MATERIAL HANDLING

Hennepin Technical College

St. Cloud Technical & Community College

Ridgewater College

This presentation covers ergonomics and material handling.

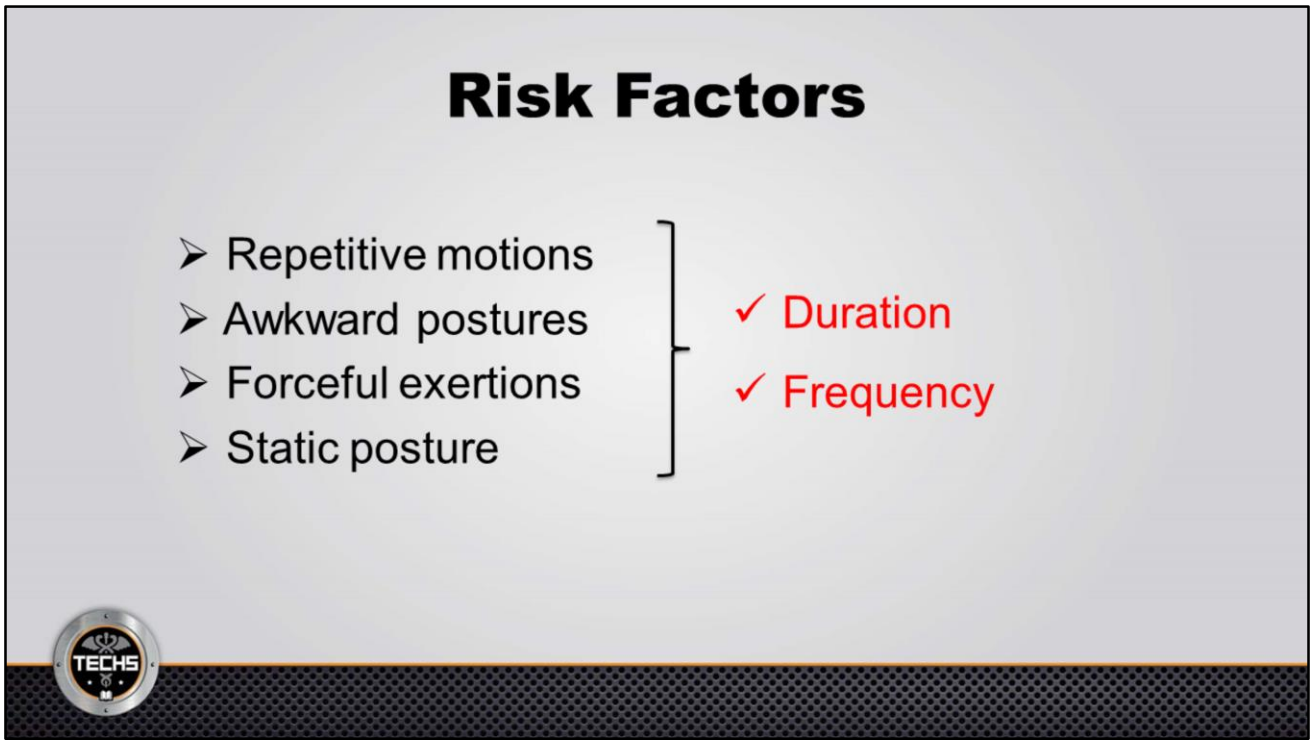
Ergonomics

- Fitting the job to the worker
- **Goal:** reduce or eliminate ergonomic risk factors
- **Result:** reduced number and severity of strains and injuries

Ergonomics is about fitting the job to the worker. This means matching the demands of work tasks to the physical abilities of a worker.

When ergonomic principles are implemented in the workplace, workers experience fewer and less severe strains and injuries.

The goal of ergonomics is to reduce or eliminate ergonomic risk factors.

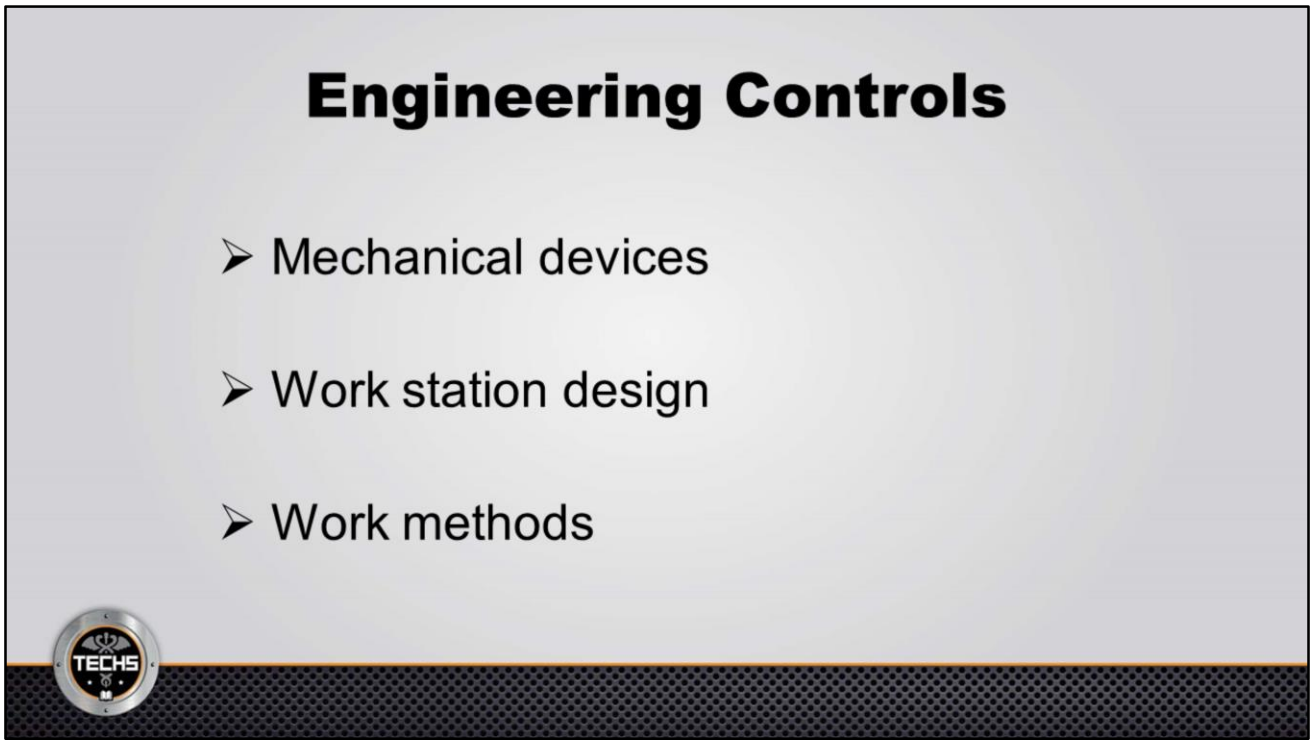


Ergonomic risk factors include:

- Repetitive motions performed frequently and for an extended period of time.
- Awkward postures such as reaching above shoulder height, bending, twisting, or kneeling.
- Forceful exertions. The greater the physical effort required to perform task, the greater the risk.
- Static posture. This means maintaining fixed positions for a long period of time.

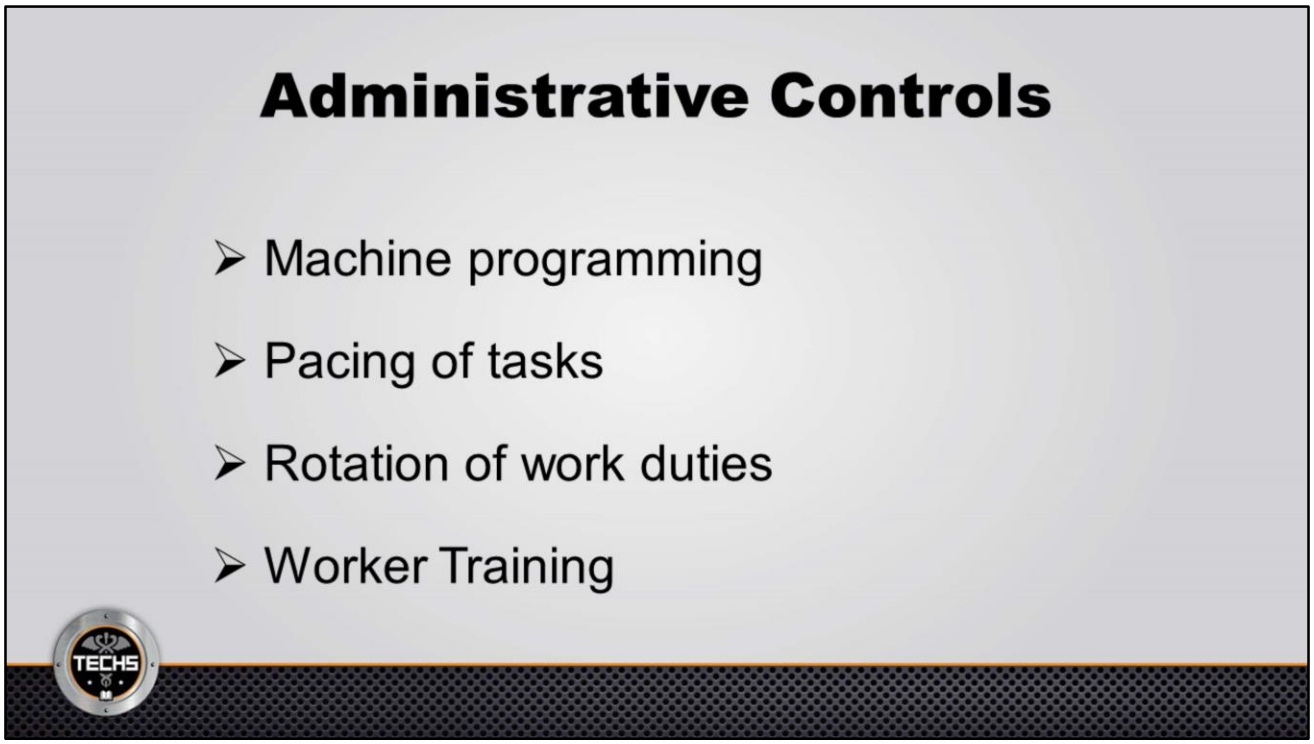
The duration and frequency for each factor are critical in determining the risk.

Once you identify and evaluate the risk factors of a task, you can find ways to reduce or eliminate them.



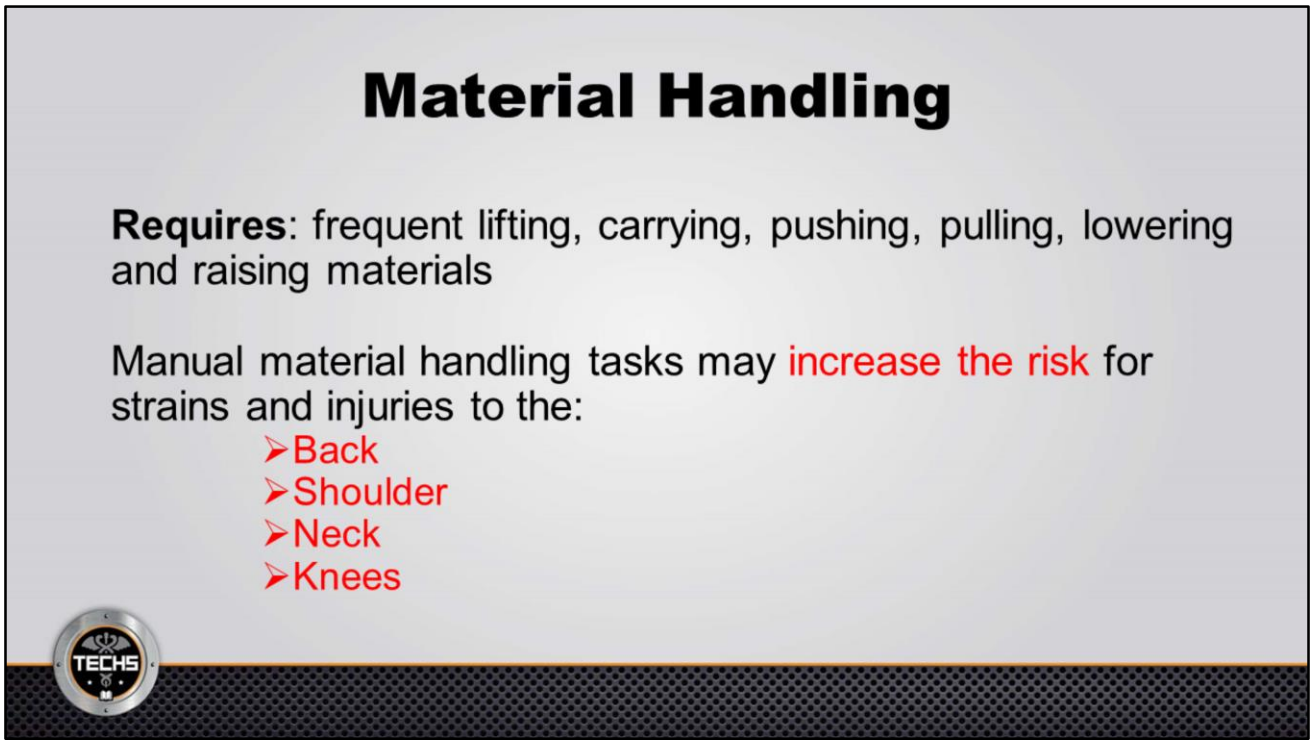
Engineering controls eliminate or reduce exposure to ergonomic risk factors. Examples include:

- The use of mechanical devices such as fork lifts and hoists instead of reliance on manual lifting.
- Work station design reduces or prevents awkward postures. Height-adjustable work benches or platforms can be used to elevate the worker to the correct height to do the job. Anti-fatigue mats reduce strain from standing.
- Work methods can be designed to reduce the exposure to ergonomic risk factors.



Administrative controls reduce exposure to the risk factors, but do not eliminate them. Examples include:

- Machine programming so that operators do not have to reach in to retrieve a finished part
- Pacing of work tasks
- Rotation of work duties among several employees
- Worker training on issues such as proper lifting procedures and correct use of work station adjustments and equipment



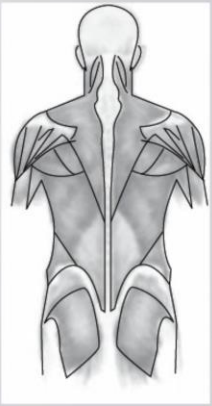
Many material handling jobs require frequent lifting, carrying, pushing, pulling, lowering and raising materials.

Manual material handling tasks may increase the risk for strains and injuries to the:

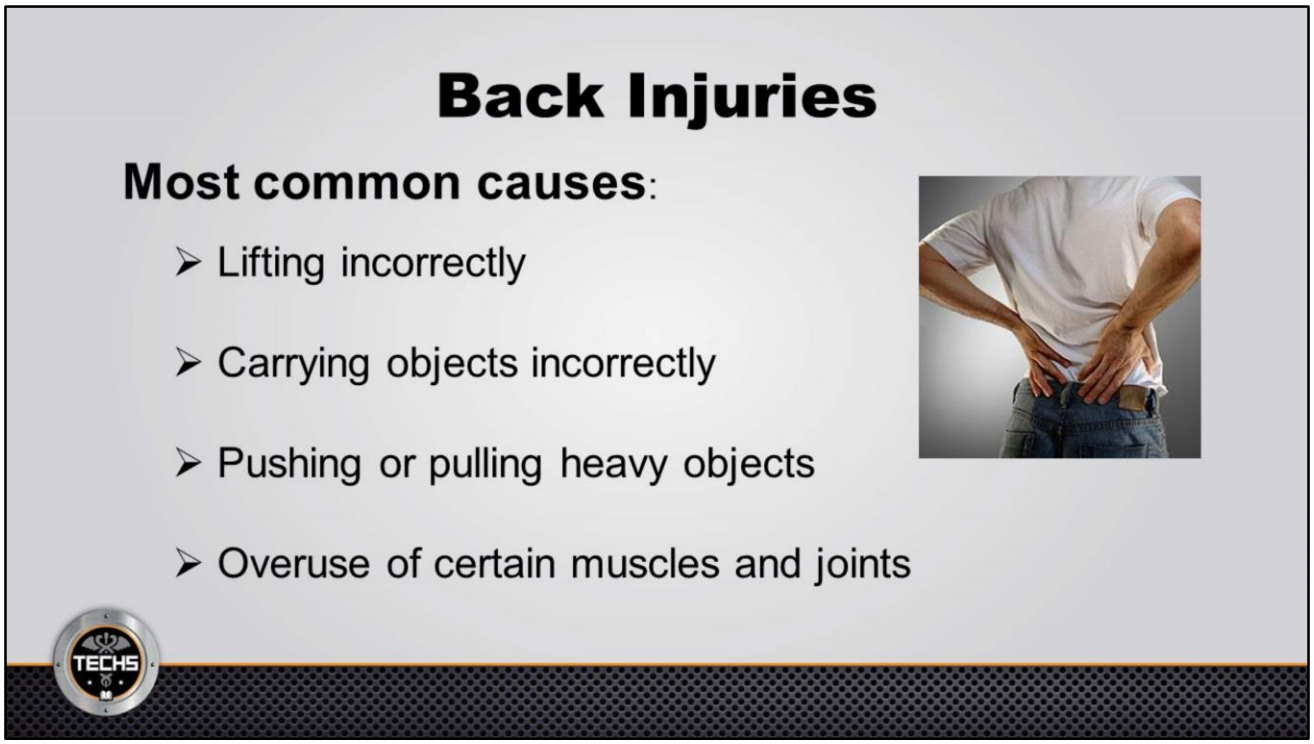
- back
- shoulder
- neck
- knees.

Back Injuries

- Some of the most common and costly injuries in the workplace
- Loss of worktime → loss of income
- Low back pain is most common in persons 30-50 years old

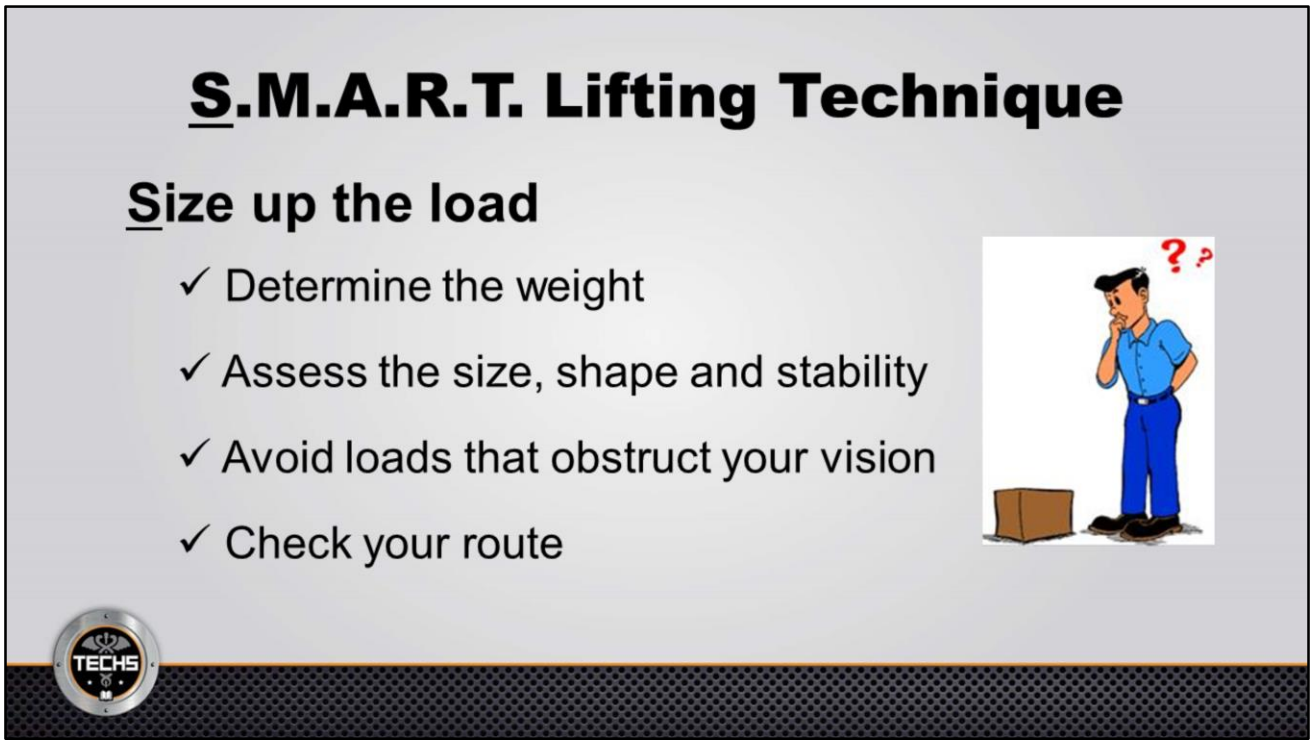


- Back injuries are some of the most common and costly injuries in the workplace.
- Back injuries may result in lost worktime, leading to lost income.
- Low back pain is most common in persons 30-50 years old.



A few of the most common causes of back injuries and back pain include:

- Lifting incorrectly
- Carrying objects incorrectly
- Pushing or pulling heavy objects
- Overuse of certain muscles and joints



Moving stock, chucks, and dies are just a few of the tasks that involve lifting that you may do in the shop, so it's important that you know how to lift correctly.

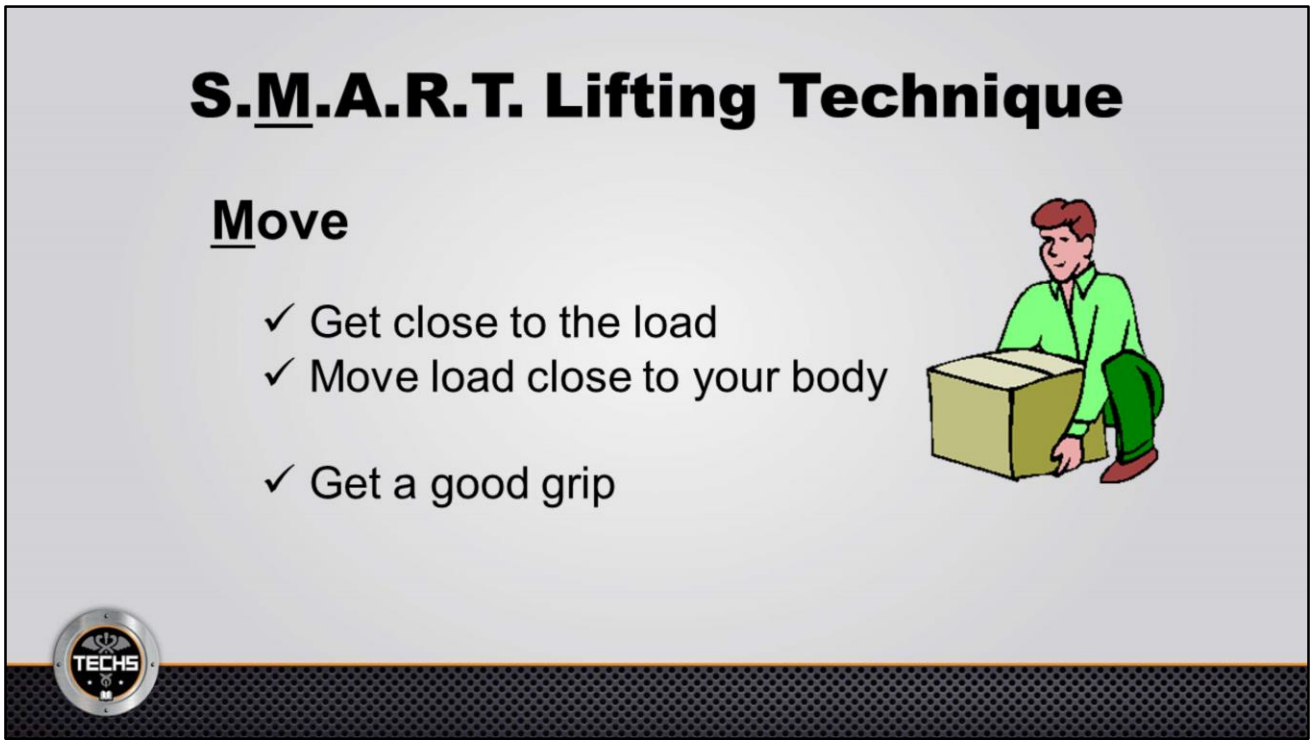
To help you remember the steps for proper lifting we will use the acronym SMART.

The first step is to Size up the load.

- ✓ Determine the weight of the load. Look to see if the weight is marked on a box or stamped on the object. If you cannot find this information, carefully lift a corner of the object and get a sense for how heavy it is. If it is too heavy, get help or – if possible - divide up the load.

- ✓ Assess the size, shape and stability of the object or the load. Avoid loads that obstruct your vision.

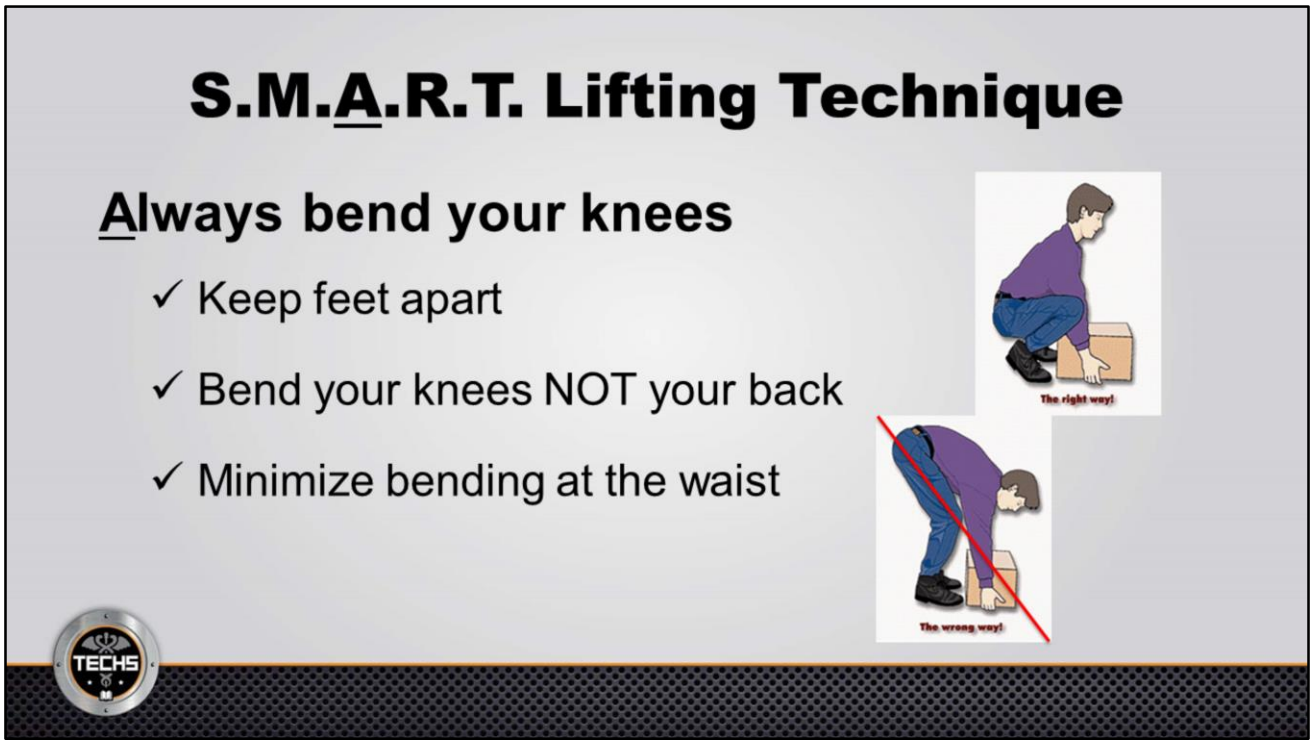
- ✓ Check your route – make sure the path to your destination is clear, so that you do not slip, trip or fall when carrying the load.



The next step is Move. This refers to you getting ready to lift the load.

- ✓ First, position yourself as close to the load as possible. You may need to move the load closer to your body to avoid over-reaching.
- ✓ For example, if a chuck or a die is on a storage shelf, slide it towards the edge. Avoid lifting with your arms outstretched.
- ✓ Next, get a good grip on the object.

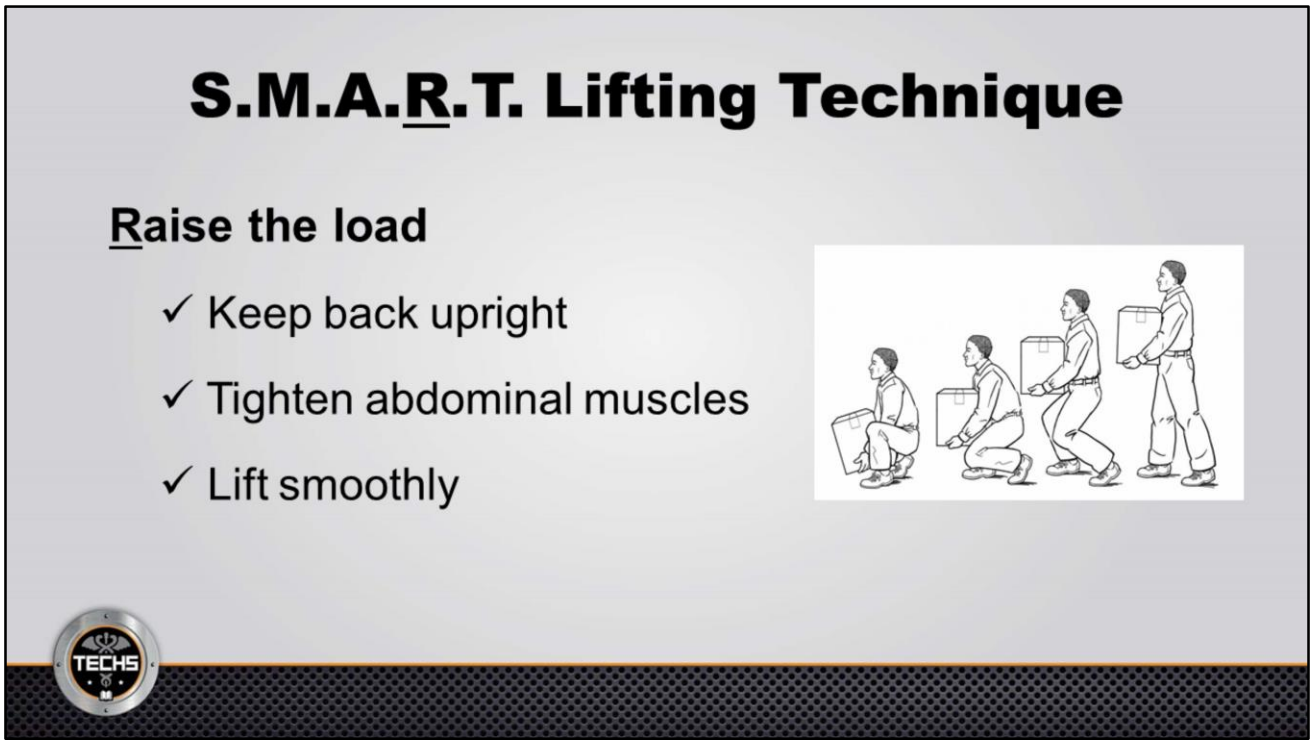
Now you are now ready to lift the load.



Always bend your knees when lifting an object that is lower than your waist.

- ✓ Keep feet apart to maintain balance.
- ✓ Bend your knees Not your back.
- ✓ Minimize bending at the waist.

The “safe lifting zone” is the distance between your mid-chest and upper thigh. Lifting in the “safe lifting zone” lowers your risk of back strain.



As you Raise the load,

- ✓ Keep hour back as upright as possible. Keeping your head up will help you maintain good posture.
- ✓ Tighten your abdominal muscles.
- ✓ Lift smoothly using your leg muscles – not your back.

S.M.A.R.T. Lifting Technique

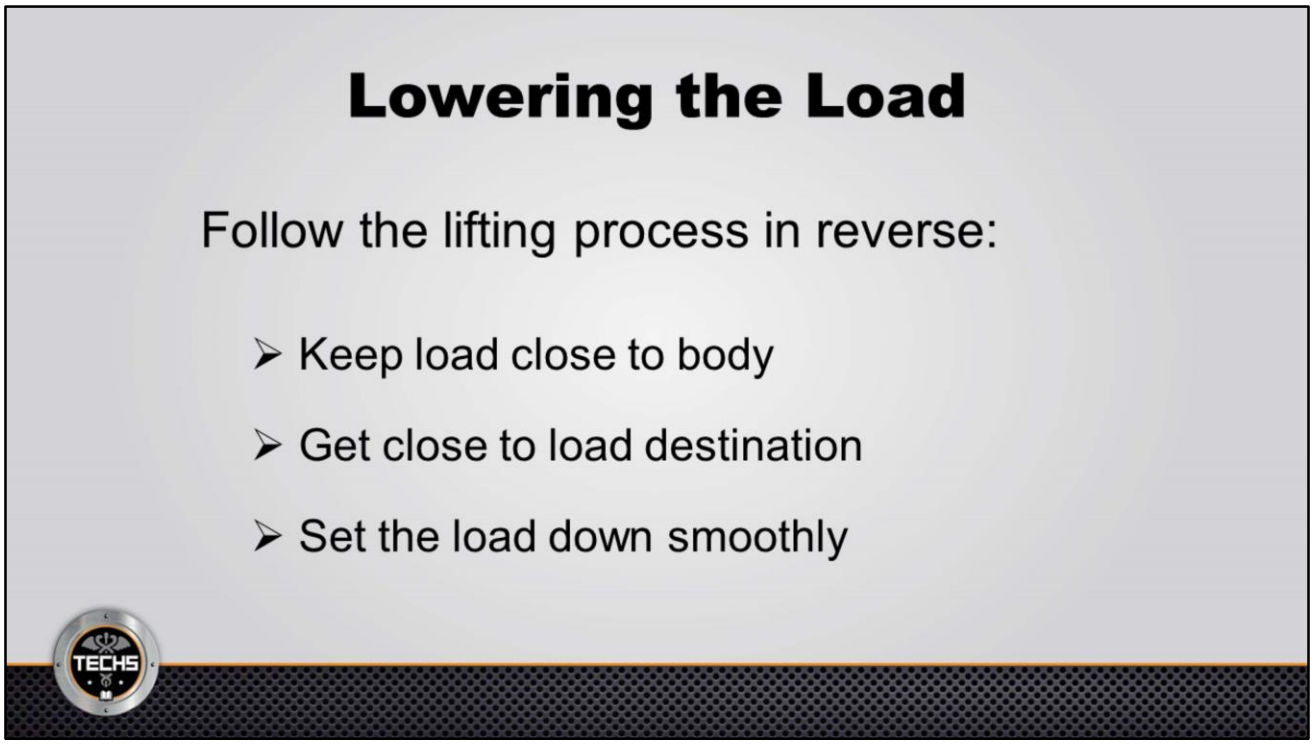
Turn your feet

- ✓ In the direction of travel
- ✓ Avoid twisting

Next, Turn your feet in the direction of travel.

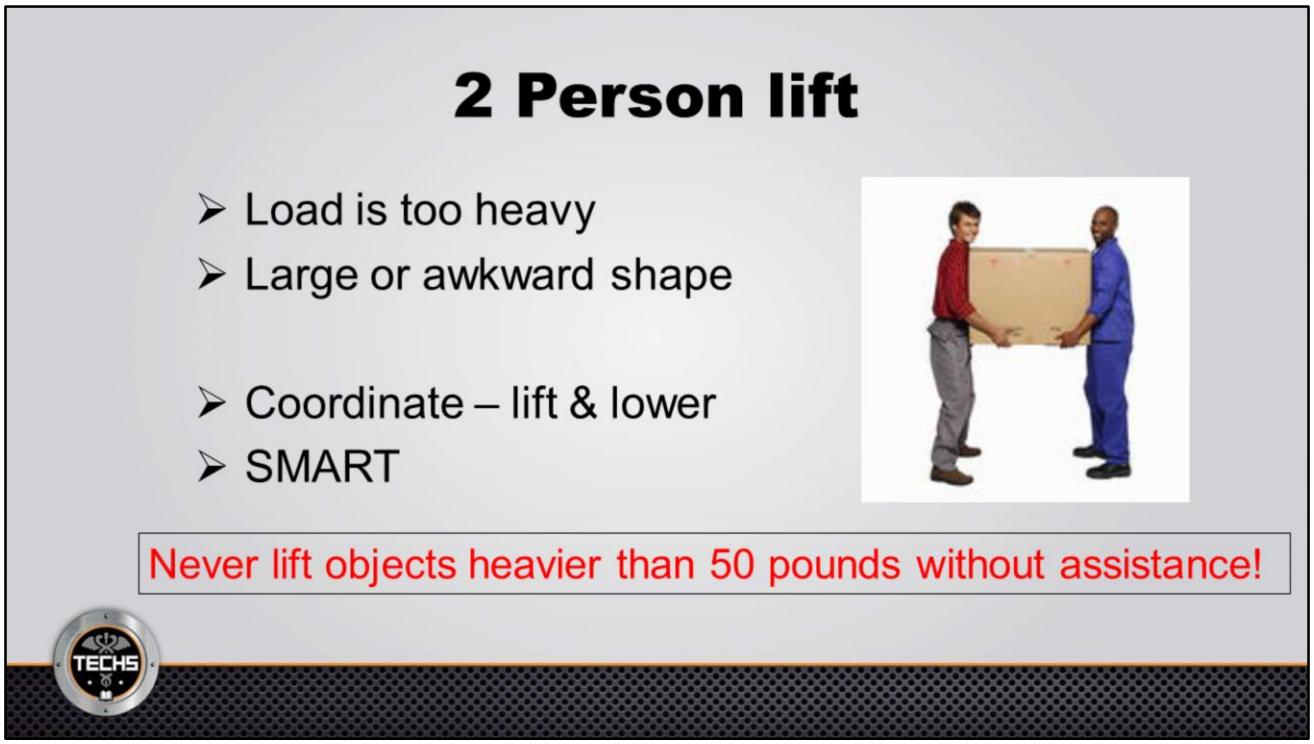
Avoid twisting when you are carrying or moving a load.

If you need to change directions, move your feet and pivot. Do not twist your body.



When you are ready to set the load down, follow the lifting process in reverse.

- ✓ Keep the load close to your body until you are in position to put it down.
- ✓ If setting a part down onto a shelf or machine, minimize holding the part out horizontally; get as close to your destination as possible.
- ✓ If placing the object on the floor or a lower shelf, remember to squat. Do not bend at your waist.
- ✓ Set the load down in one slow, smooth movement.



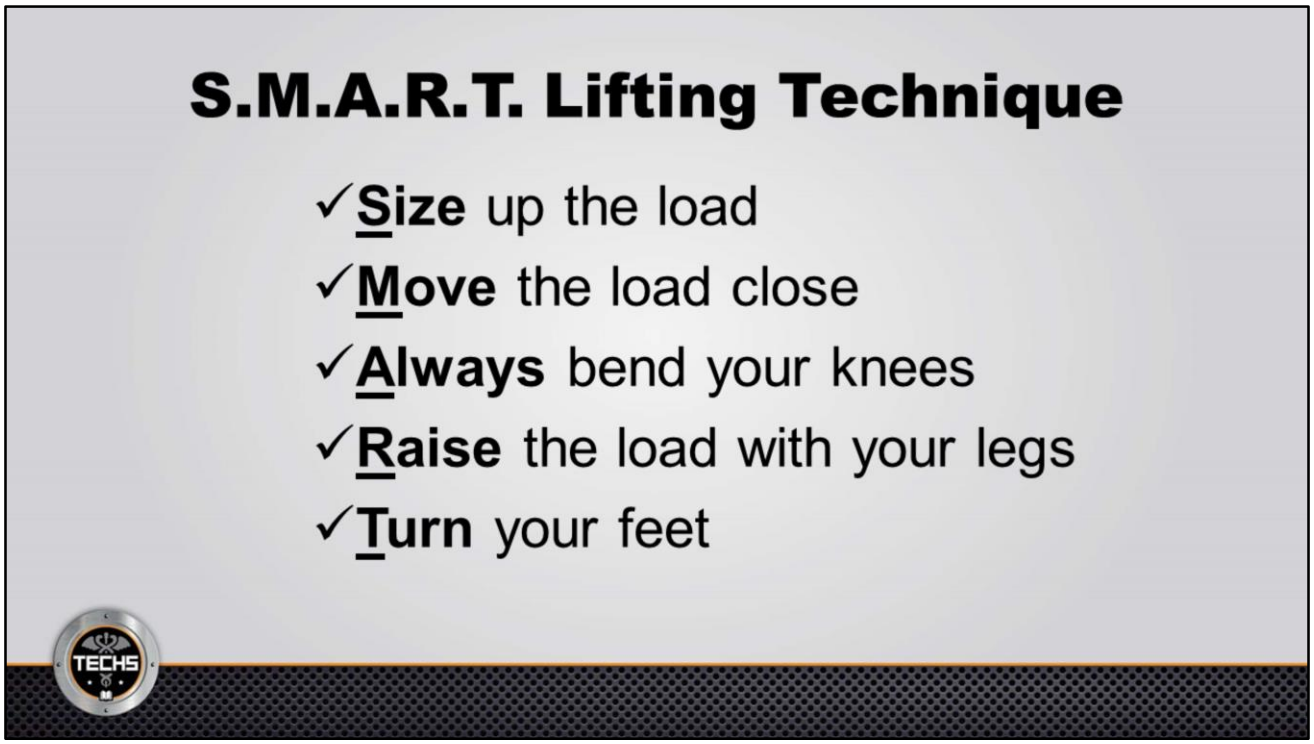
Use a 2-person lift when:

- ✓ the load is too heavy for one person.
- ✓ if the object is large or an awkward shape – get help.

Never lift more than 50 pounds without assistance!

Coordinate the lift so that you lift and lower together.

Follow the SMART lifting technique.



S.M.A.R.T. Lifting Technique:

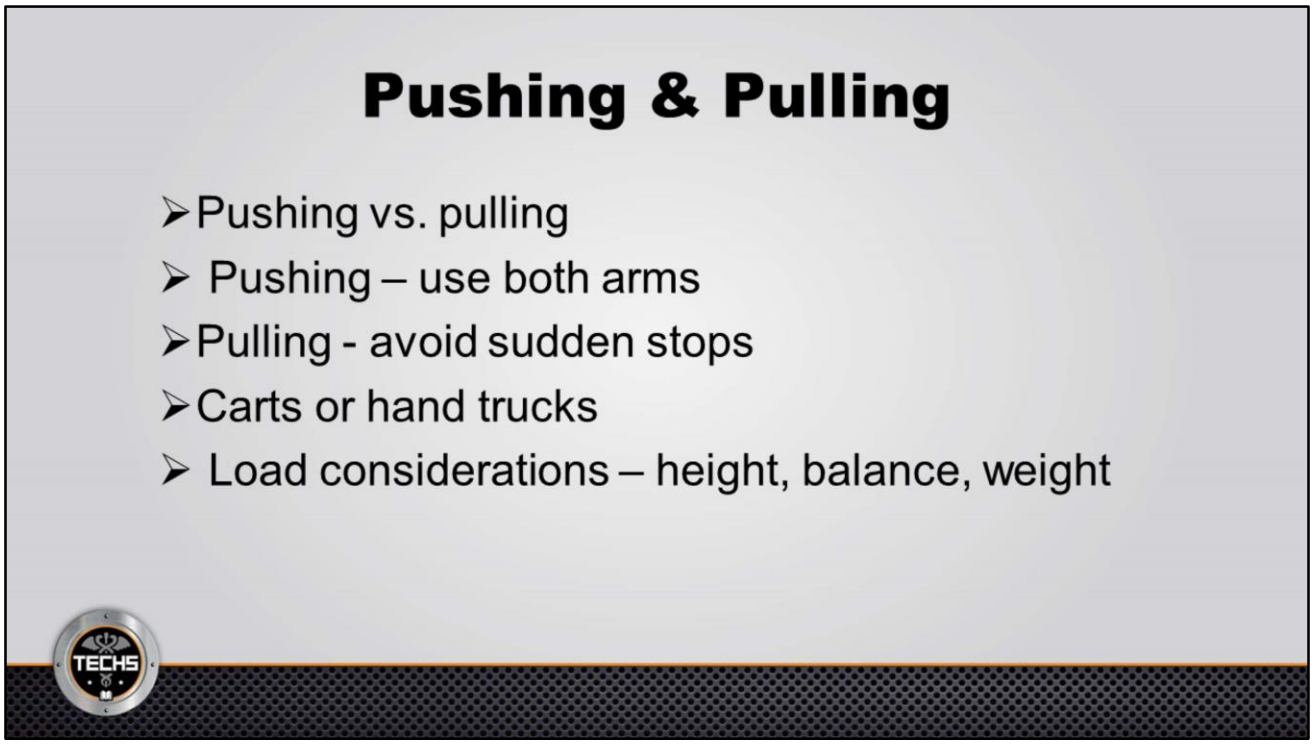
- ✓ Size up the load.
- ✓ Move the load close to your body.
- ✓ Always bend your knees and keep your back upright.
- ✓ Raise the load with your legs.
- ✓ Turn your feet in the direction of travel. Do not twist.

Mechanical material handling eliminates manual lifting completely.

Examples of equipment used for mechanical material handling include:

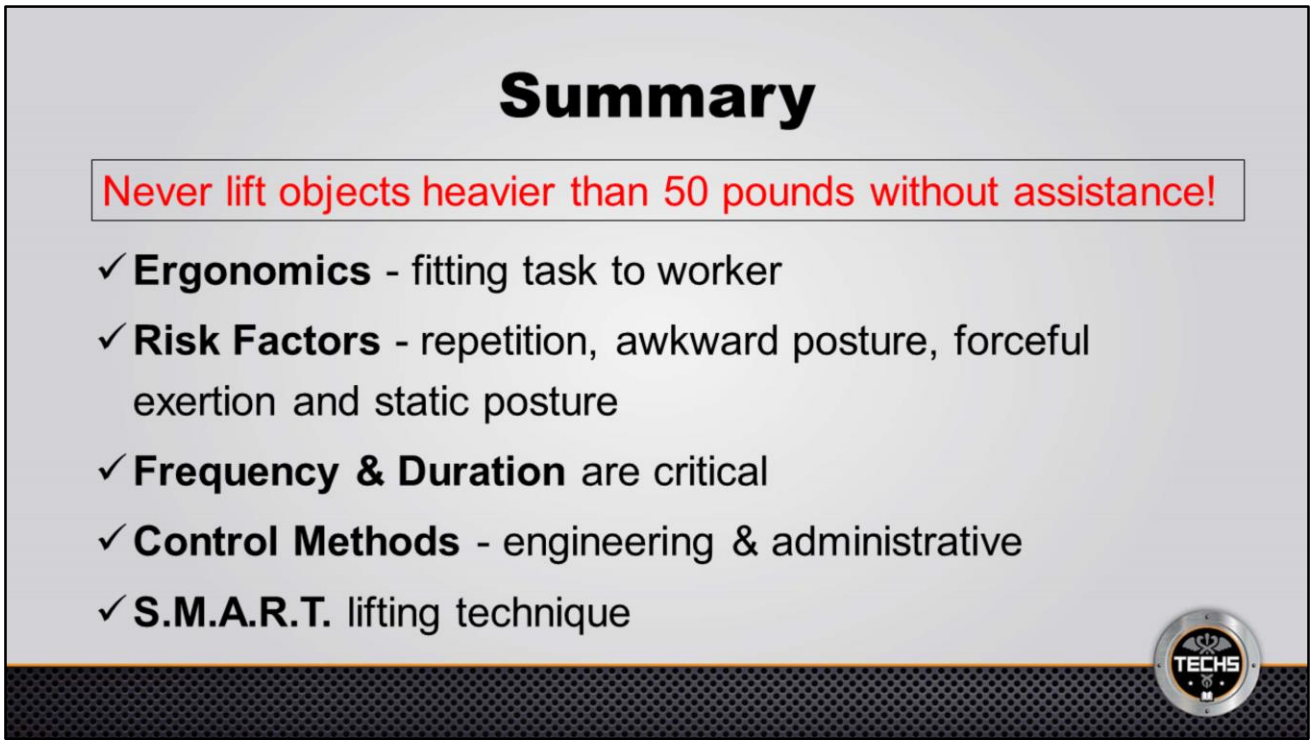
- Fork lifts
- Hoists
- Cranes

You must be trained before you can use this type of equipment.



Pushing & Pulling:

- Pushing is easier on your back than pulling. Pushing puts less strain on your back.
- When pushing, use both arms, maintain an upright posture, and stay close to the load.
- If you must pull - avoid sudden stops.
- Using a cart, dolly, pallet jack or hand truck combines manual and mechanical material handling.
- Load considerations when using a cart, dolly, pallet jack or hand cart:
    - The load height should not obstruct your vision.
    - The load should be balanced.
    - The load's weight should not exceed the equipment's load limit.



In Summary:

- ✓ Ergonomics involves fitting the task to the worker to prevent back and other types of injuries.
- ✓ Ergonomic Risk Factors include - repetition, awkward posture, forceful exertion and static posture.
- ✓ The Frequency & Duration of each risk factor are critical considerations.
- ✓ There are two types of control methods - engineering and administrative that can be used to eliminate or reduce each risk factor.
- ✓ Remember to use the SMART lifting technique.
- ✓ Never lift object heavier than 50 pounds without assistance!