

Merits:

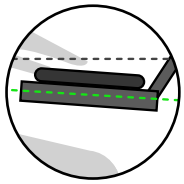
- Allows user to lock into place.
- Allows for height and angle adjustability.
- Accommodates both the mouse and keyboard.

Limitations:

- Does not allow mouse and keyboard to be at the same height.
- May result in increased reach requirements.
- Mouse platform may cause stability issues.



Additional Keyboard Tray Considerations



The keyboard tray should be positioned (flat or slight negative tilt) such that neutral wrist postures are maintained.

Preventative maintenance (e.g. cleaning and lubricating) is suggested to ensure ease of operation.

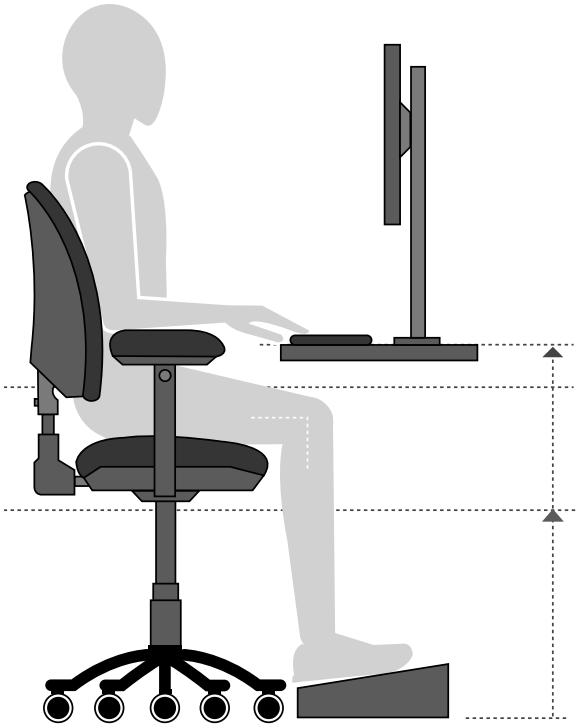
Footrest

If the user needs to raise their chair in order to acquire neutral postures of the upper extremities, a footrest may be required to maintain neutral postures of the lower extremities.

A footrest should have the following:

- Adequate area to support the feet.
- Non-slip surface.
- Adequate friction against the floor to eliminate sliding.
- Angle adjustability to allow for variations in foot posture.

Ensure there is adequate space beneath the workstation to place the footrest so that the user can maintain neutral postures (i.e. ensure workstation supports do not interfere with correct placement). If the user moves their chair frequently between work surfaces, more than one footrest may be required.



Document Support

Tasks that require the user to read, or refer to, documents consistently require a document support to maintain neutral neck postures. When a user enters information from papers, files, binders, etc., document supports help keep these items upright and aligned with the monitor.

Document supports should:

- Accommodate the size and weight of the document being placed on it (e.g. books, legal/letter paperwork).
- Be placed between the keyboard and monitor, centred directly in front of the user (in-line document holder), OR adjacent to the monitor and at a similar height, depending upon the required tasks.
- Be adjustable in angle.

CAUTION

Placing papers flat on the desk will result in excessive neck flexion, and possibly rotation.

• In-line Document Holder

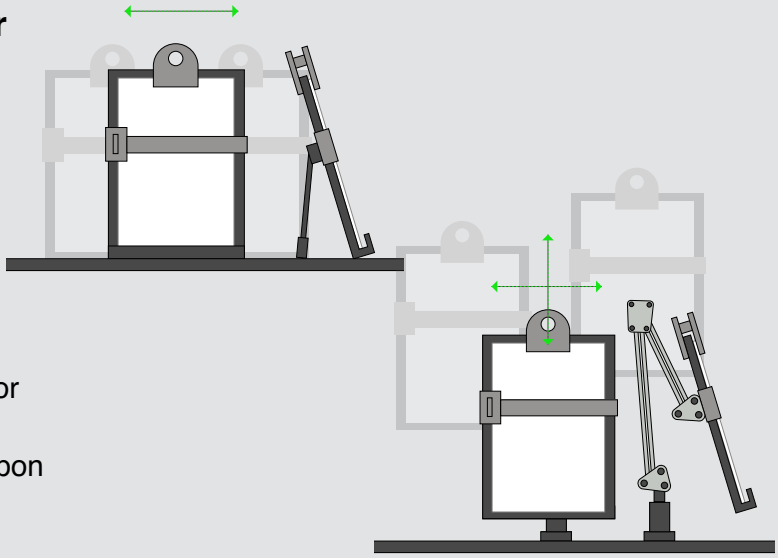
Merits:

- Ideal for users required to write on documents, not just view them.
- Supports heavier materials (e.g. books or binders).

Limitations:

- Requires various degrees of neck flexion to reference the documents.
- Requires additional desk space to position between the keyboard and monitor.

• Vertical Free Standing Document Holder



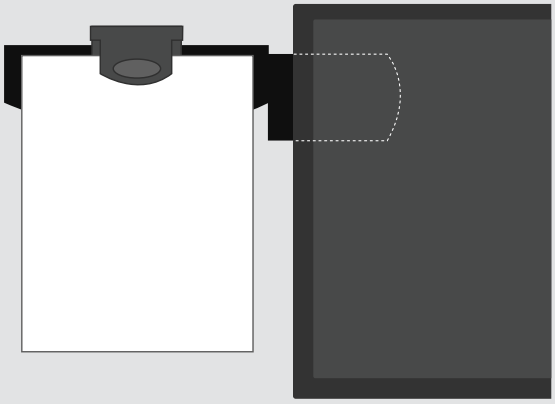
Merits:

- Can be adjustable in height.
- Ideal for referencing portrait view documents.

Limitations:

- Requires various degrees of neck rotation dependent on placement.
- Requires additional lateral desk space.
- Does not support heavier materials (e.g. books or binders).
- Does not provide adequate support for writing upon the documents.

• Monitor Mount Document Holder



Merits:

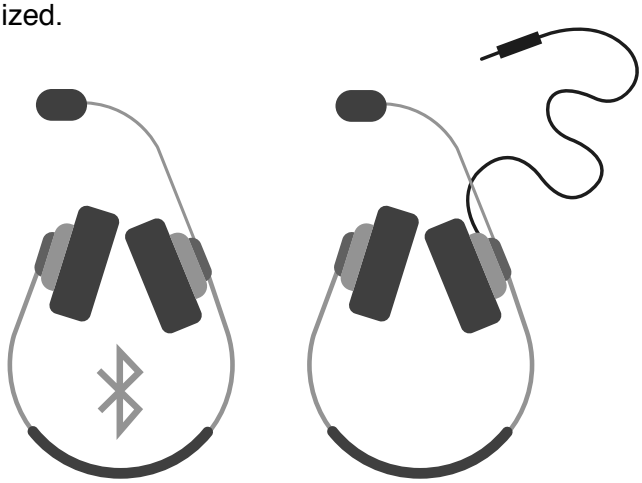
- Does not require additional desk space.
- Ideal for referencing portrait view documents.
- Allows documents to be placed at a similar viewing height as the monitor.

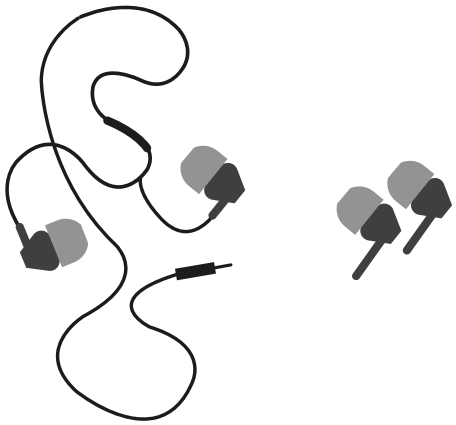
Limitations:

- Requires various degrees of neck rotation dependent on placement.
- Does not support heavier materials (e.g. books or binders).
- Does not allow for writing upon the documents.

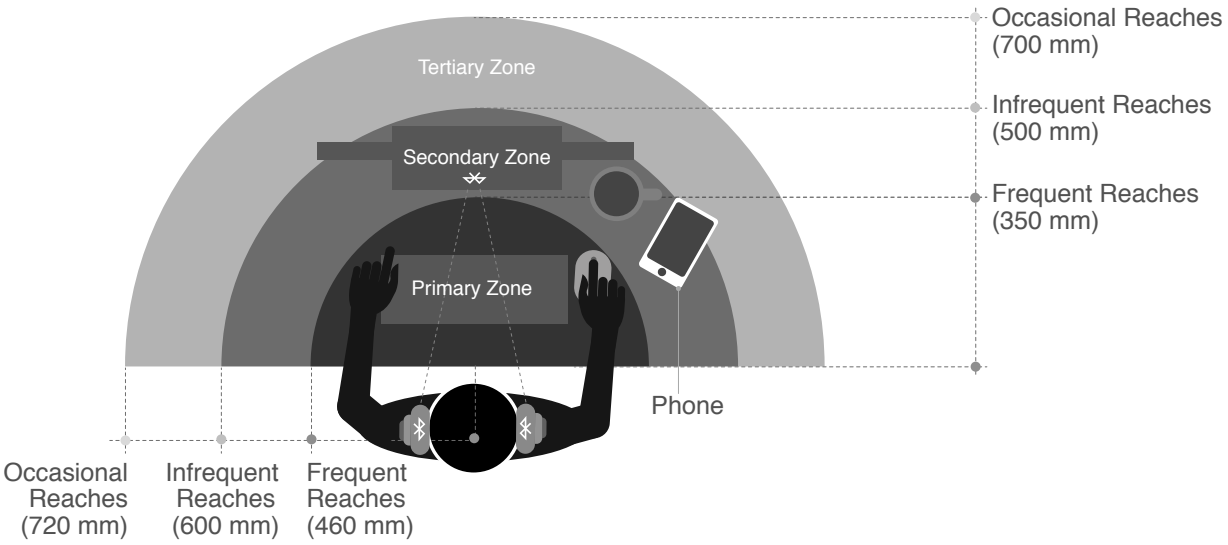
Telephones

If the user is required to write or type while talking on the telephone, a headset should be utilized. Headset selection should be based upon user preference, and the specific work tasks. For example, a wireless headset should be used when the user is required to move around while using the telephone. If privacy is not a concern, the ‘hands free’ speaker option may be utilized.





If the telephone is utilized frequently, it should be positioned within the user’s primary reach zone on the side corresponding to the preferred hand to hold it. (See Section 2, page 8).



Reach Zones

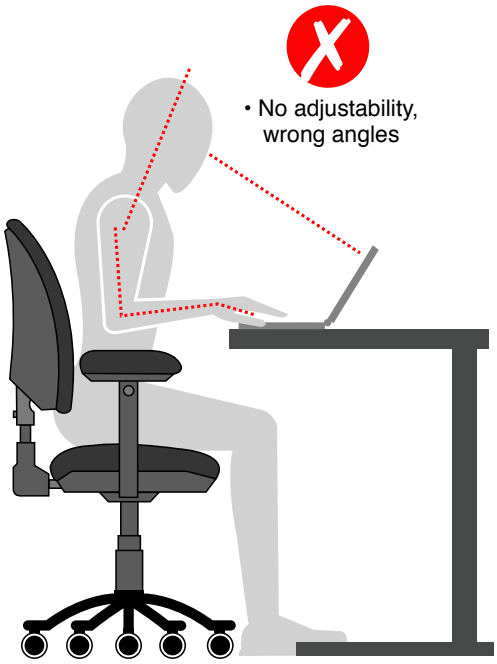
Section
6

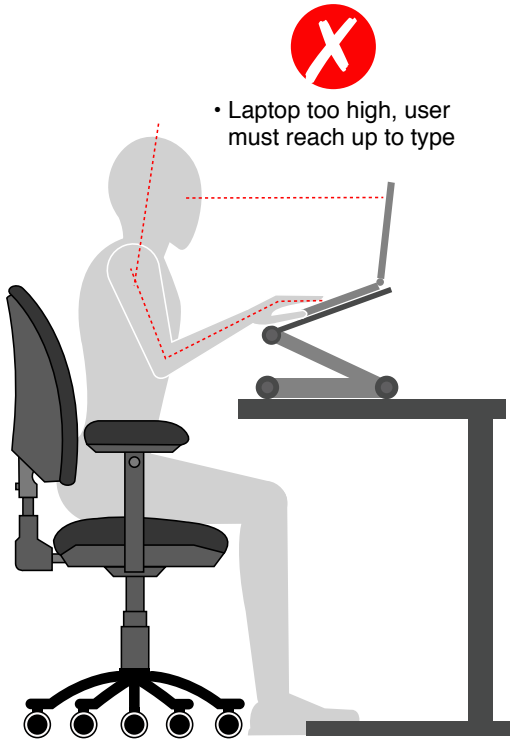
Technology: Laptops, Mobile Telephones, and Tablets

Mobile devices such as laptops, mobile telephones, and tablets were not intended to be used for long durations. If these items are going to be used for extended periods of time, then external equipment is recommended.

Laptops

Laptops are light and portable but they present issues that can be distinctly different from the traditional desktop computer. These devices should only be used when portability is essential for the user. Using a laptop without any external devices does not allow the user to adhere to the recommended neutral postures (See Section 1, page 1).



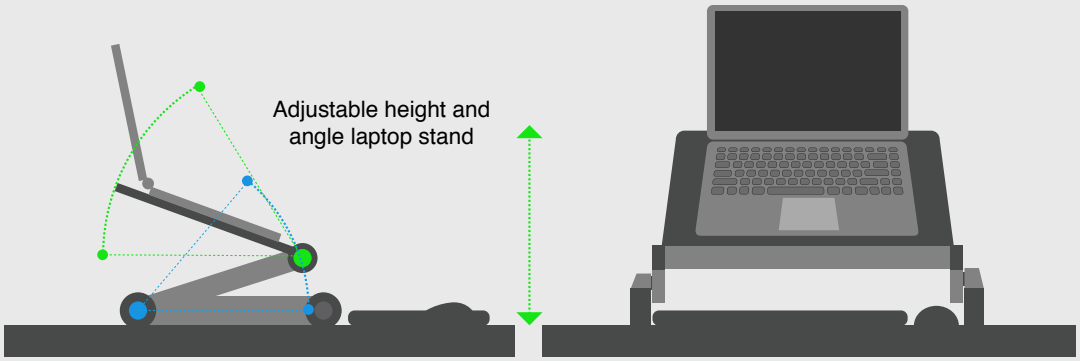


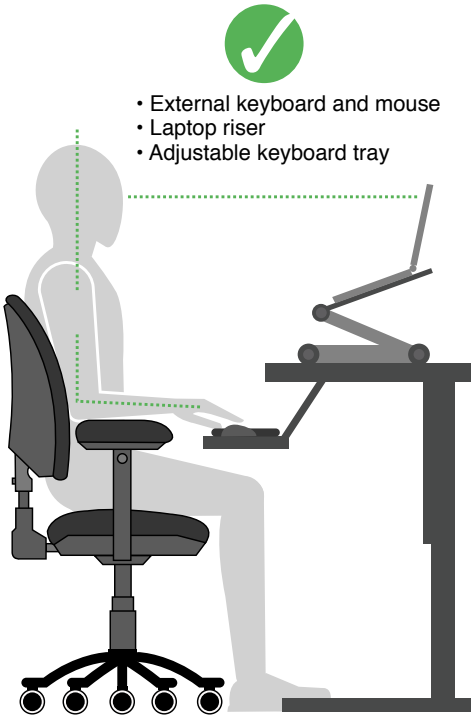
When a laptop is used primarily, an external keyboard and mouse as well as a laptop riser or external monitor is required in order to maintain neutral postures. When utilizing the laptop without external devices, the user should be aware of the following:

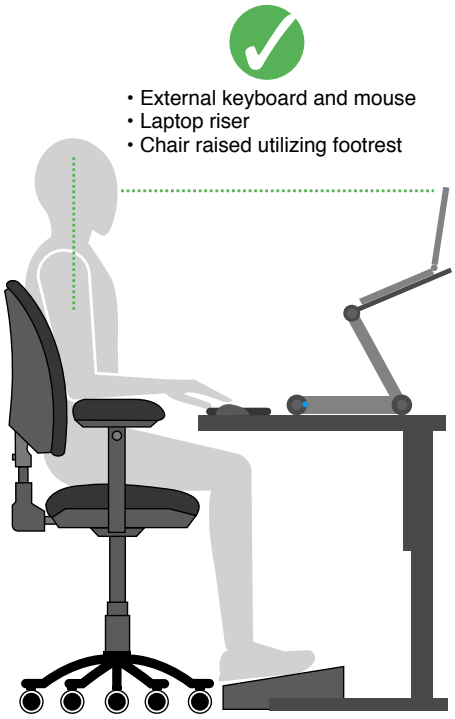
- Placing the laptop at a height which is comfortable for the hands and arms can result in neck fatigue (from having to flex to view the screen).
- Raising the laptop to view the screen can place the hands and arms in awkward postures.
- The small screen size can result in difficulty with reading and can lead to excessive flexion of the neck and upper back.
- Small key spacing may result in cramped and awkward postures of the hands, arms, neck, and shoulders.
- Using the touch pad or pointing device can result in awkward postures of the wrist and arm.
- Angling of the screen to compensate for low height of the laptop can result in increased glare on the screen.

Recommendations for Laptop Use

In the case where an external monitor is not available, the laptop screen should be positioned at the correct viewing height, angle, and distance from the user (See Section 4, pages 20, 22 and 23). To accomplish this, the laptop needs to be positioned on a height/angle adjustable laptop riser, and utilized with an external keyboard and mouse (See Section 4, pages 26 to 31).





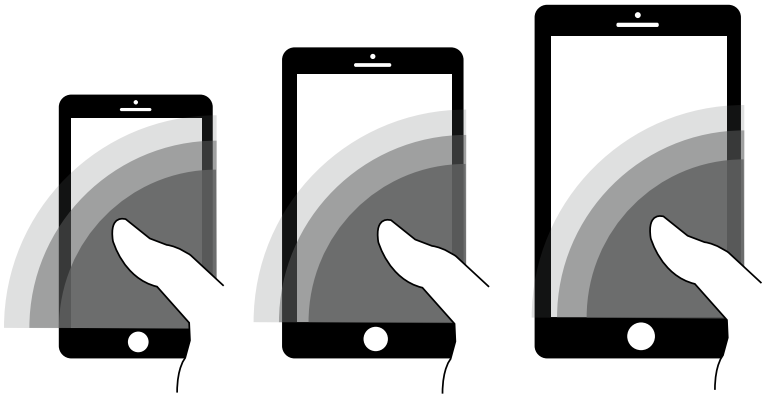


Mobile Telephones and Tablets

Static, awkward postures are the main ergonomic hazards associated with tablet and mobile telephone use. These devices may require wide grips and awkward postures of the thumb and fingers as well as neck flexion to view the screen. The use of these devices should be limited to short durations.

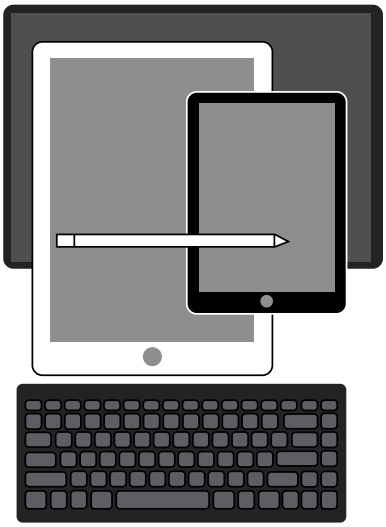
Mobile Telephones

- Use hands-free options (e.g. headphones, speaker phone) as often as possible.
- Use a neutral grip when holding the device.
- Alternate hands that are holding the device.
- Alternate between thumbs and fingers to type, use fingers as often as possible.
- Use of predictive text and short cuts can reduce the amount of typing required.
- Rotating the mobile telephone to landscape view as well as propping it up will allow the use of both hands while typing.
- Using “voice-to-text” helps reduce typing requirements.
- Maintain neutral, upright neck and back postures as often as possible.



Tablets

- Due to the larger size of tablets they require wider grips to hold. Rest tablets on solid surfaces or vertical/angled stands whenever possible in order to avoid prolonged gripping.
- Utilize external equipment (keyboard, mouse, stylus).
- Should be set in a vertical position to minimize neck flexion.
- Alternate hands that are holding the device.
- Maintain neutral upright neck and back postures as often as possible.



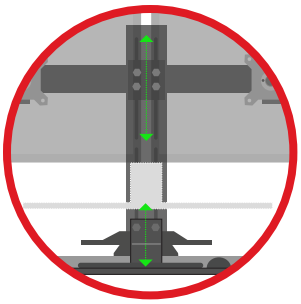
Dictation Software

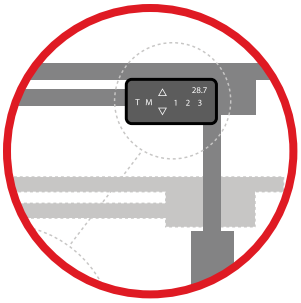
Various dictation software programs are available which can assist in reducing the need for users to input using a keyboard. This software provides people an alternative to typing.

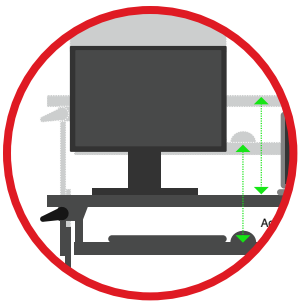
Section
7

Sit/Stand Workstations

An adjustable sit/stand workstation allows the user to alternate between sitting and standing throughout the day.







Height adjustability allows the user to both sit and stand while maintaining neutral postures without the use of additional equipment. When selecting a sit/stand workstation, it is important that the following be considered:

- The specific tasks the user is performing.
- The height range of the workstation; the optimal range will depend on the height and needs of the individual(s) using the desk. When multiple people are sharing the same workstation it is best to find a desk with an extended height range.
- The ease of adjustability (e.g. lever vs. electric).
- Space within the work area (See Section 2, page 8).

Neutral Postures

Types of Sit/Stand Workstations

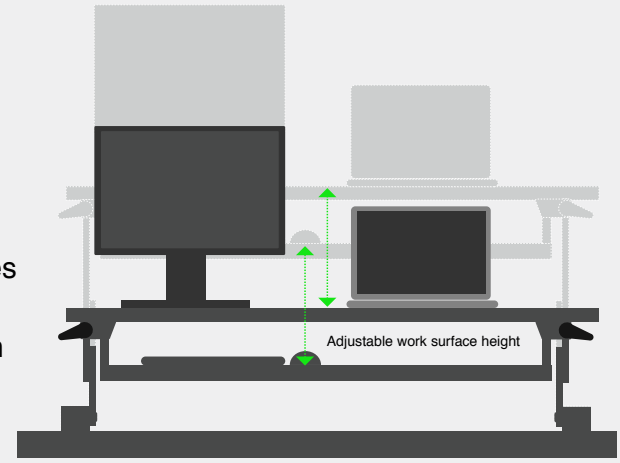
- **Desk Surface Sit/Stand Unit**

Merits:

- Can use the existing workstation.
- Easy to relocate.

Limitations:

- Size and adjustability restrictions may not allow all users to obtain neutral postures.
- Limited space on the unit for other materials besides computer components.
- Adjustments generally require manual compression of levers using both hands.
- Elevation of the unit requires manual force.
- Location of the levers may be too wide for some users.



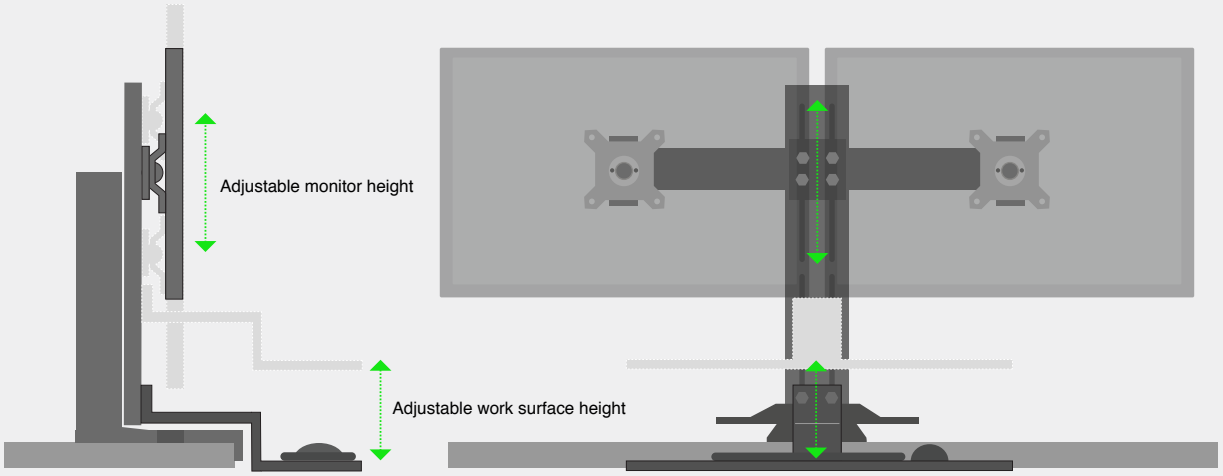
- **Desk Mount Sit/Stand Unit**

Merits:

- Can use the existing workstation.
- Easily adjustable.
- Allow most users to obtain neutral postures.
- Multiple versions available based upon desired workstation configuration.

Limitations:

- Limited space on the unit for other materials besides computer components.
- Challenging to position multiple monitors.



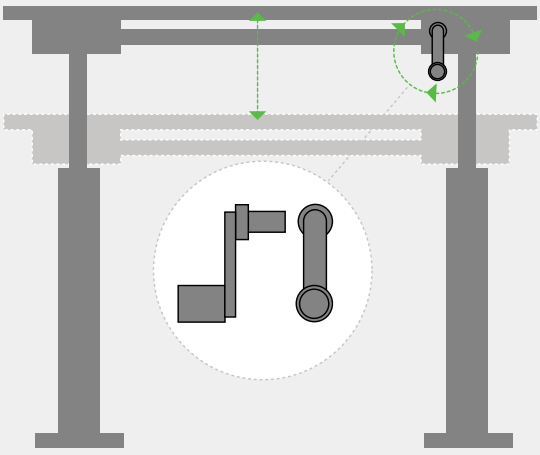
- **Manually Adjustable Sit/Stand Workstation**

Merits:

- Entire workstation moves up and down.
- Allows most users to obtain neutral postures.
- Provides ample space to house and position all materials including computer components.

Limitations:

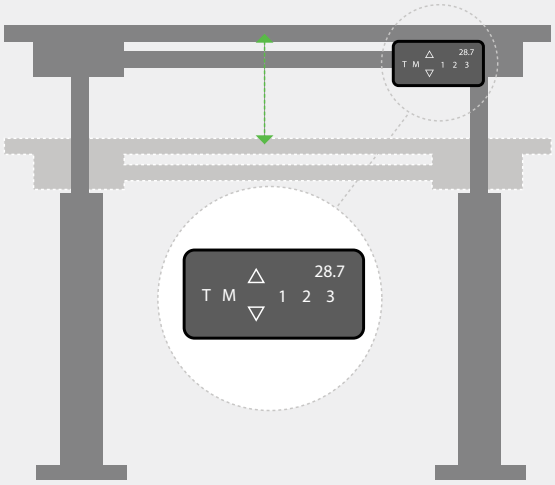
- Available office space.
- Adjustments generally require additional time and the use of manual force, therefore user may not adjust it.



- **Electrically Adjustable Sit/Stand Workstation**

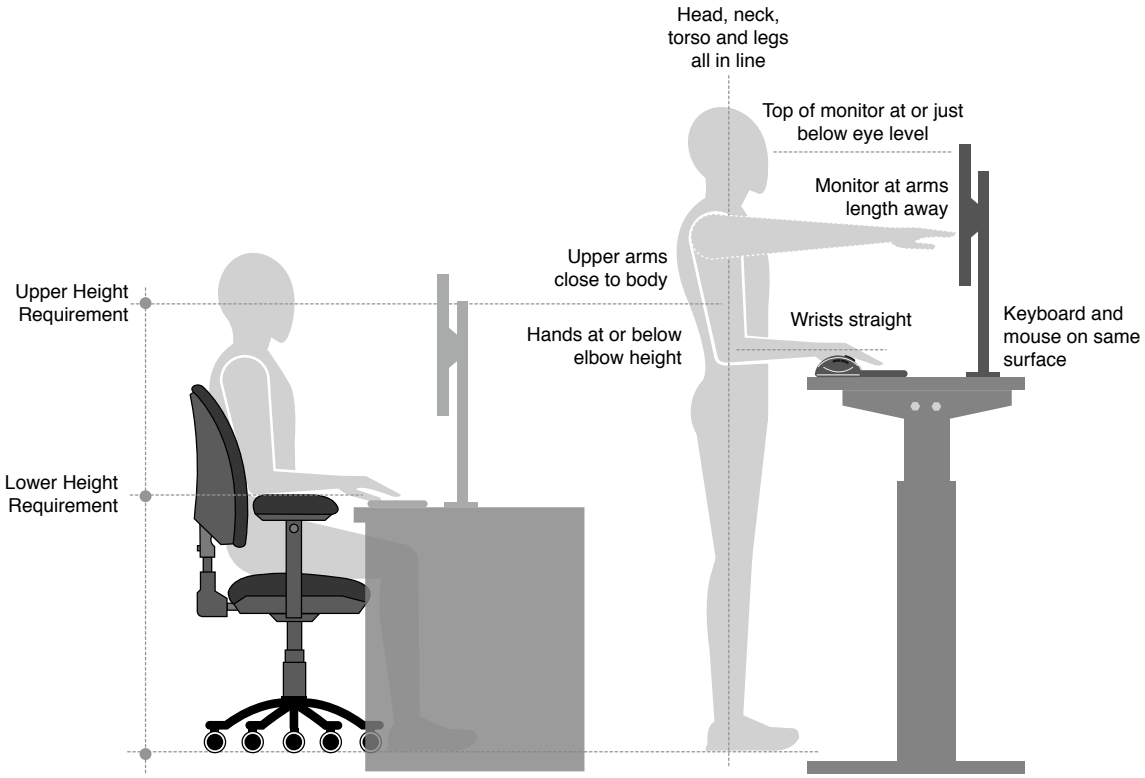
Merits:

- Entire workstation moves up and down.
- Allows most users to obtain neutral postures.
- Adjustability is quick.
- Provides ample space to house and position all materials including computer components.
- Does not require any force to adjust.
- Height settings for sitting and standing can be individually programmed.



Limitations:

- Available office space.
- Access to a power outlet.



Additional Workstation Considerations

- Cables, electrical access, storage of materials, and general configuration should not hinder desk adjustment ability.
- Anti-fatigue matting should be utilized while standing.
- Supportive footwear should be worn while standing.
- Continuous periods of sitting or standing should be avoided; alternate as often as possible.

Section

8

Remote (Mobile) Workstation Setup

Working remotely presents challenges due to the variety of locations a person may choose to conduct their work. This may include a temporary or secondary office location, a boardroom table, a kitchen table, a couch, or a motor vehicle.

While working remotely, or utilizing a mobile workstation, the following should be considered:

Work Area:

- Choose a dedicated workspace where an office desk environment can be replicated as closely as possible.
- Select a work area that is private, quiet, and preferably away from areas of high traffic flow.
- Ensure the work area has sufficient lighting (See Section 9, pages 50 to 52).
- Adequate power supply should be available for all required equipment.

Work Surface:

- Should be solid enough to support all of the equipment and materials the user requires (See Section 2, pages 6 and 7).
- An acceptable remote work surface may be a desk, table, counter top (as long as it fits the desired requirements), workbench, etc.
- Should be positioned in order to utilize the available light source optimally (See Section 9, pages 50 to 52).

Chair:

- A fully adjustable office chair should be utilized if possible (See Section 3, page Page 11 to 17).
- If a fully adjustable office chair is not available, try a variety of chairs or sitting devices to see which one fits best.
- Be sure the chair has a stable base and a backrest.
- The height of the chair should attempt to place the elbows at or slightly above the work surface while maintaining a neutral sitting posture.
- If the chair fit deviates substantially in depth, height, width, or overall size from that required by the user, the chair fit should be modified by using external materials:

- If the chair height is too low, placing soft cushioned materials (such as pillows, towels, etc.) between the user and the seat pan will lift the user higher.
- If the chair height is too high, the user should utilize a footrest (or a modified footrest such as a box or crate) to obtain neutral sitting postures (See Section 5, page 33).

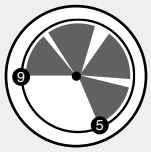
- If the seat pan is too large, placing soft cushioned materials (such as pillows, towels, etc.) between the user and the backrest will bring the user forward.

Computer, Monitor, and External Equipment:

- Remote (mobile) workstations generally involve the use of either a laptop computer, a cellular telephone, or a tablet. These devices should be utilized with additional external equipment (monitor, keyboard, mouse, etc.) as often as possible (See Sections 4, 5 and 6 on pages 19, 25, and 37).

Remote Work Additional Considerations

Treat remote or mobile work similar to traditional office work.



Keep a routine with regular start and stop times as well as regularly scheduled breaks.

Work while standing or moving periodically if possible (See Sections 7 and 9 on pages 41 and 49).

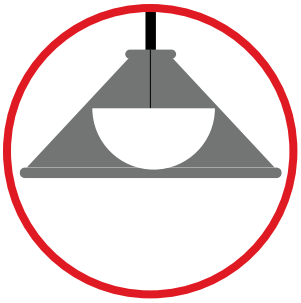
Take additional “movement” breaks every 20-30 minutes (See Section 9, page 59).

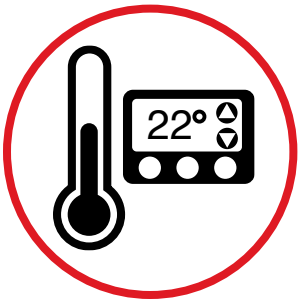
Schedule work tasks to allow for additional postural changes (e.g. take phone calls while standing or walking; alternate between computer tasks and reading/writing tasks, etc.)

Section
9

Additional Considerations

Lighting, noise, thermal comfort, the use of keyboard shortcuts, alternative sitting devices, manual material handling, postural variation, and movement should also be taken into account while working within an office environment.

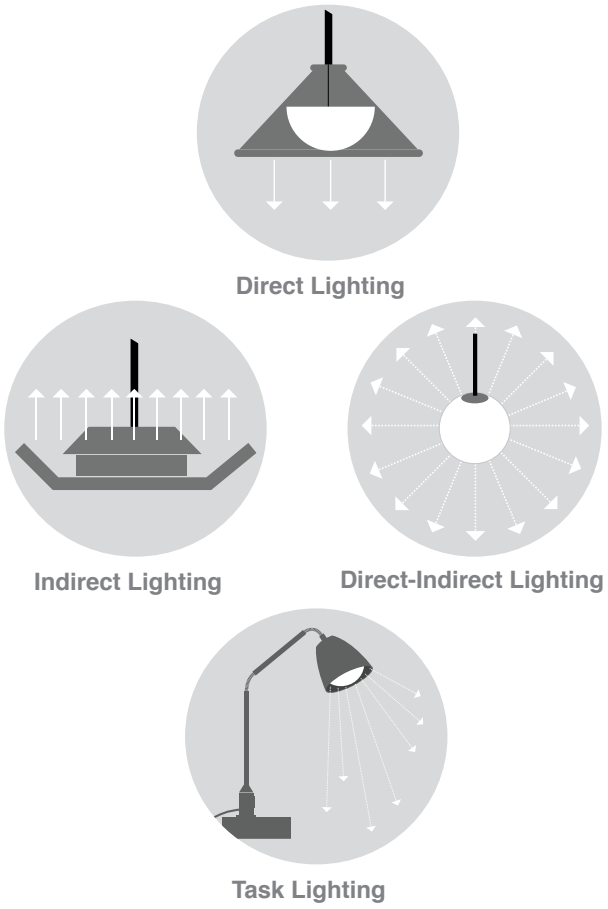




Lighting

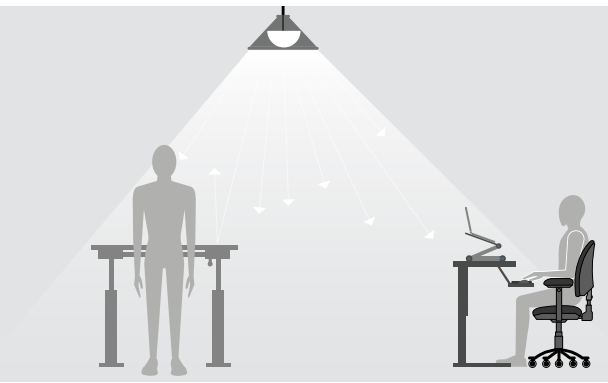
Office lighting should have sufficient flexibility to address the needs of those who view monitors, documents, or a combination of the two. Proper lighting levels are essential to provide acceptable visual comfort as well as to avoid eye strain that can lead to potential awkward postures. Office lighting should take into account expected changes in workstation layout and equipment; environmental and seasonal factors; and individual user needs. The following should be considered when evaluating light levels within the work space:

- Presence of natural lighting.
- Available artificial lighting (e.g. overhead, desk lamps, etc.)
- Colours and finishes on the ceiling, walls, and other surfaces.
- Window coverings/treatments (e.g. blinds, window tint, etc.).
- Individual vision needs of the user.
- Direction of light (e.g. glare)



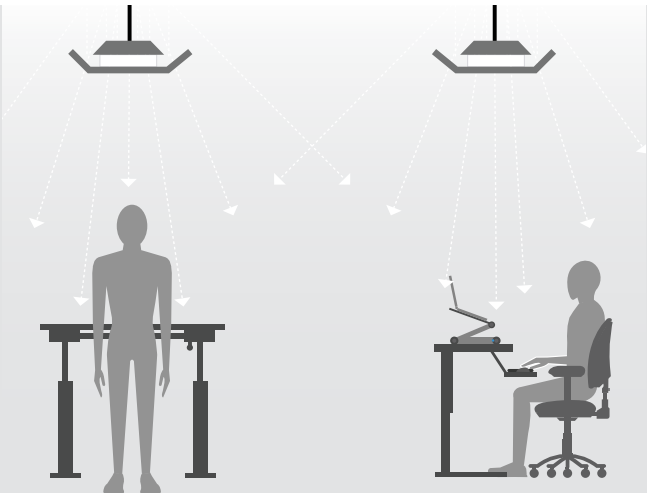
Direct Lighting

- 90% or more of the light is aimed downward towards the work area.
- May minimize reflection and glare.
- Workstations should be arranged so that they are beside the light source and not directly beneath it.

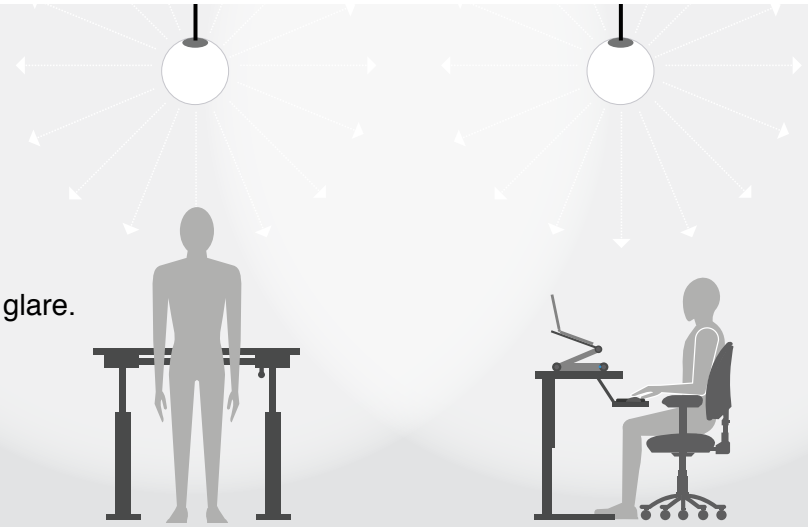


Indirect Lighting

- 90% or more of the light is aimed upwards.
- No direct light hits the work surface.
- Reduces glare.
- Provides even illumination across the work area.
- Accommodates a variety of workstation configurations.
- Efficiency of lighting is dependent on the ceiling height.



- **Direct-Indirect Lighting**
  - Distributes light equally both upwards and downwards.
  - Reflects light off the ceiling and other work surfaces.
  - No light emitted horizontally which reduces glare.
  - Accommodates a variety of workstation configurations.

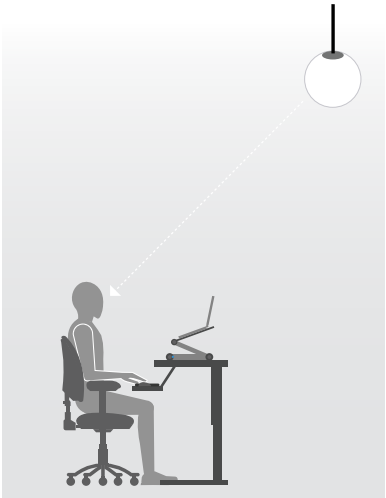


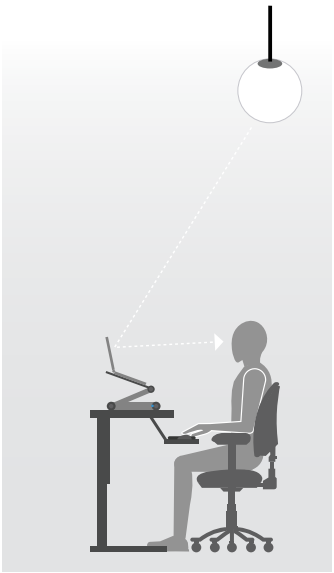
- **Task Lighting**
  - Used when additional lighting is required.
  - Caters to the needs of the user.
  - Requires proper positioning to reduce glare.

Glare

Glare occurs when there is a large difference in luminance (brightness) between an object and its background. It can make it difficult to see the computer screen which may lead to eye strain and awkward postures. There are two forms of glare:

1. **Direct glare** occurs when light shines directly into the eyes.



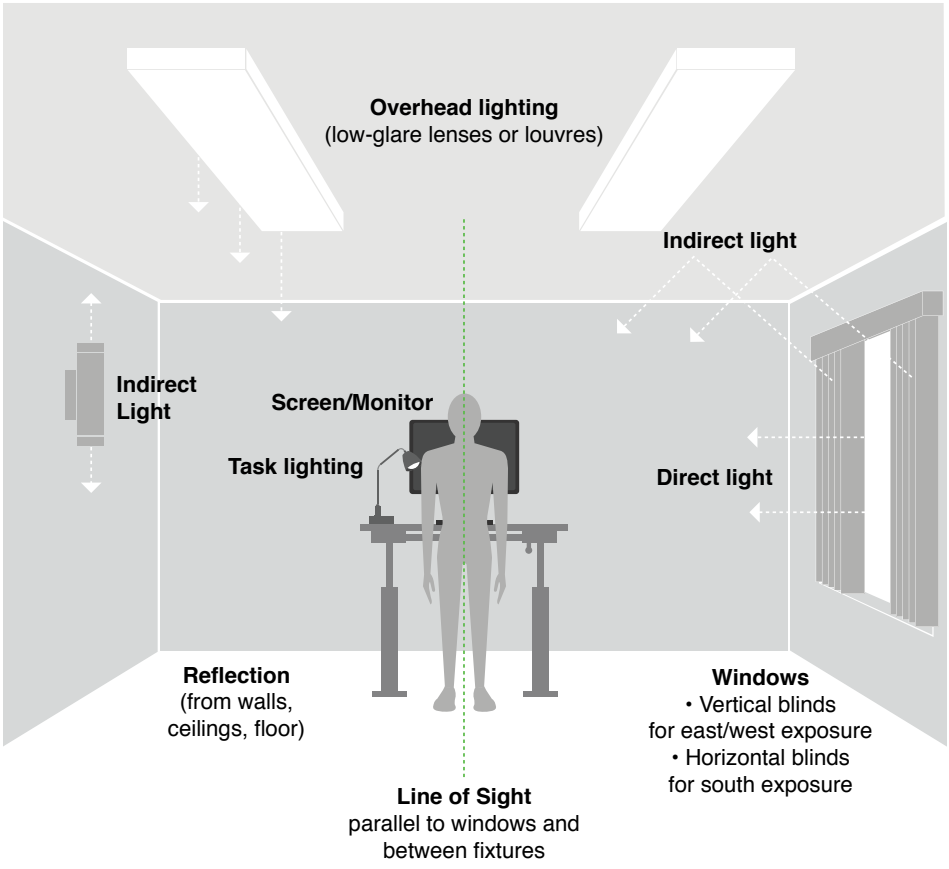


2. **Indirect glare** occurs when light. is reflected from a surface. For example, light which may hit the monitor and reflect into the eyes.

Glare can be reduced by doing the following:

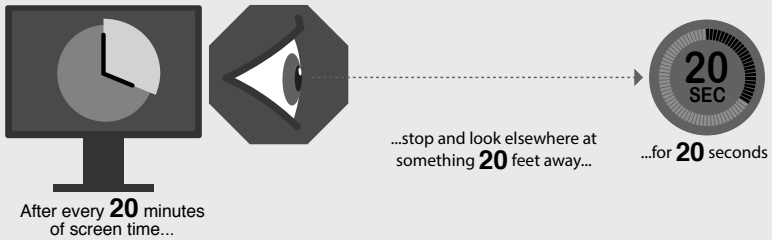
- Position the workstation (monitor) perpendicular to the window and between overhead light panels.
- Use curtains and blinds to control the amount of natural light.
- Eliminate light sources that shine and reflect directly into the eyes.
- Dim overhead lights or remove a portion of the light source (e.g. removing fluorescent light tubes).
- Place filters on overhead lights.
- Tint windows.
- Utilize anti-glare bulbs.
- Cover the monitor with an anti-glare screen.

Note: Polarized glass provides the most effective protection against glare.



Additional Considerations:

- The finish on work equipment, work surfaces, documents, etc., should be kept matte where possible.
- Removing or disabling light fixtures may require additional task lighting.
- Anti-glare screens can be used to reduce glare and reflection when all other options have been ruled out. Many monitors are already equipped with low reflective screens.
- Consider the 20-20-20 rule to help with eye fatigue:



Noise

Noise levels in an office setting are generally not high enough to damage hearing, but have been found to be a significant factor in employee satisfaction and productivity. Noise may:

Interfere with communication

Annoy or distract

Increase the level of concentration required

Increase the level of fatigue

Cause stress

Noise Sources in an Office

Some sources of noise in an office environment are:

Co-workers

Ventilation Systems and Fans

Computers, Printers, and Photocopiers

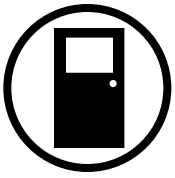
Fax Machines and Telephones

Everyday Outdoor Noises

Noise Reduction

To reduce noise in an office environment consider the following:

Install sound-absorbing tile, carpet, and barrier walls



Isolate loud equipment in a separate room (e.g. photocopier, printer)

Utilize noise cancelling headphones

Follow a regular maintenance schedule for office equipment

Thermal Comfort

Thermal comfort is affected by the heating, ventilation and air conditioning (HVAC) system, the activities being performed, and personal preference. Thermal conditions should not:

Make individuals uncomfortably warm or cold

Cause irritation to the eyes or skin

Negatively affect optimum humidity levels

Create unnecessary air movement or drafts

Problems and Possible Causes

Drafts
Vents may not be positioned properly

Varying Temperatures (throughout the office)
HVAC system may not be working properly

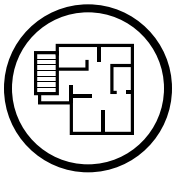
Static Shocks
Humidity level may be too low

Eye Irritation and Dry Skin
Humidity level may be too low

To optimize thermal comfort be aware of:

Seasonal temperature and clothing differences

Occupational activity level



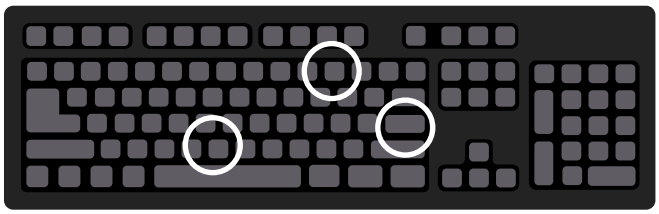
Building layout

Thermal control options, including individual options for control

Individual preference

Keyboard Shortcuts

To reduce mouse use there are various keyboard shortcuts available within different computer operating systems and software programs. Use the links below to learn more about the keyboard shortcuts available for your operating system:



Windows Keyboard Shortcuts

Mac Keyboard Shortcuts

Voice Activation Software

There are also several different voice activation softwares that help decrease or eliminate the use of standard input devices.

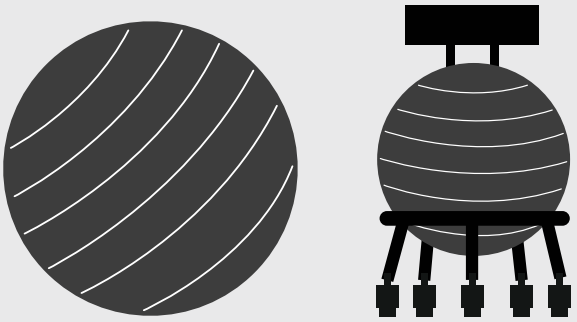
Alternative Sitting Devices

Many people are interested in trying different sitting devices such as exercise balls and kneeling chairs. Ergonomists generally do not advocate the use of these devices. Based on current research areas of concern include:

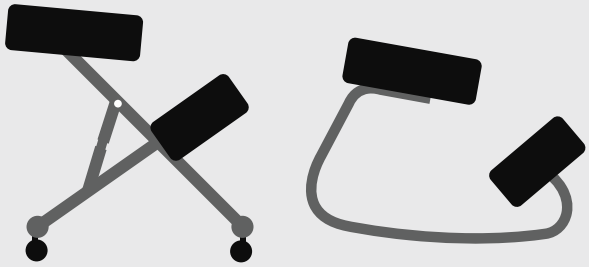
- Limited or no ergonomic features such as backrest, armrests, or adjustability.
- May restrict circulation and nerve supply to the lower limbs resulting in discomfort.
- Postural changes may be difficult.
- May cause overstimulation and fatigue of certain muscles decreasing their functionality.

Ergonomists generally do not advocate the use of exercise balls, stools, or kneeling chairs.

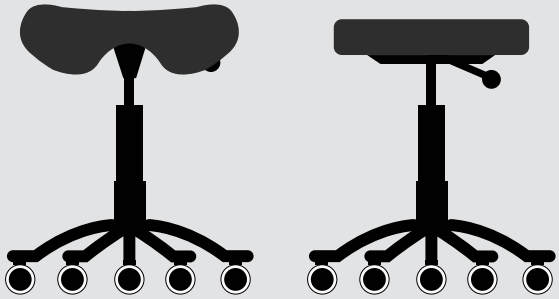
- **Stability Ball**
  - Designed as a training/fitness tool, not to be sat on for long periods of time.
  - Sitting on a ball for extended periods of time has been shown to increase low back pain due to the inability to hold correct postures.
  - May increase the risk of sustaining an injury due to the unstable nature of the ball.
  - Has no or limited back/lumbar support.
  - No/limited adjustability and support which can lead to awkward postures.
  - May create other health and safety concerns.



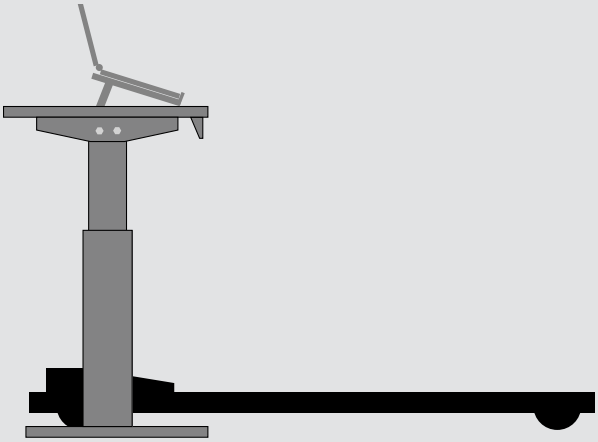
- **Kneeling Chair**
  - Due to positioning of the knees it can constrict blood vessels leading to a reduction in circulation.
  - Leads to an increase in pressure on the knees and shins.
  - Restricts leg movement.
  - Difficulty getting in and out.
  - Has no back/lumbar support
  - No/limited adjustability and support which can lead to awkward postures.



- **Stool**
  - Has no back/lumbar support.
  - No/limited adjustability and support which can lead to awkward postures.
  - Limited seat size may affect lower limb circulation.



- **Treadmill Desk**
  - Constant movement may hinder concentration during complex tasks.
  - May create other health and safety concerns.
  - Walking while working for extended periods of time may increase low back pain due to the inability to hold correct postures.
  - Requires correct footwear (e.g. running or walking shoes).



Manual Material Handling (MMH)

Manual material handling activities can include:

In an office these types of activities are performed occasionally (moving supplies, files, etc.), but it is important that the ergonomic hazards associated with these tasks are controlled.

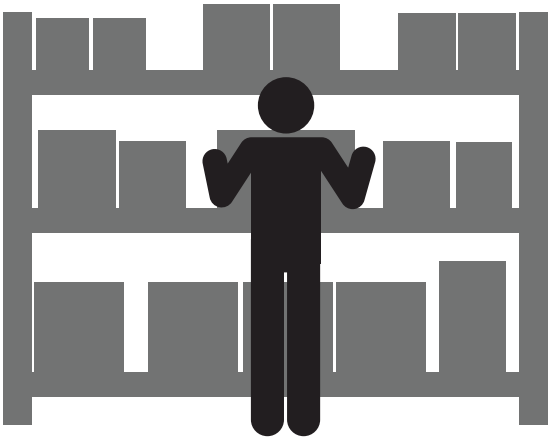
The following are important considerations when performing MMH activities:

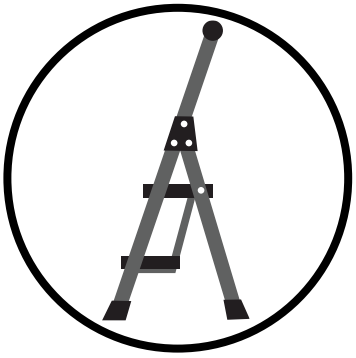
- Weight, shape, and size of the load.
- Where the load is being lifted/carried to and from (heights and reaches).
- Ability to grasp or hold the load.
- Safe MMH limits (weight of items) and heights at which the loads are manipulated.
- Frequency of lifting.
- A path clear of all obstacles.
- Aids such as carts or hand trucks to manipulate and transport loads.
- Design work processes to reduce movement of material.

Material Storage

The following are important considerations for storing materials:

- **Frequently accessed items** (e.g. files, printer paper, etc.) should be stored between waist to chest height of the average sized person.
- **Infrequently accessed items** should be stored close to floor or ceiling level:
  - heavier items lower (floor),
  - lighter items higher (ceiling).
- Provide a safe means to access items placed above shoulder height (e.g. appropriate step stool).
- Plan and design work processes to reduce movement of materials.





Step Ladder/Stool

Postural Variation and Movement

Sustaining any posture for an extended period of time potentially increases the risk of developing musculoskeletal disorders. In order to avoid this, it is important to make postural changes as often as possible. Strategies for postural changes in the office include:

Alternate between posture (e.g. sit down, stand up, change seated posture).

Schedule 3 to 5 minutes of movement every hour.

Centralize printer to provide additional opportunities for movement. Print and retrieve one document at a time.

Perform phone calls/ virtual meetings, etc., from alternate postures (e.g. standing, walking, etc.).

Schedule tasks to create additional postural changes.

Use alarms as reminders to periodically change postures.

References

Canadian Centre for Occupational Health and Safety: Work-related Musculoskeletal Disorders (2019). https://www.ccohs.ca/oshanswers/diseases/rmirsi.html

Canadian Standards Association Z412-17. Office ergonomics – An application standard for workplace ergonomics (2017). CSA Group, Toronto.

Occupational Health & Safety Act: Industrial Establishment R.R.O. 1990, Regulation 851(2019), https://www.ontario.ca/laws/regulation/900851

Occupational Health & Safety Act R.S.O. 1990, Section 25 (2020). Duties of Employers. https://www.ontario.ca/laws/statute/90o0

Prevention Through Intervention

Occupational Health Clinics for Ontario Workers (OHCOW) is dedicated to the identification and prevention of work-related injuries and illnesses. This includes musculoskeletal disorders, cancer and other diseases from workplace exposures, as well as stress-related impact.

OHCOW interdisciplinary staff of Occupational Physicians, Nurses, and Hygienists, plus Ergonomists, Client Service and Outreach Coordinators provide five types of free services:

- **Medical diagnostic** case review for workers who may have work-related health problems or illnesses
- **Group service** for joint health and safety committees and groups to deal with workplace conditions that affect more than one worker, including hygiene, ergonomic and health assessments
- **Inquiry service** to answer questions about exposures and possible workplace hazards, and their prevention
- **Outreach and education** to generate public awareness about health and safety issues, as well as workshops and presentations tailored to specific workplace challenges
- **Research service** to investigate and report on illnesses and injuries to improve working conditions

to Workers, Unions, Employers, Students, Joint Health & Safety Committees and Representatives, Health Professionals, Legal Clinics, Community Groups, and the General Public.

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