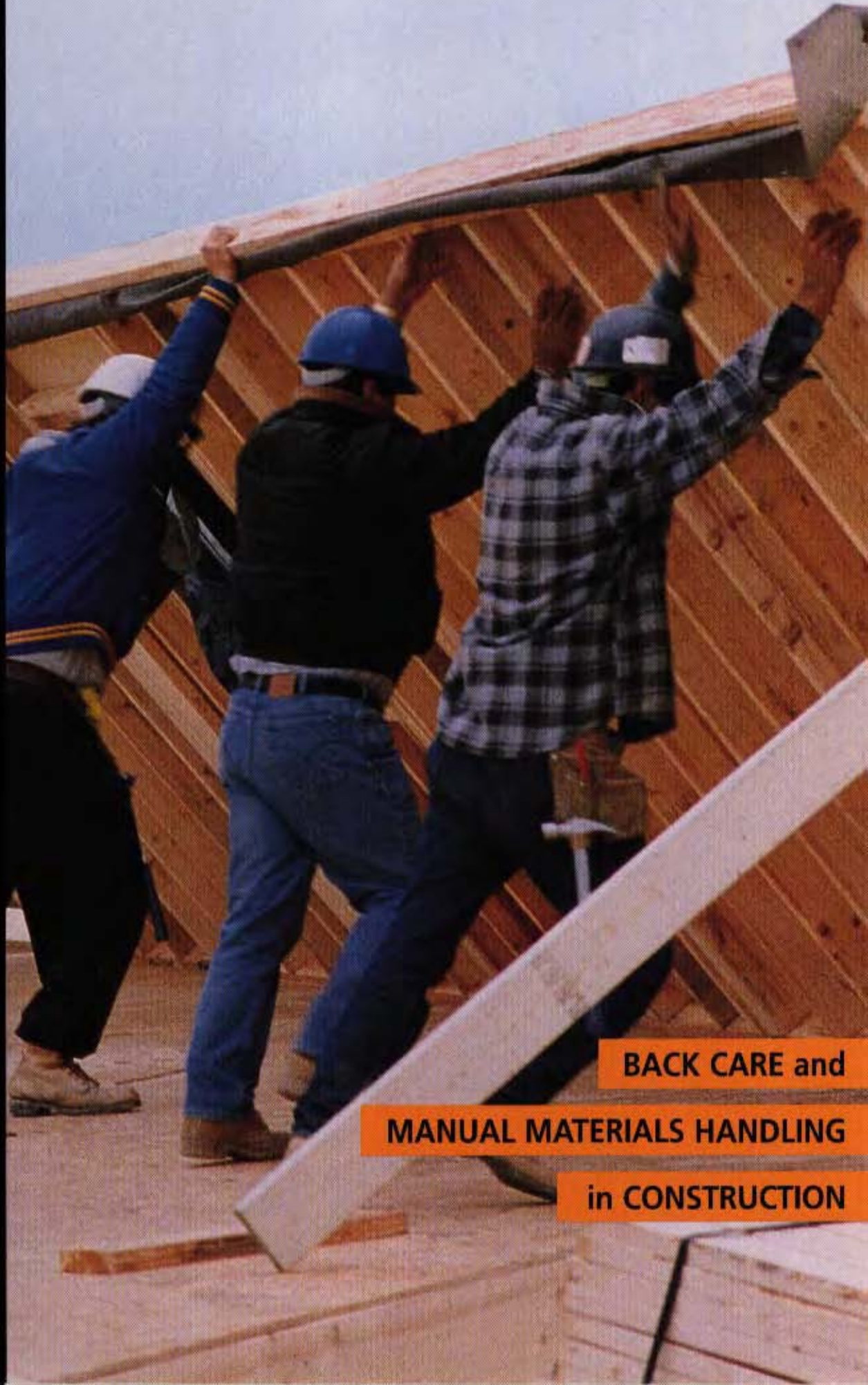




**CONSTRUCTION
SAFETY**



**BACK CARE and
MANUAL MATERIALS HANDLING
in CONSTRUCTION**

In the past, members of the public have used printed information that was outdated by subsequent improvements in knowledge and technology. We therefore make the following statement for their protection in future.

The information presented here was, to the best of our knowledge, current at time of printing and is intended for general application. This publication is not a definitive guide to government regulations or to practices and procedures wholly applicable under every circumstance. The appropriate regulations and statutes should be consulted. Although the Construction Safety Association of Ontario cannot guarantee the accuracy of, nor assume liability for, the information presented here, we are pleased to answer individual requests for counselling and advice.

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Back Care and Manual Materials Handling in Construction

developed in coordination with Bygghalsan of Sweden

**Construction Safety Association of Ontario
21 Voyager Court South
Etobicoke, Ontario, Canada
M9W 5M7
(416) 674-CSAO (2726)
Fax: (416) 674-8866**

Foreword

The first edition of this manual was developed through cooperation between the Construction Safety Association of Ontario (CSAO) and Bygghalsan of Sweden.

CSAO is an organization that counsels and educates construction employers and workers in health and safety. Bygghalsan is the Swedish construction industry's organization for working environment, safety, and health.

Originally titled **Stand/Lift/Carry**, this manual was expanded from a Bygghalsan publication released in 1983.

CSAO has since revised and reprinted the manual several times.

Contents

Introduction	1
Spinal Column and Muscles	2
Workplace Posture	7
Correct Posture	
Common Postures	
Stretches for Common Work Postures	
Lifting	10
Lifting Capacity	
Proper Lifting	
Lifting Grip	
Lift/Carry/Unload	
Lifting Tips	
Twisting	
Shovelling	
Lifting and Placing Block	
Transferring Weight	
Lifting Heavy Bags	
Lifting Over Barriers	
Lifting Sheet Materials	
Lifting by Two Persons	
Lifting with Support	
Balancing a Load	
Materials Handling Equipment	
Hoisting or Moving Heavy Loads	
Work Techniques	32
Benches	
Work Platforms and Ladders	
Tools	
Heavy Equipment	
Exercise Program	37
Warm-Up Exercises	
Stretching Exercises	
Strengthening Exercises	
Lie/Sit/Stand	
Summary	41
Common Questions about Back Care	41

Introduction

Construction work puts physical stress on the body. Various studies have shown that the construction trades have a higher incidence of back injuries and muscle strains than many other occupations.

A Swedish study of construction apprentices found that 18% had back problems when they began their training. This figure rose to 40% by the end of the second year.

Pain in the back and joints is a major factor in forced retirement from the construction trades and in workers seeking less demanding occupations. Such changes are often accompanied by a serious reduction in living standard.

In construction, about half of the back injuries are attributed to lifting excessive weight or lifting incorrectly while roughly 23% are the result of slips, trips, and falls.

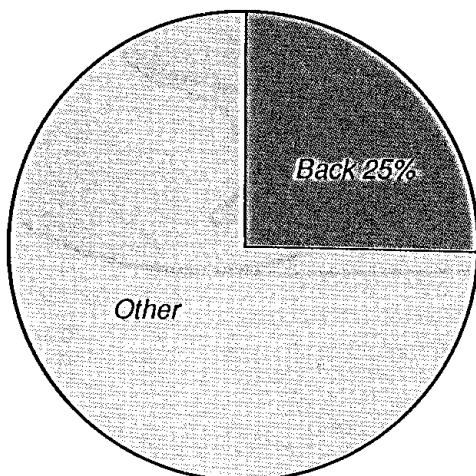
Back injuries from slips, trips, and falls can sometimes be prevented by good housekeeping. Proper storage of material and regular cleanup of debris can improve access not only for workers but for materials handling equipment.

Most back injuries are the result of everyday wear and tear rather than a single traumatic event. The cause is generally not a single lift but damage done over time.

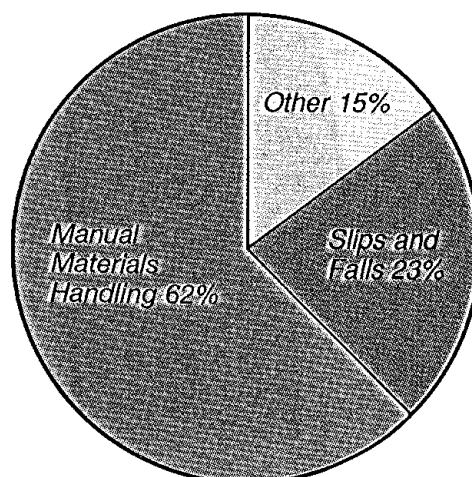
Repeated twisting, awkward postures, heavy lifting, and prolonged vibration can all contribute to back pain and injury. Unfortunately, once back pain is experienced, the chances of it recurring increase greatly.

To reduce back injuries on the job, a preventive program is necessary. An effective program should cover factors such as anatomy, workplace posture, lifting techniques, ergonomics, and exercises.

This manual provides the basic information for an effective program.



Construction Injuries



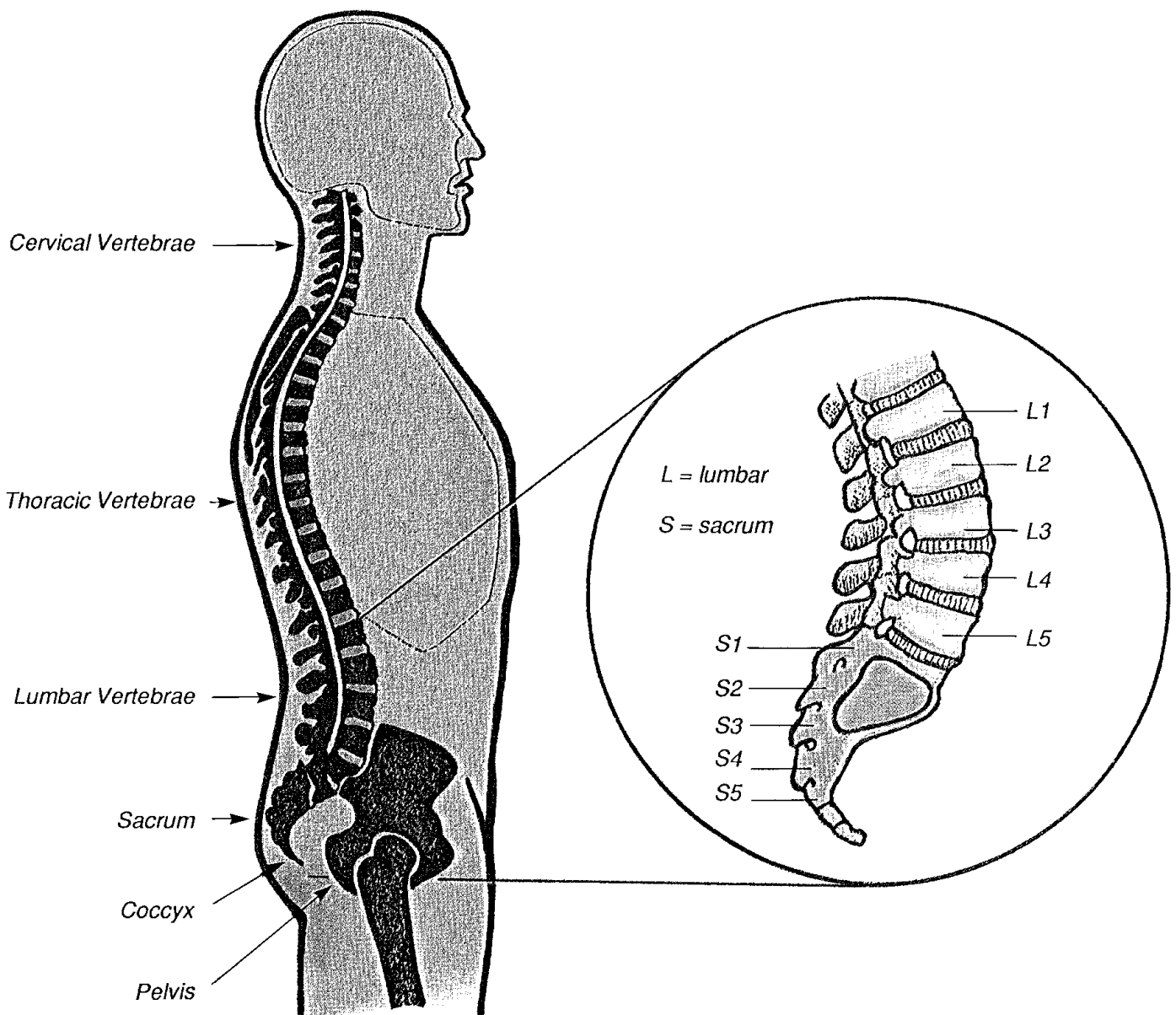
Causes of Back Injuries

Spinal Column and Muscles

Spinal Column

The spinal column is made up of bones called vertebrae. They are divided into three areas: neck (*cervical*), upper back (*thoracic*), and lower back (*lumbar*). Vertebrae are numbered from the top down in order to identify them easily.

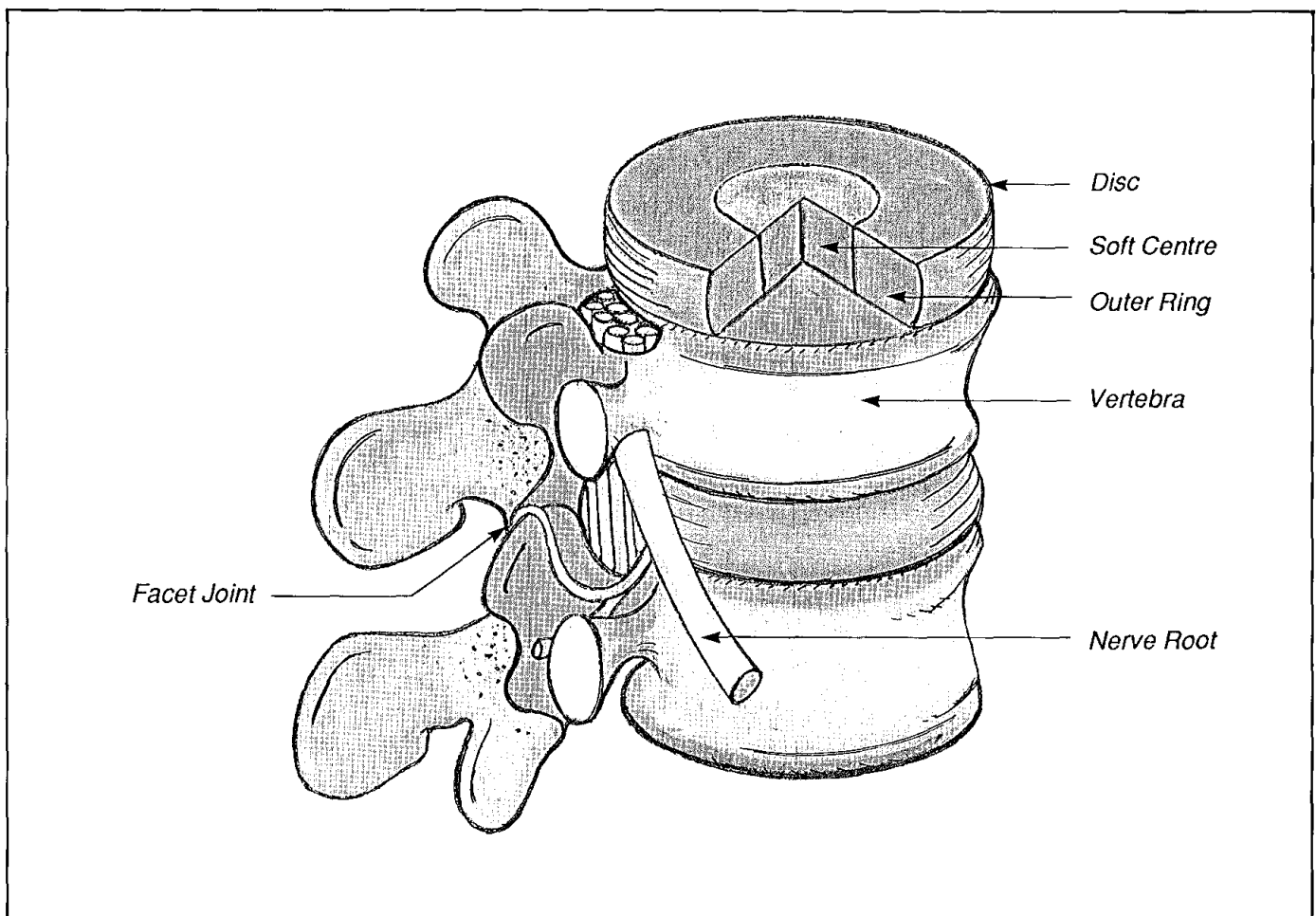
The spine also provides a bony protective cover for the spinal cord. This cord can be compared to a telephone cable connecting hundreds of tiny wires. Each wire carries messages from the brain to specific parts of the body and brings back information on conditions throughout the body.



Spinal Column

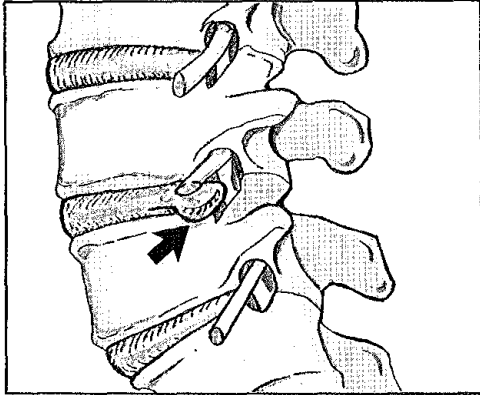
The spine is a unique part of the skeleton because it provides support as well as allowing free movement of the upper body (the trunk). This movement is made possible by spinal discs, tying each vertebra to its neighbour, and by small spinal joints called facet joints linking each vertebra. The discs act as shock absorbers, cushioning loads and allowing movement. The facet joints control the direction of movement.

A disc is composed of two parts—an outer hard fibrous ring surrounding an inner soft gel-like centre. Because each disc is attached firmly to the vertebrae above and below it, a disc cannot slip out of place. In fact, there is no such thing as a "slipped disc."

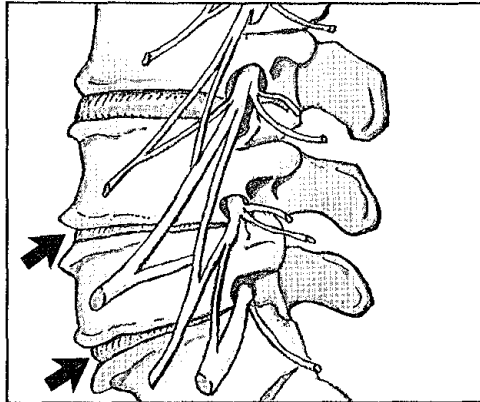


Vertebrae and Discs

Incorrect lifting, poor posture, and twisting can stress the outer surface of a disc, making it vulnerable to injury.



Disc Protrusion or Herniation



Disc Degeneration

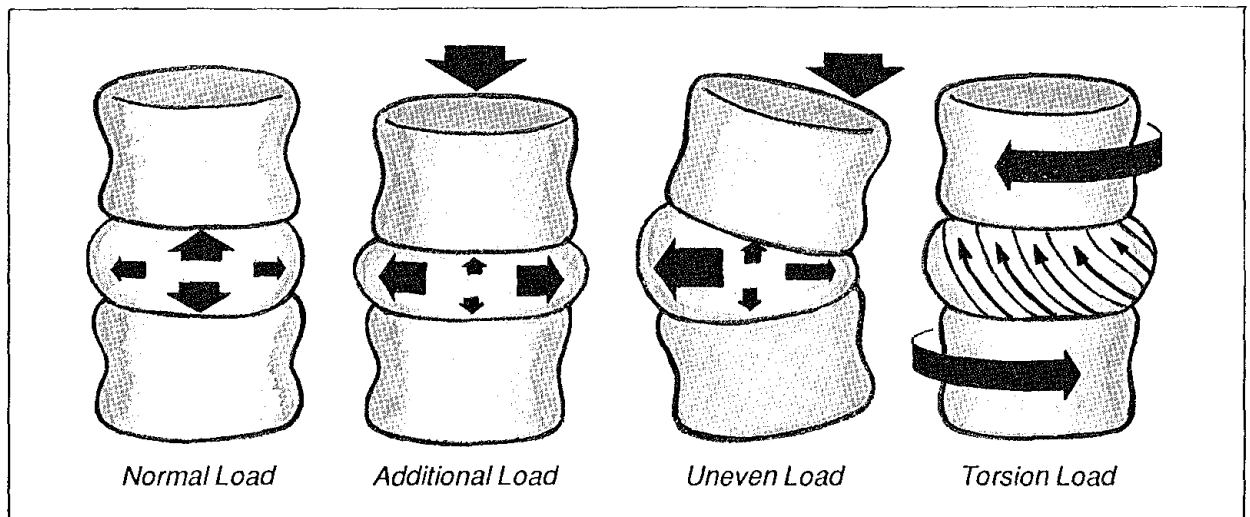
If the outer fibrous ring is damaged, part of the gel can seep out. This is called a disc protrusion or disc herniation. The result may be pain felt not only in the back but in other places as well. When the pain is felt down the leg, the condition is known as "sciatica."

Composed largely of water, discs act as cushions between vertebrae. With age, discs begin to lose water, a condition known as "degenerative disc disease." In fact, this is not a disease at all but simply the normal aging process which can be accelerated by poor back care. The flattening and hardening of discs and the resulting wearing out of facet joints is thought to be a cause of low back pain and stiffness in the spine.

These conditions—disc protrusion, disc degeneration, and worn-out facet joints—cause the majority of low back pain symptoms in adults.

Discs are continually being compressed by the effects of gravity. When we stand, discs must support the weight of our upper body. When we carry something, discs must support an additional compression load.

Carrying an uneven load or twisting combined with carrying puts further compression loads on our discs. These everyday stresses may result in low back injury. We can minimize the risk by not carrying uneven loads and not twisting while we lift or carry.



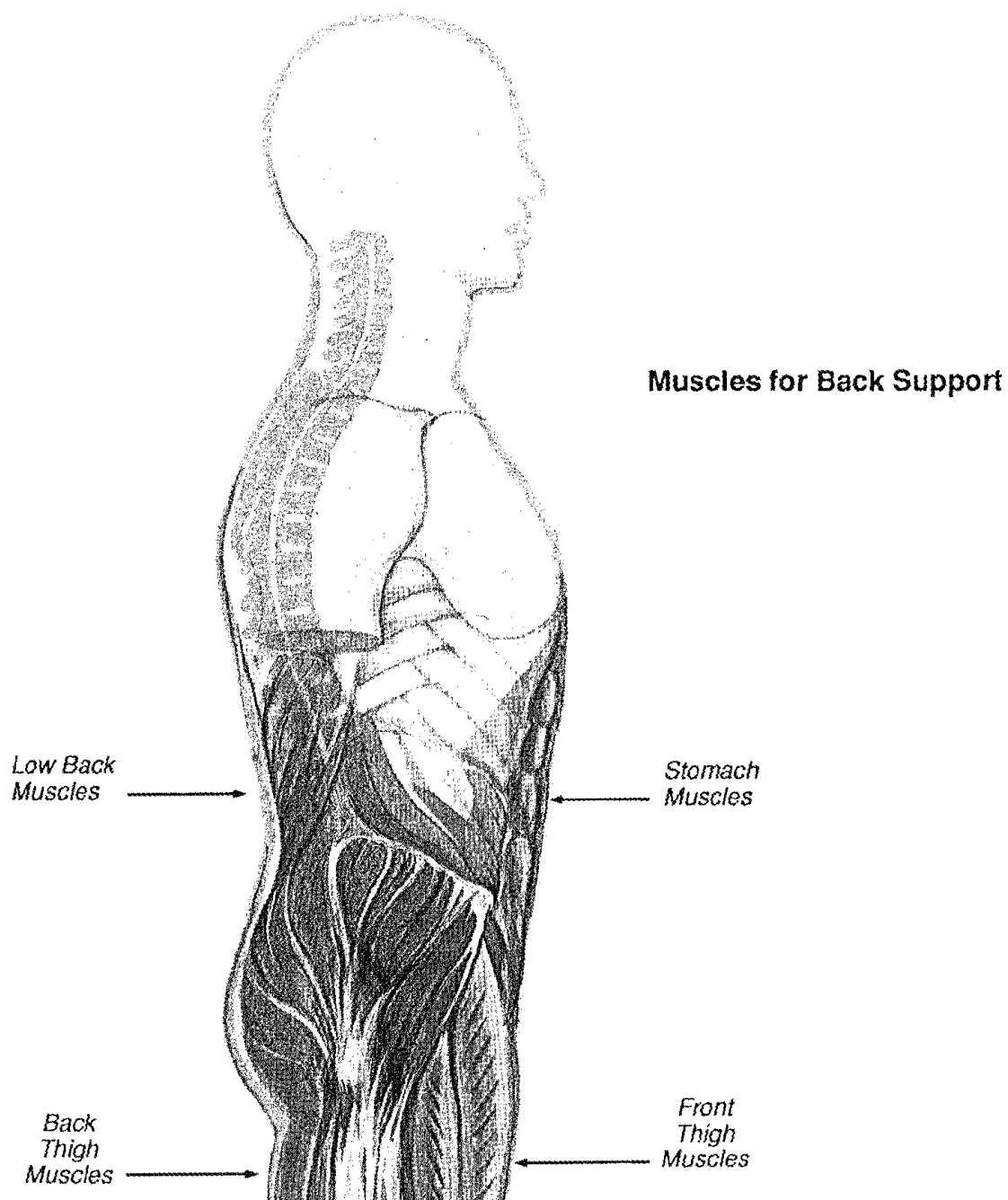
Spinal Discs under Various Loads

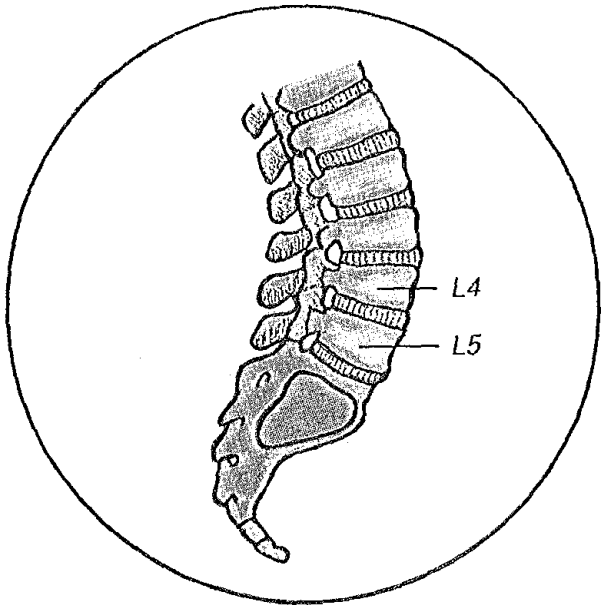
Muscles

Movement of the body is controlled by the contraction (tightening) and relaxation of muscles. In addition, rope-like ligaments join bone ends to support and strengthen joints and prevent abnormal movement.

The spine is the only bony support in the body between the rib cage and the pelvic (hip) bones. This arrangement is necessary to allow ease of movement in the lumbar section or lower back.

Because of the lack of bony structure in the lower back, the body depends on an interwoven sheath of heavy muscles and flat sheets of strong ligaments across the abdomen and lower back to provide necessary support. For a healthy back these muscles must be kept in good condition.

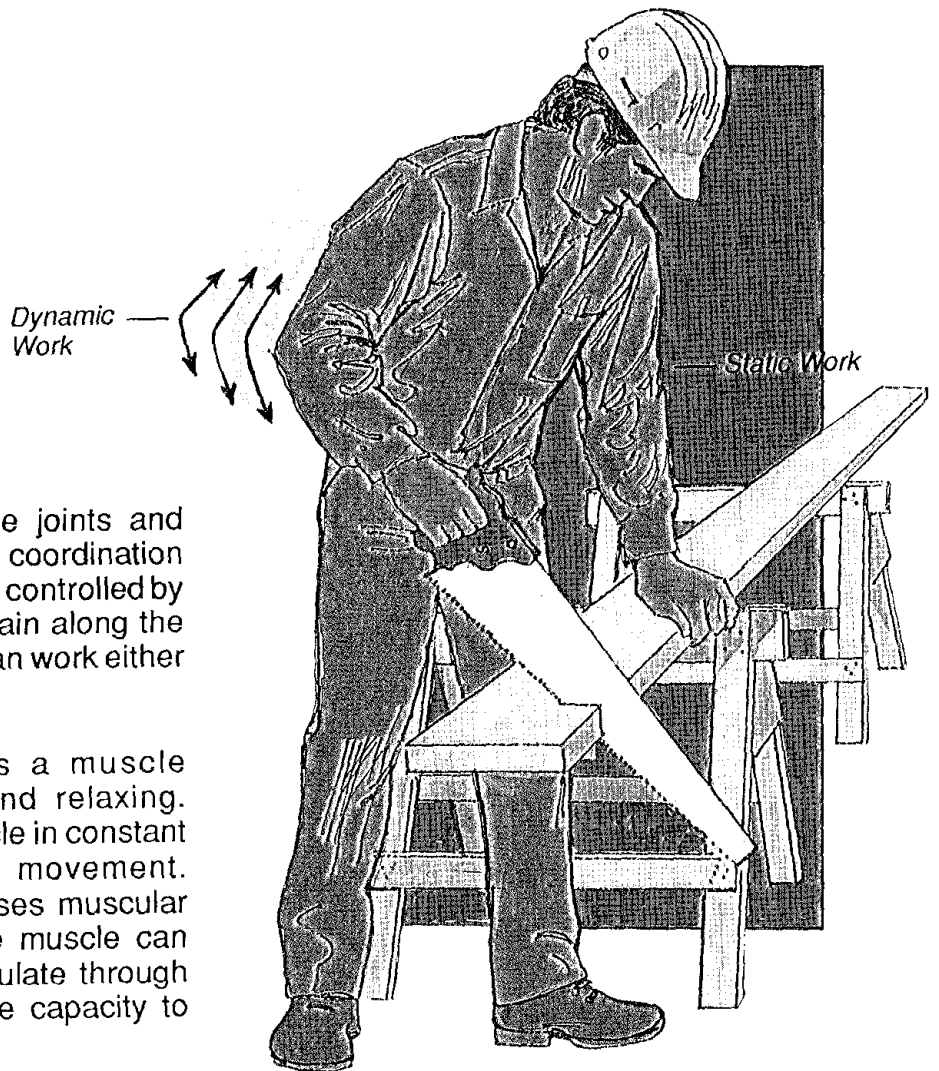




The most common sites of injury in the lower back are in the area where the rigid pelvis and sacrum meet the flexible spine.

This area (L4, L5) takes the most strain when we bend, twist, or lift.

Common Sites of Lower Back Injury



Precision movement of the joints and limbs of the body requires coordination and interaction. Muscles are controlled by messages sent from the brain along the nervous system. Muscles can work either dynamically or statically.

Dynamic work involves a muscle alternately contracting and relaxing. Static work involves a muscle in constant contraction without joint movement. Prolonged static work causes muscular pain. Only by relaxing the muscle can oxygen-carrying blood circulate through the tissues and restore the capacity to normal.

Dynamic versus Static Work

Workplace Posture

Maintaining proper posture is the most critical part of good back care. Using our muscular system to control posture minimizes the effects of everyday wear and tear on our spine.

Lower back muscles are short, small muscles designed to keep us upright. They are called "anti-gravity" muscles and are usually very strong since they have to work almost continuously.

Stomach muscles are big, broad muscles designed to support your spine and take some of the work load off the small lower back muscles.

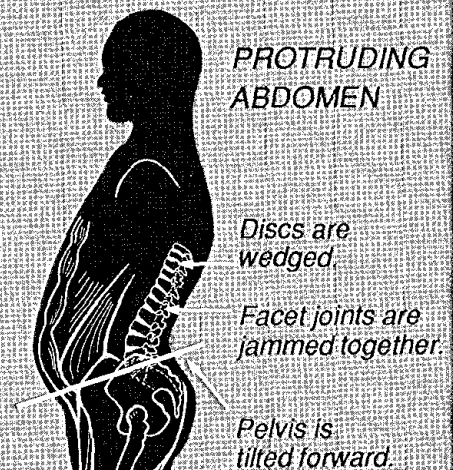
When we don't use our stomach muscles, the back muscles lose this important support system and become overloaded. The resulting muscle imbalance makes the spine susceptible to injury.

Therefore, maintaining good posture by using our stomach muscles is essential to proper back care.

Any position held too long is not good for your back. Aches and pains from prolonged working postures are nature's way of warning you to change positions. If these warnings are continuously ignored, you will be vulnerable to low back injury.

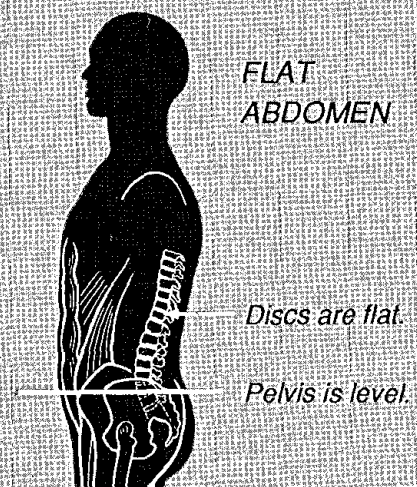
Unbalanced Pelvis **Weak position vulnerable to injury**

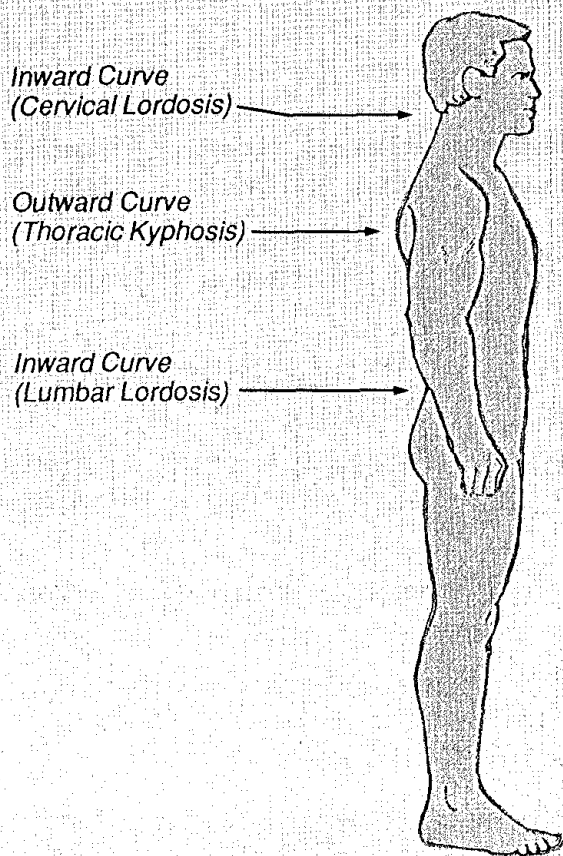
When you stand with stomach protruding, your pelvis is tilted down and your back has an increased curve. In this position, stress is concentrated in your lower back, making it vulnerable to injury. Tightening the lower stomach muscles will straighten the pelvis and correctly align the lower spine.



Balanced Pelvis **Strongest position for the back**

When you stand properly with chin tucked in, shoulders back and down, and pelvis level, there is a slight natural inwards curve in your lower back. This is correct posture and the strongest position for your back. Maintaining a level, balanced pelvis is essential to proper back care and helps prevent potential back problems.





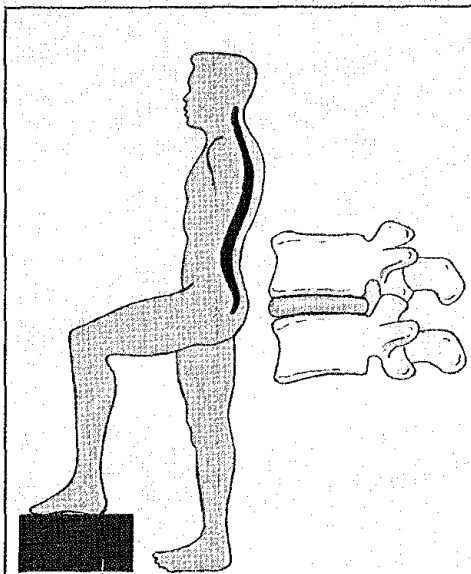
Correct Posture

Correct posture is not an erect, military pose but an alignment that maintains the naturally occurring curves in your spine.

You have an inward curve (lordosis) at two places in your spine—neck and lower back. You have an outward curve (kyphosis) in your upper back.

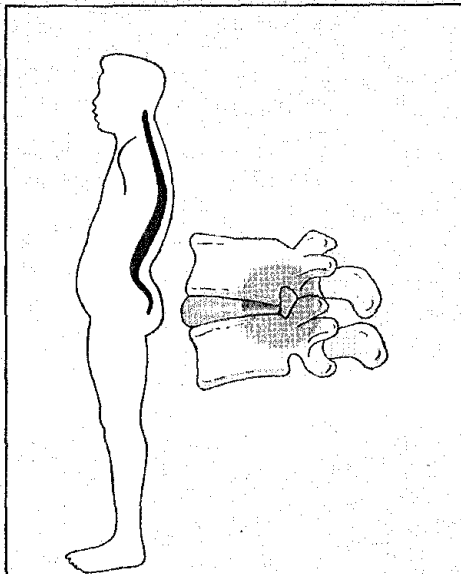
Keeping your spine aligned in this manner reduces everyday stresses on your back and minimizes the effects of the normal aging process on the spine.

Common Postures



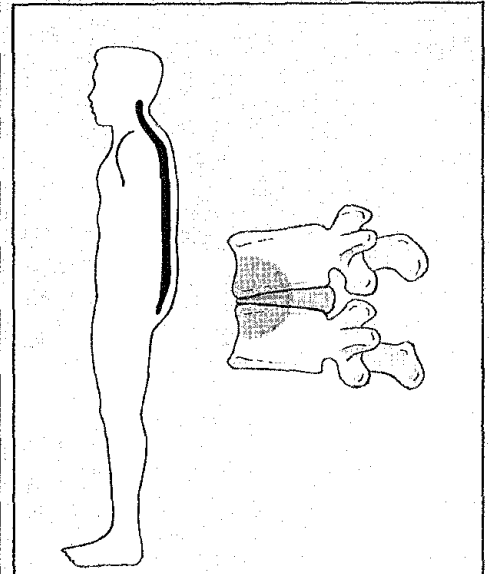
NORMAL BACK

Prolonged standing often causes an increased curve in your lower back. Elevating one foot on an object such as a stool or brick will take stress off the spine and restore the natural inward curve in your lower back.



SWAY BACK

An increased curve in your lower back will jam the vertebrae together (sway back). If held too long, the position will cause lower back muscle and ligaments to tighten and lead to low back pain.



FLAT BACK

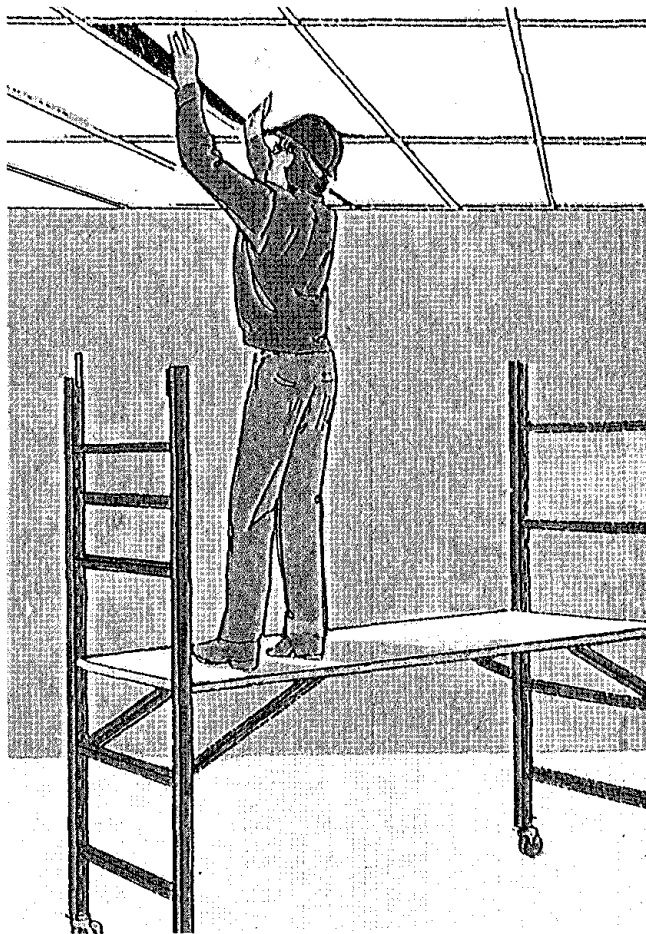
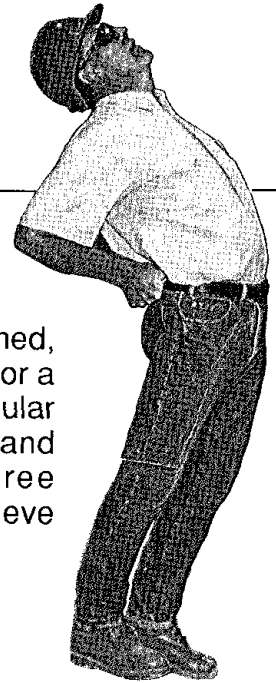
Too little curve (flat back) will put extra pressure on the front of your discs. This may contribute to disc problems and pain.

Stretches for Common Work Postures



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 stable footing and bending forward three times.

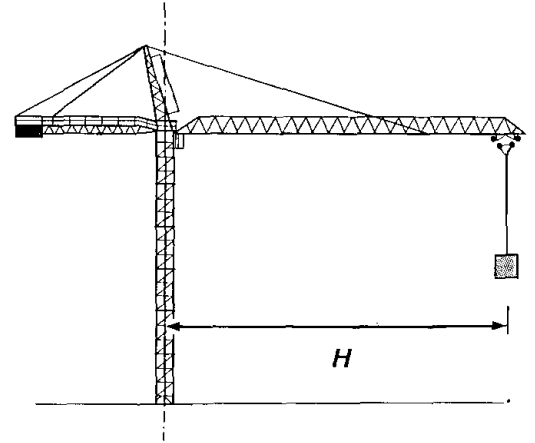
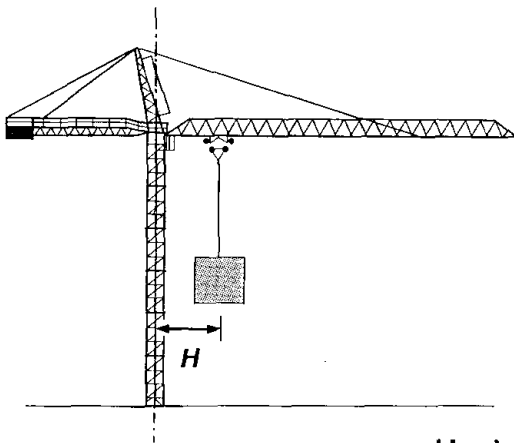


Lifting

Lifting Capacity

Lifting a weight that is too heavy, lifting in an awkward position, twisting your body while lifting, or doing excessively heavy work are all common causes of low back problems. The following lifting models illustrate the need for a good work technique.

A tower crane's lifting capacity is reduced the further the load is away from the mast.

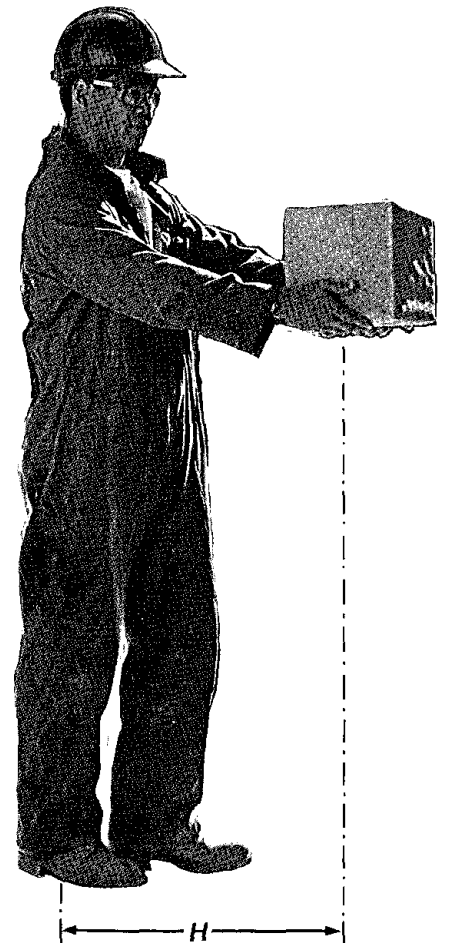


H = horizontal distance

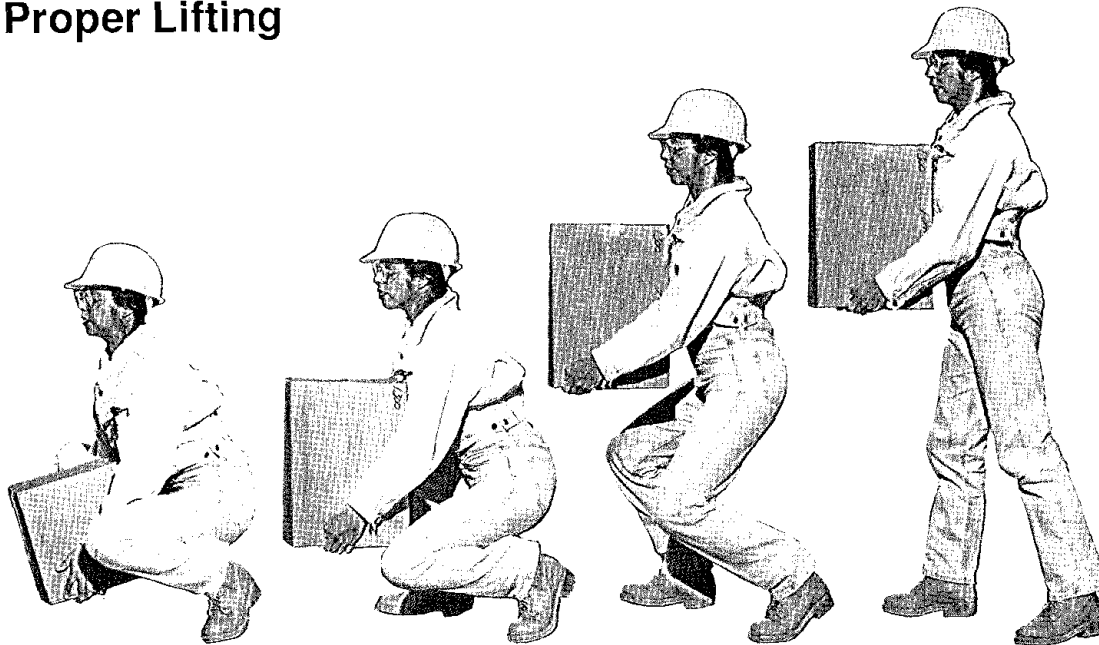


Similarly, our lifting capacity is reduced the further a load is away from our spine.

Therefore it is critical to get as **close** to the load as possible when lifting and carrying it.



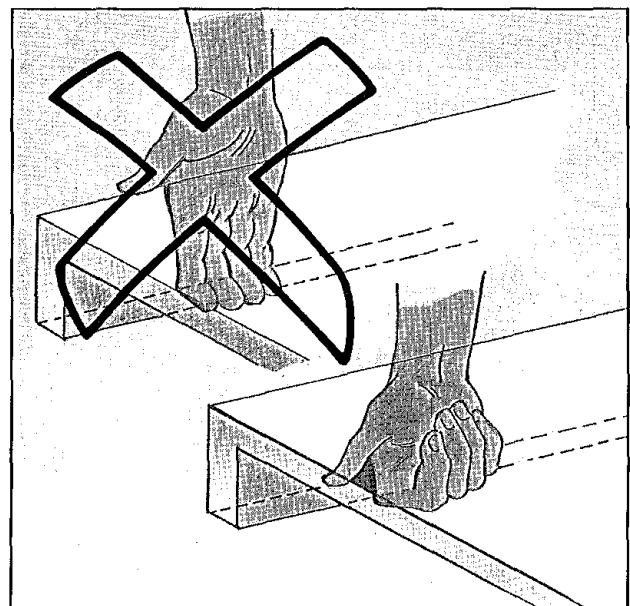
Proper Lifting



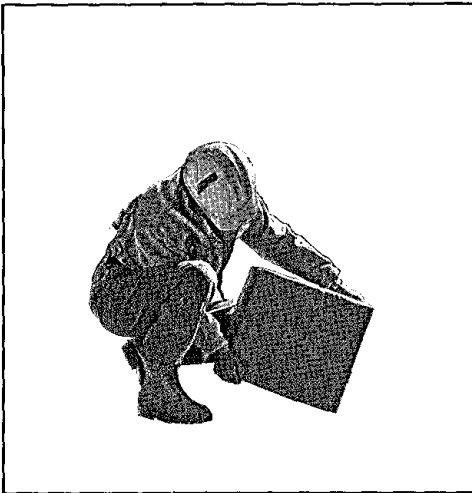
1. Plan your move.
 - Size up the load and make sure your path is clear.
 - Get help as needed.
 - Use a dolly or other materials handling equipment if possible.
2. Use a wide, balanced stance with one foot slightly ahead of the other.
3. Get as close to the load as possible.
4. Tighten your stomach muscles as the lift begins.
5. When lifting, keep your lower back in its normal arched position and use your legs to do the lift.
6. Pick up your feet and pivot to turn. Don't twist your back.
7. Lower the load slowly, maintaining the curve in your lower back.

Lifting Grip

To ensure solid contact when lifting heavy objects, use your entire palm, not just your fingertips.



Lift



Size up the load and make sure your path is clear.

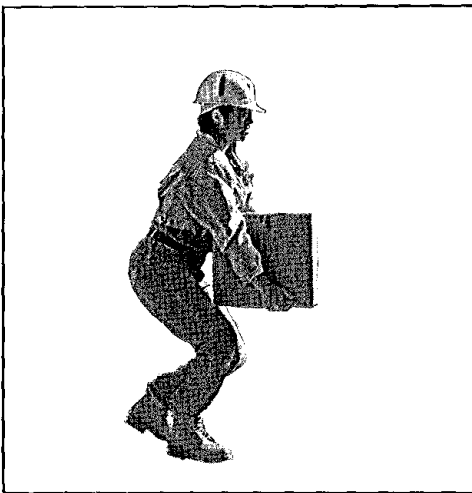


Get help with heavy lifts and use materials handling equipment when necessary.

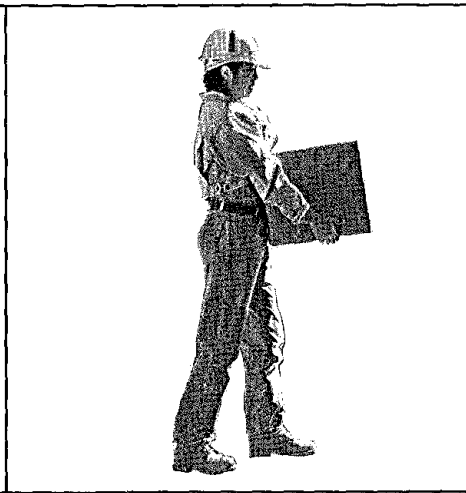


Use a wide, balanced stance with one foot slightly ahead of the other. Get as close to the load as possible. Tighten your stomach muscles as the lift begins.

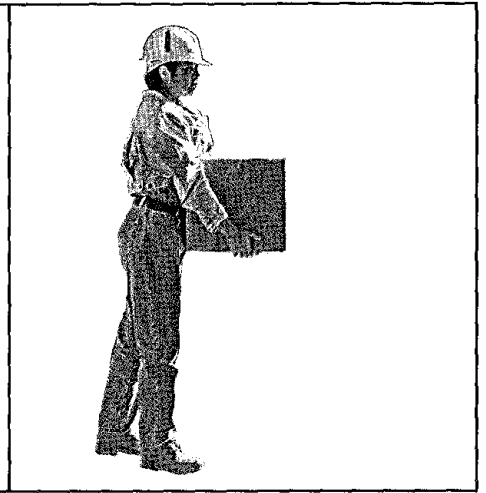
Carry



Keep your lower back in its normal arched position and use your legs to lift.

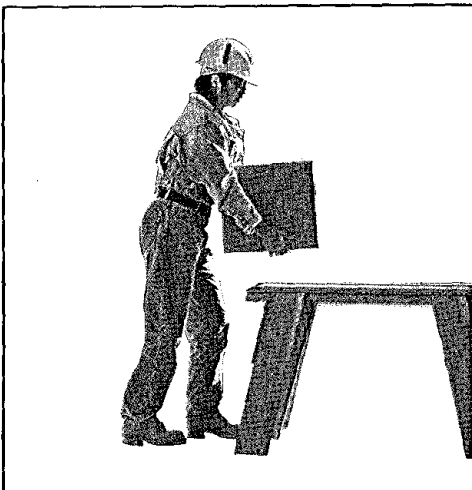


Maintain a good grip and keep the load close to your body.

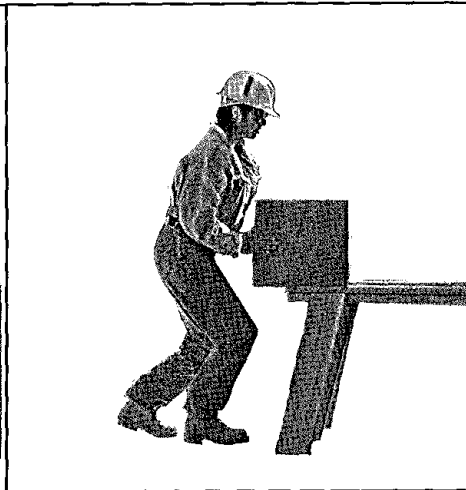


Maintain a clear line of vision. Pick up your feet to turn. Do not twist.

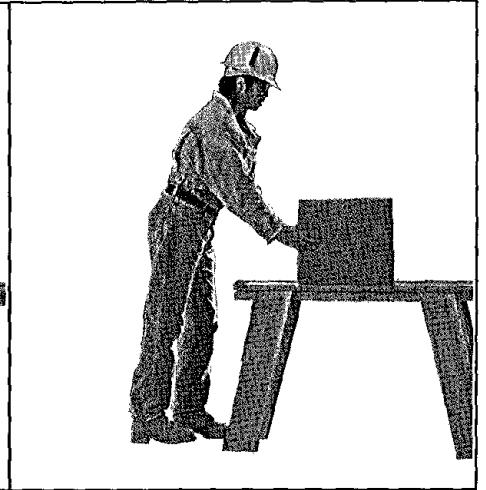
Unload



Lower the load, maintaining the natural curve of your back.



When lowering a load onto a deep shelf, put it on the edge of the shelf.



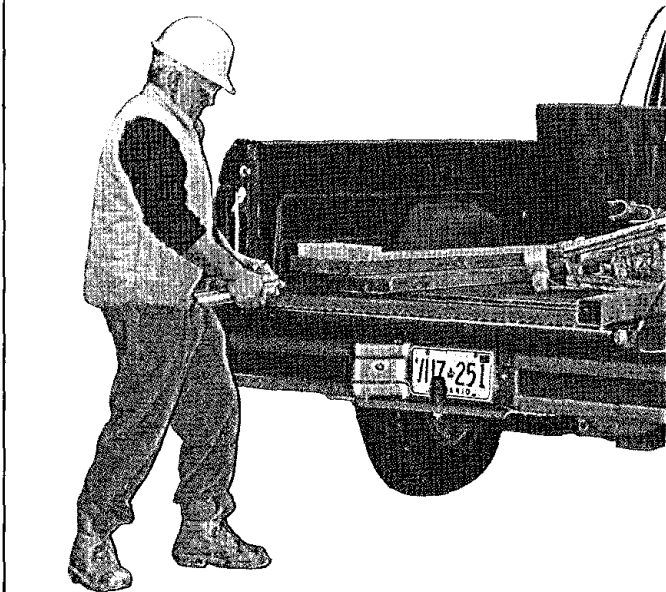
Push the load into place.

Lifting Tips

DO

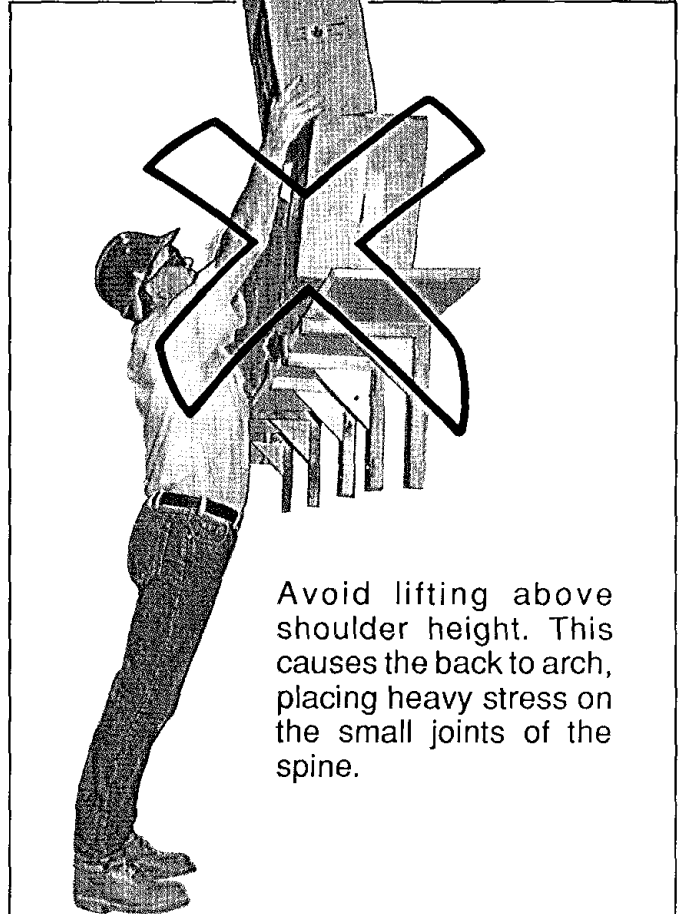


Push rather than pull. Pushing allows you to maintain the natural curves in your back.

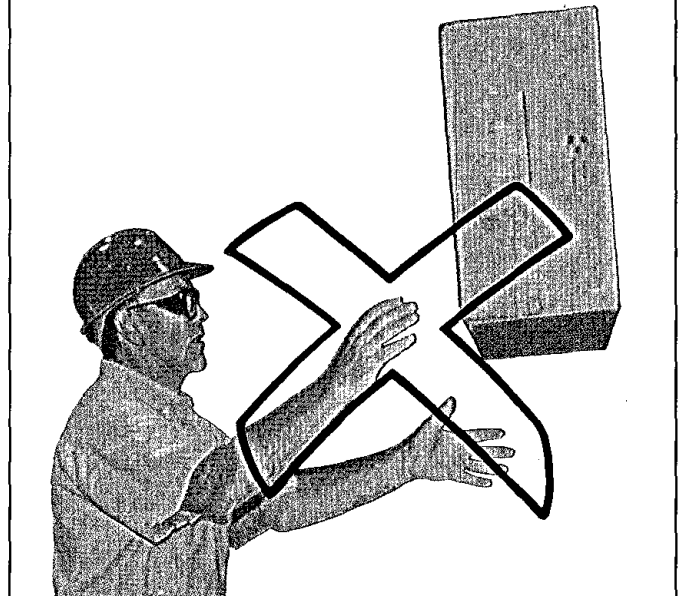


Keep a good grip on the load. Maintain a clear line of vision between the object and your destination. When lowering the object, remember to maintain the slight natural curve in your lower back. If possible, place the load on the edge of the tailgate and push it into place.

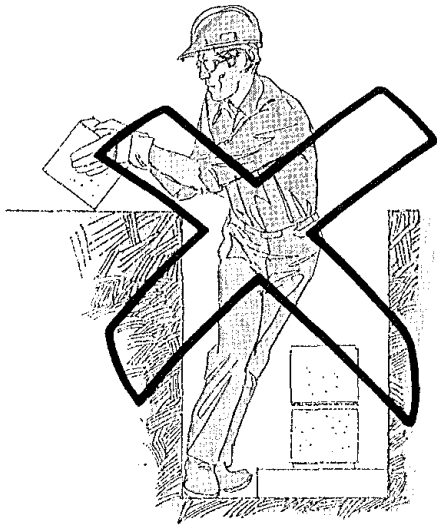
DON'T



Avoid lifting above shoulder height. This causes the back to arch, placing heavy stress on the small joints of the spine.



Do not catch falling objects. Your muscles may not have time to coordinate properly to protect the spine.



Twisting

Repeated twisting of the lower back during lifting or shovelling is a common mistake. It can contribute to lower back pain and disability. Instead lift your feet and turn your body as noted below.



Shovelling



Keep feet wide apart with front foot close to shovel. Keep bottom hand low and toward shovel blade.

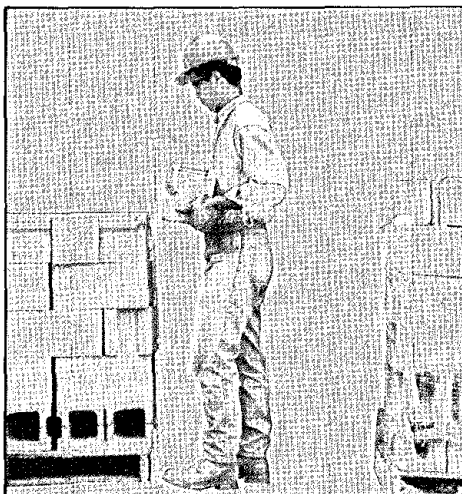


Shift weight to rear foot, keeping load close to body.



Turn feet in direction of throw.

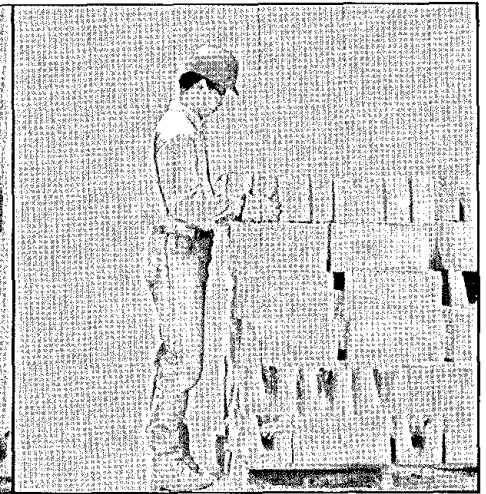
Lifting and Placing Block



Lift block with feet and body in same direction.

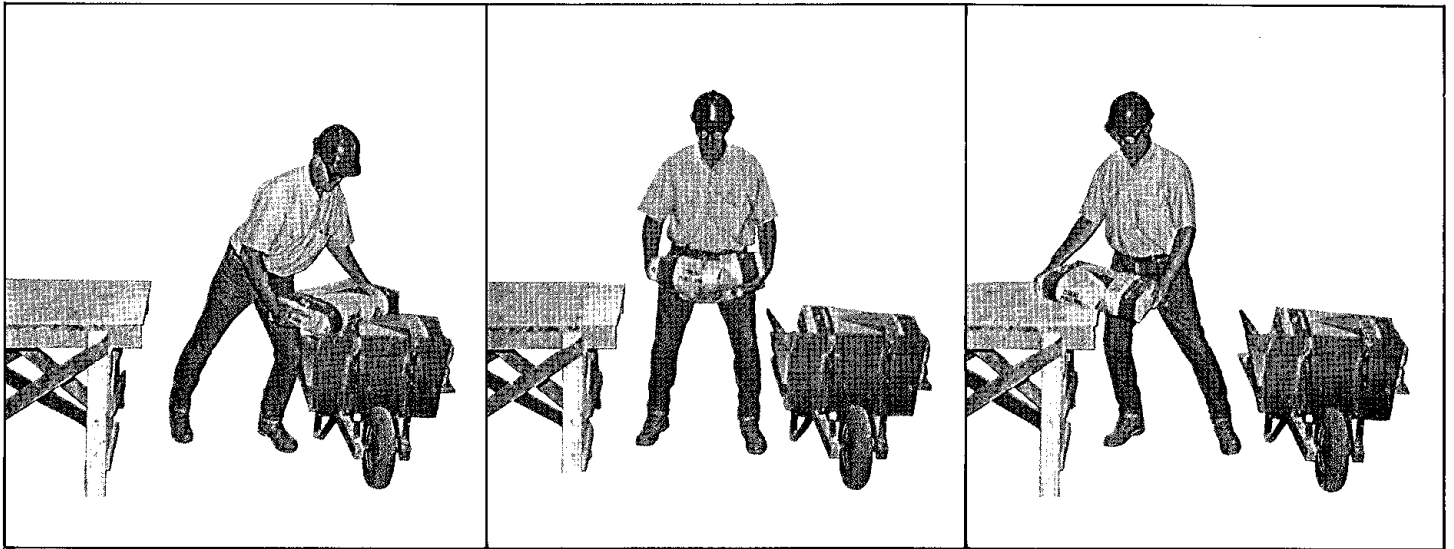


Pick up feet and turn with feet and body together. Don't twist your back.



Place block in position, maintaining the normal curve in your lower back.

Transferring Weight



Pull the object towards you while transferring your weight to the lift side.

Lift only to the level required.

Shift your weight to the other leg while pushing the object into position. Do not twist.

Lifting Heavy Bags



Put one knee down against bag.

Pull bag up leg.

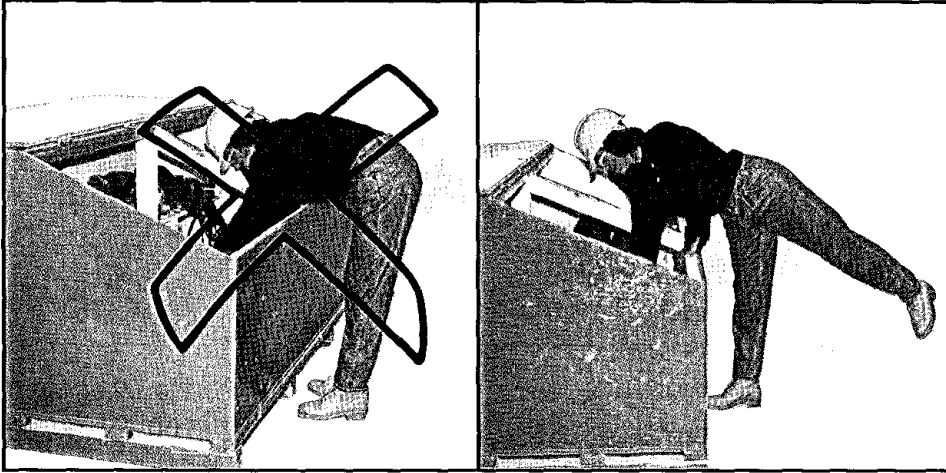
Rest bag on edge of knee.

Stand upright.

Pull bag to waist height.

Lifting Over Barriers

Many back injuries result from repeated use of poor lifting techniques. Often a simple change in how we use our body to perform routine tasks can prevent back injuries and make work easier at the same time.



Lifting with the back rounded and knees straight places great stress on the spine, making the lower back more susceptible to injuries.

Use the golfer's lift for lighter objects in containers or behind barriers. Place one hand on a support, swing one leg behind as you reach, then push up on your hand and straighten up.

Ergonomically designed gang boxes with doors that open in front like a cupboard can make the storage and removal of equipment easier. Heavy items should be shelved at waist height for safer handling.



For two-handed lifts over a barrier, reduce stress on the spine by avoiding the back-rounding shown above.

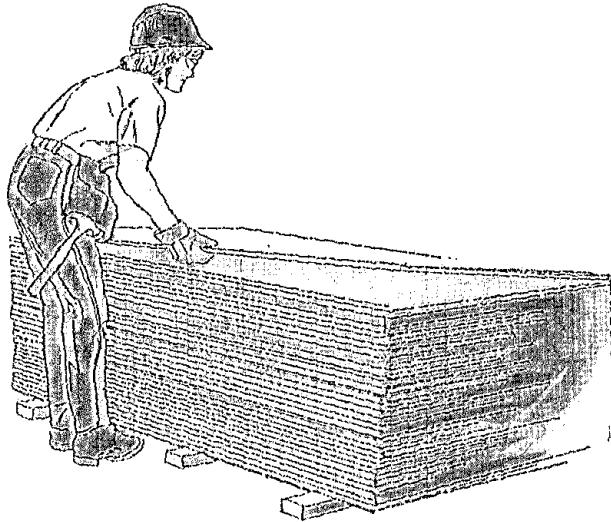
When heavier objects require two hands for an over-barrier lift, move close to the object, then bend at the hips while keeping your back in the normal arched position.

Get a sure grip, then lift, allowing the muscles at the back of your legs to do the work. When lifting, keep your head up and lower back in its normal arch until you're standing upright again.

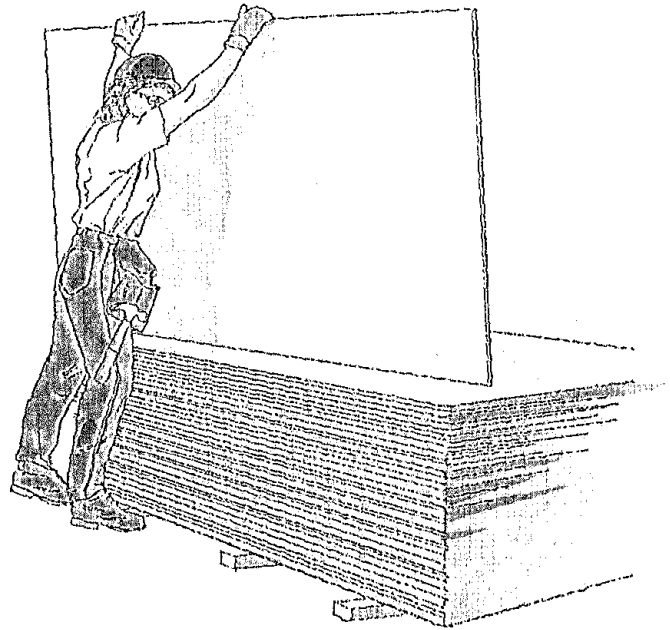
Lifting Sheet Materials

When you handle large sheet materials, it is essential to use the proper techniques to protect your back.

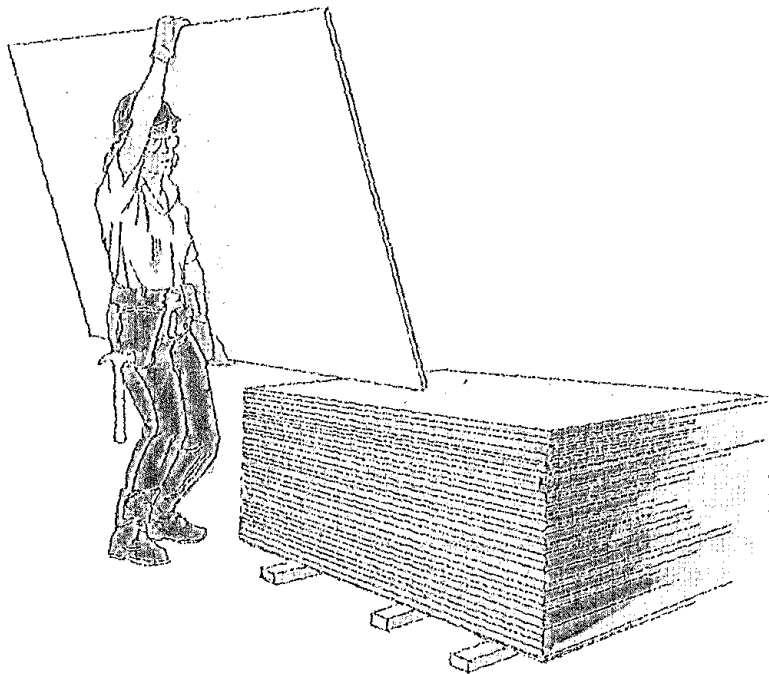
Where possible, store sheets at a convenient height and above ground on dunnage or trestles.



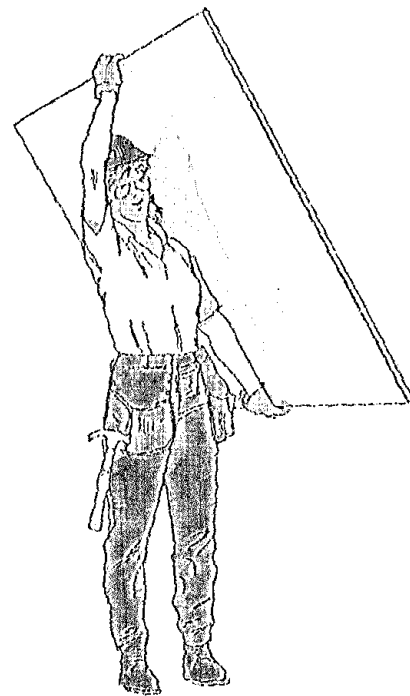
Grasp sheet on long side at mid-point.



Tip sheet up, then slide sheet partway off pile.



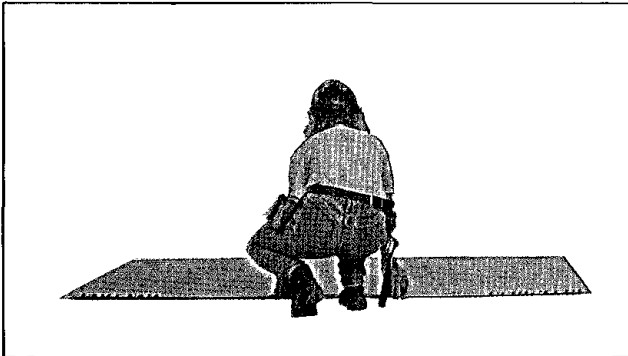
Bend at the knees, maintaining the normal curve in your low back. Grasp sheet above and below at mid-point.



Carry sheet, keeping back erect. Avoid leaning to one side.

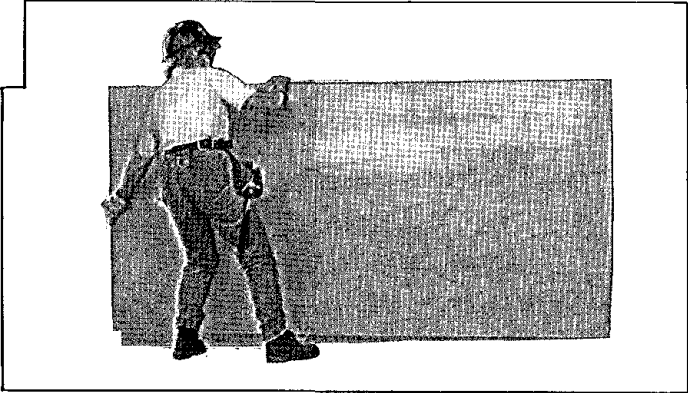
If you have to lift sheet material from the floor, use one of the following techniques.

Method 1

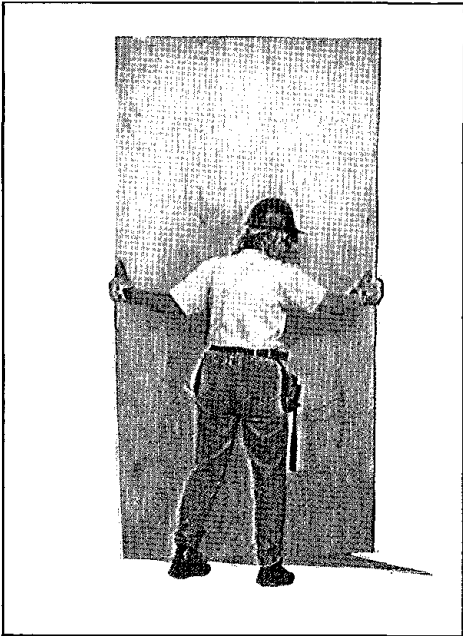


Bend knees, keeping body as upright as possible, and grasp sheet at mid-point.

Caution: Do not use this method where wind may blow the material out of control, especially at heights.



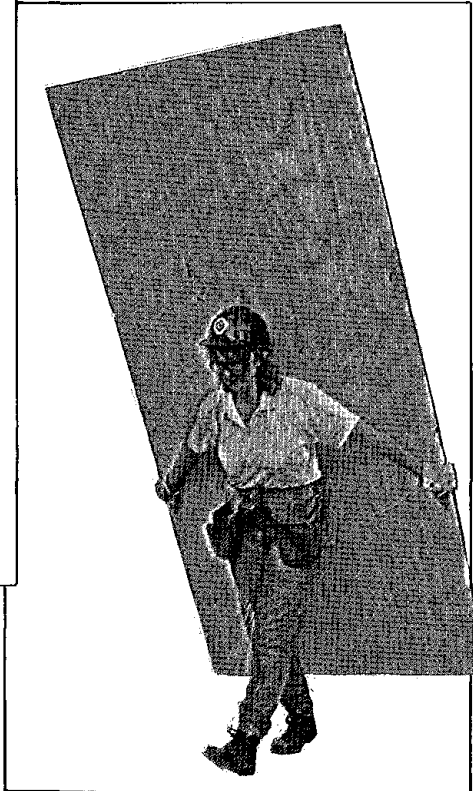
Tip sheet up to horizontal position.



Stand sheet to vertical position.

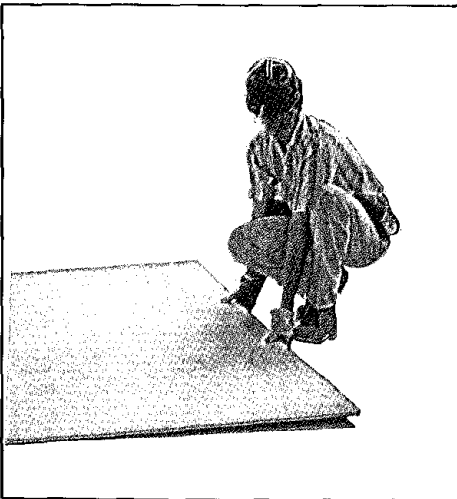


With back to sheet, bend your knees and place hands on either side of sheet.



Carry sheet, keeping back as upright as possible.

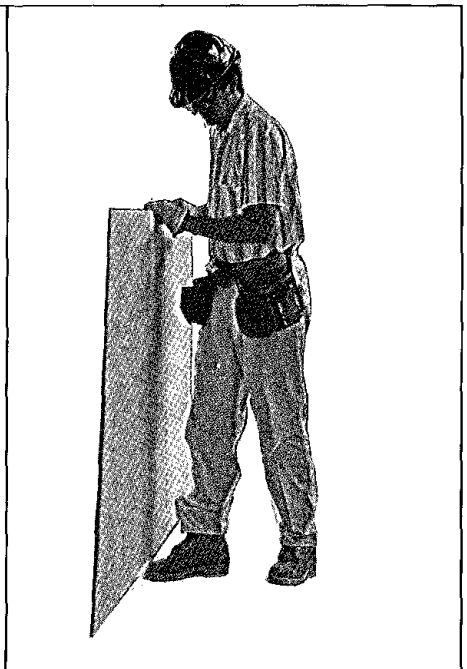
Method 2



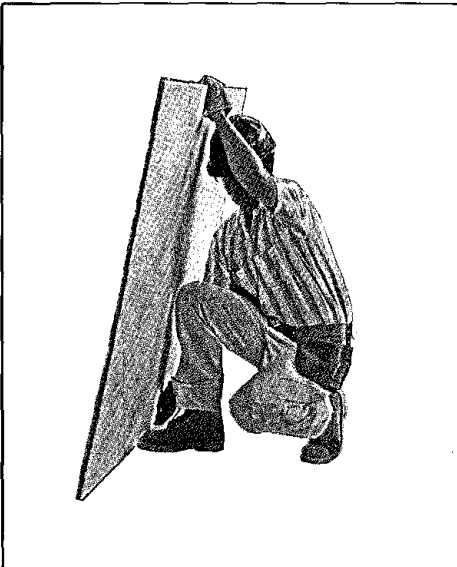
Bend knees, keeping back as upright as possible, and grasp sheet at mid-point.



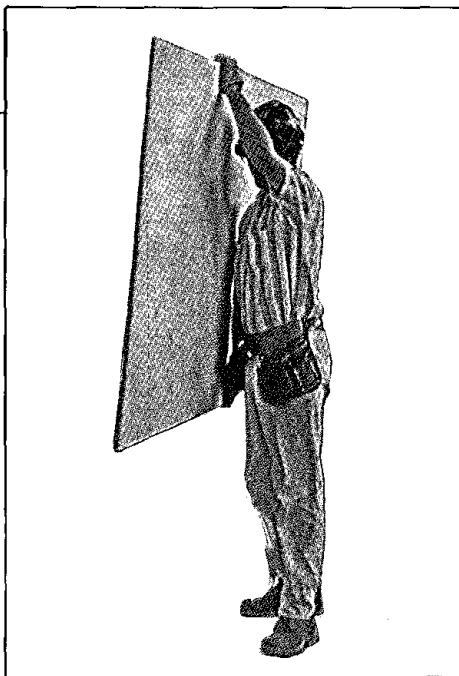
Tip sheet up to horizontal position.



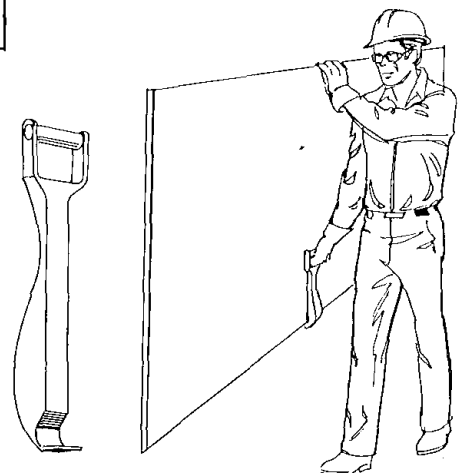
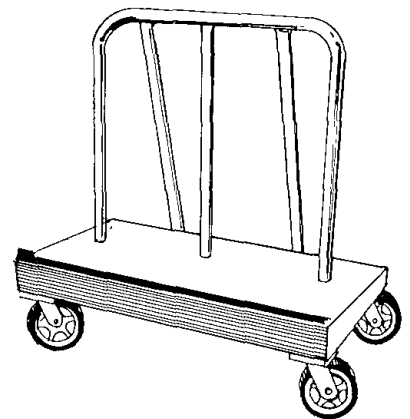
Lift sheet slightly and put toe under mid-point.



Bend at knees, keeping back upright. Slip free hand under sheet.



Stand and lift, maintaining the normal curve in your low back.



For long carries of sheet material, use a carrying handle. Better yet, if walking surface is smooth and hard, use a drywall cart.

Lifting by Two Persons

Lifters should be of similar height to distribute the load evenly. Before starting, they should plan their lifting strategy and decide who will take charge.



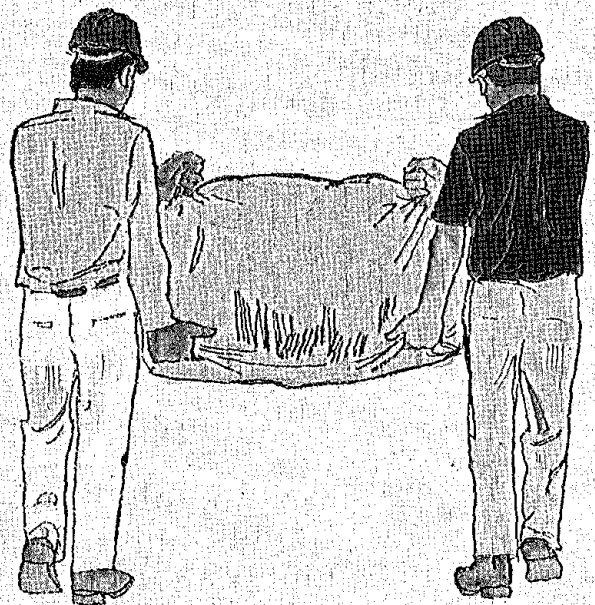
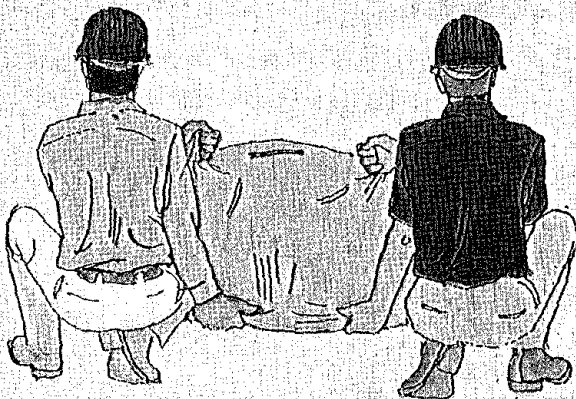
Long Load

For a long load, the lifter who takes charge must see that each person carries the load on the same side and that the person in front has a clear view ahead.

- Lift load from ground to waist height.
- Lift load from waist to shoulder height.
- When carrying long, flexible loads such as rebar, walk out of step to avoid excessive bounce.

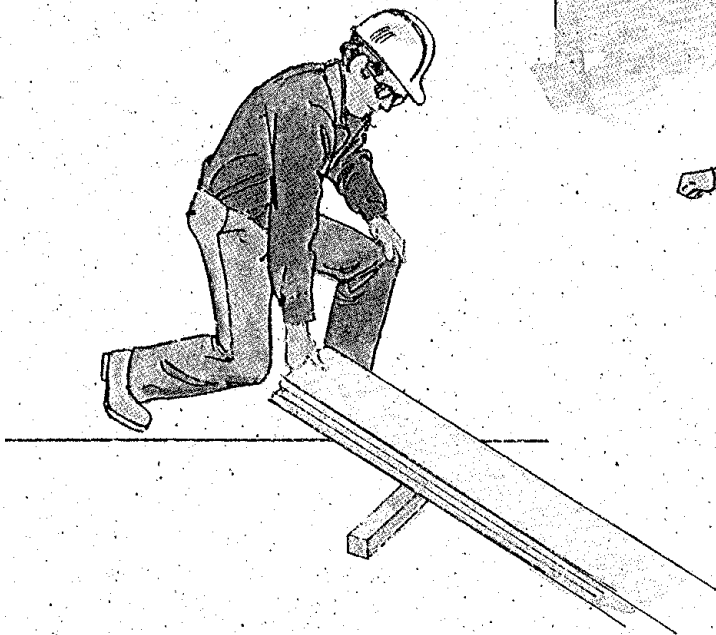
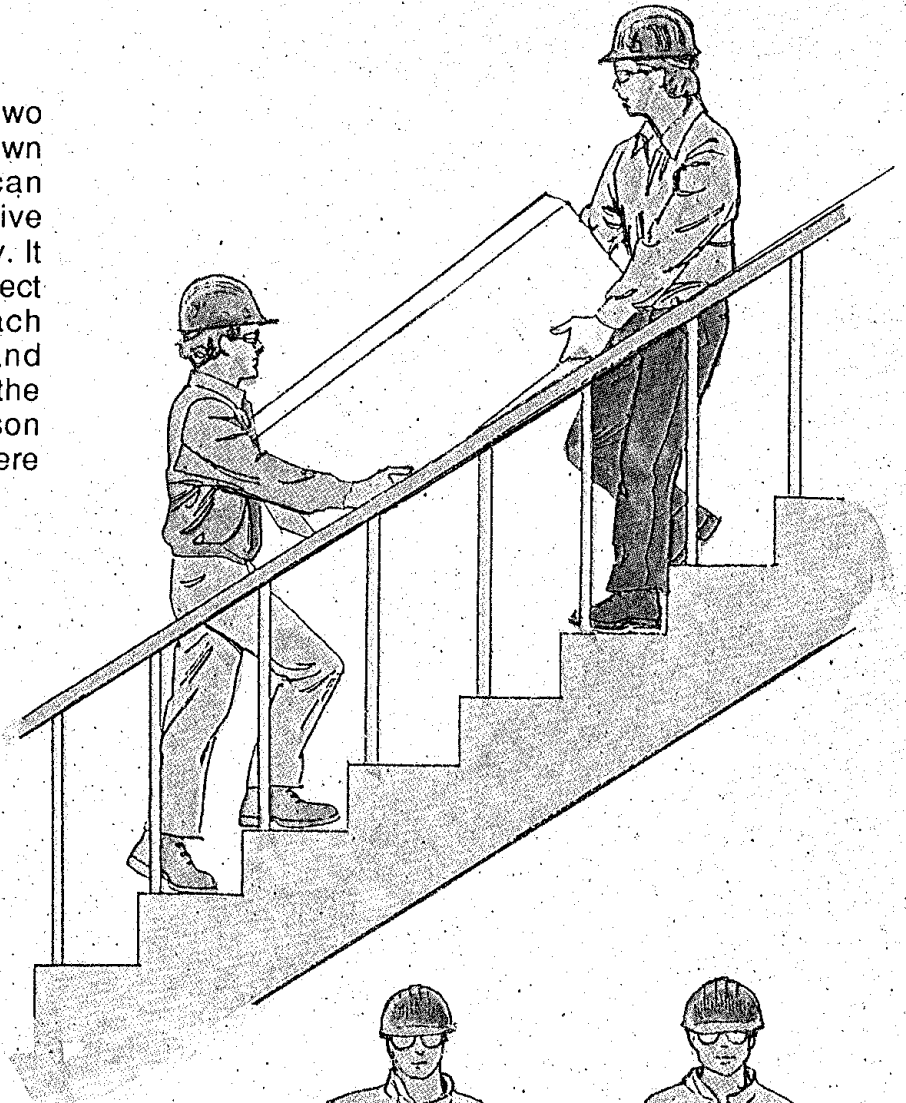
Sacks

- Grasp bottom corner with one hand, upper corner with other.
- Lift, using your legs to do the work and maintaining the curve in your back.



Up and Down Stairs

Care must be taken when two people carry a load up or down stairs. Improper carrying can subject the spine to excessive forces which may lead to injury. It is essential to maintain the correct pelvic tilt. Use your stomach muscles to help support and protect your back. If possible, the tallest and/or strongest person should be at the **bottom**, where the load is heaviest.



Lifting with Support

Supporting yourself by placing one hand on a secure object or on your thigh can reduce stress on your spine and knees.



Balancing a Load

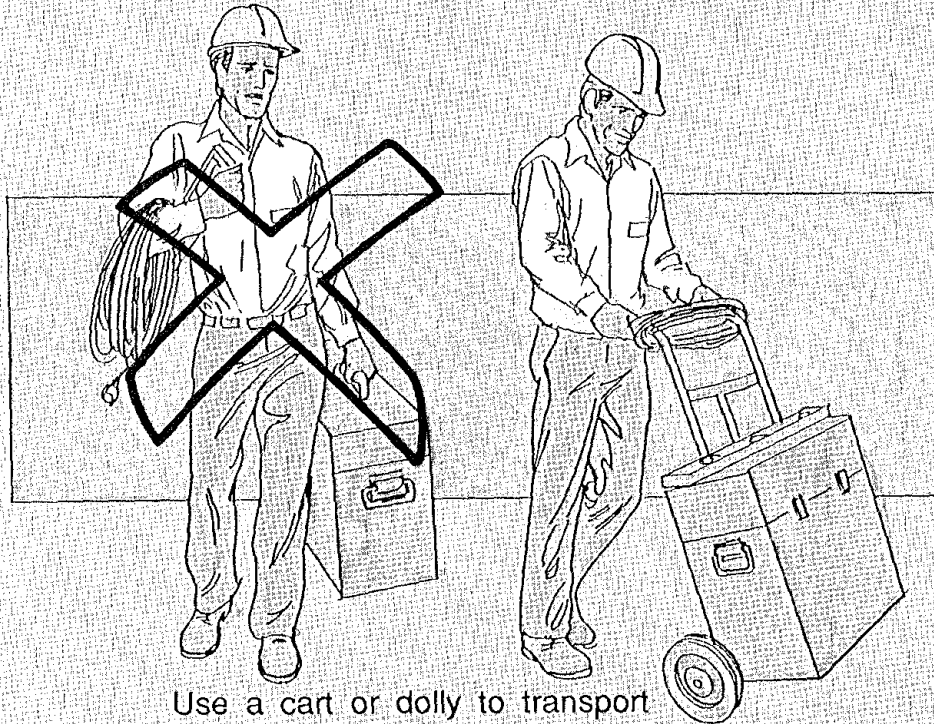
Any activity that unevenly loads the spine may aggravate your back. Avoid one-handed carrying if possible. Try to distribute the weight evenly on each side. If you can't avoid one-handed carrying, such as with a single pail, hold the free arm either straight out or on your hip as a counterbalance.

Materials Handling Equipment

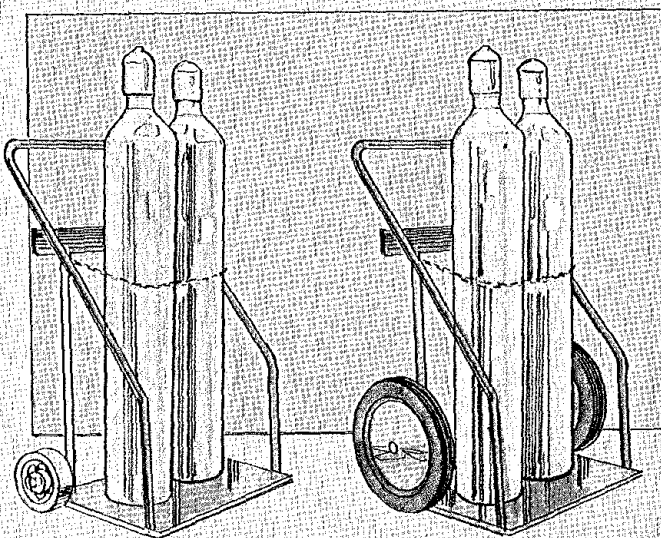
Different types of equipment have been designed and manufactured to lift and move loads of various shapes, sizes, and weights. This equipment can not only save time and labour—it can save your back.

Rollers, wheelbarrows, carts, dollies, and rolling tables and scaffolds can be used to handle material efficiently and reduce the risk of back injury.

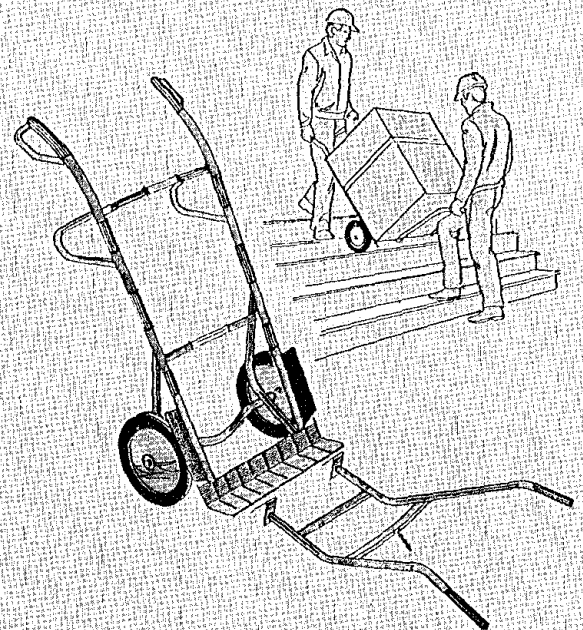
Some devices can be assembled on the job from components for frame or tube-and-clamp scaffolding.



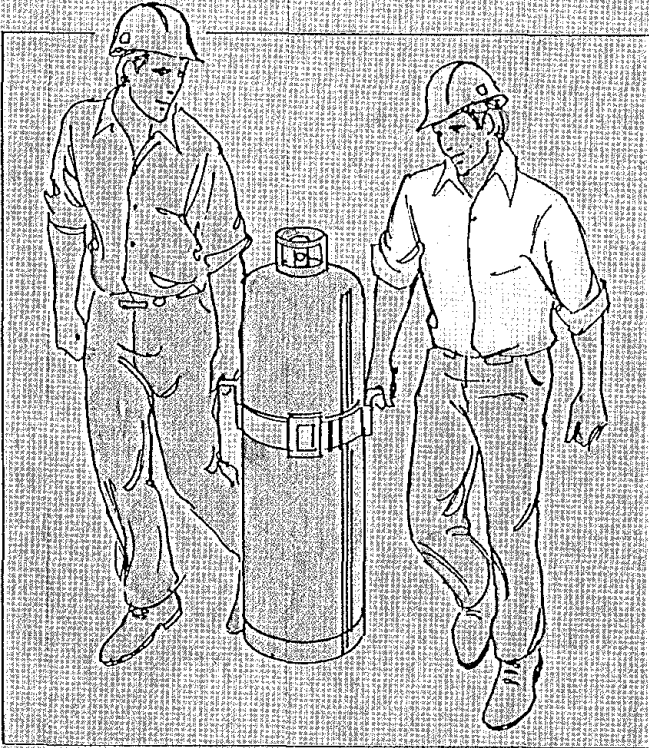
Use a cart or dolly to transport tools and equipment wherever possible.



The cart with larger wheels allows easier movement up stairs and over rough terrain.



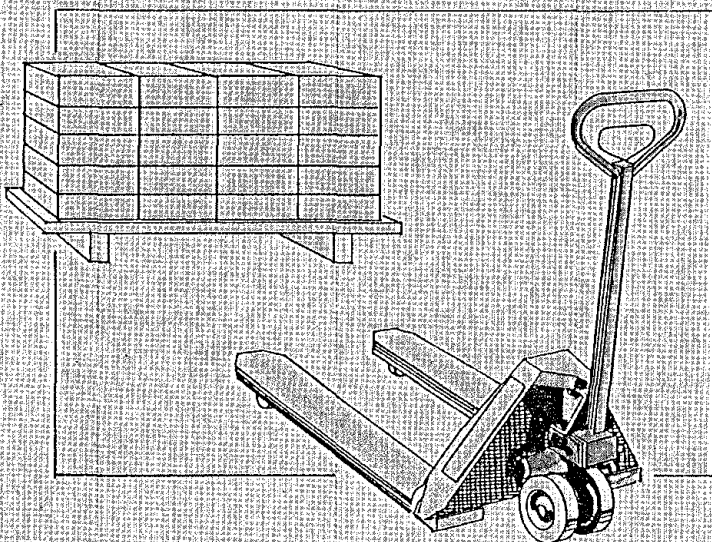
Some carts are designed for use by two people.



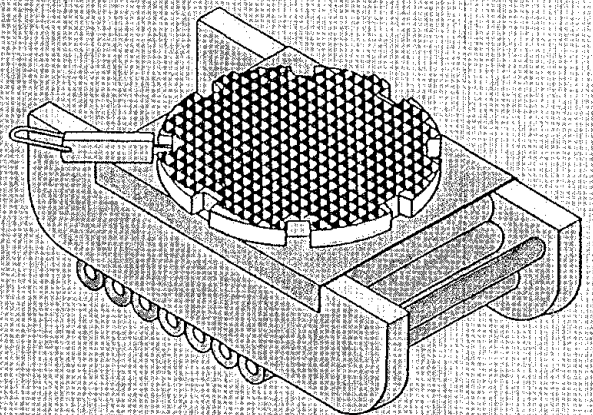
If conditions prohibit the use of carts, lifting straps can help prevent injuries by giving a better grip on awkward loads.



Wheelbarrows with dual wheels are a great improvement over those with single wheels. Better balance and flotation make wheeling easier on the back.

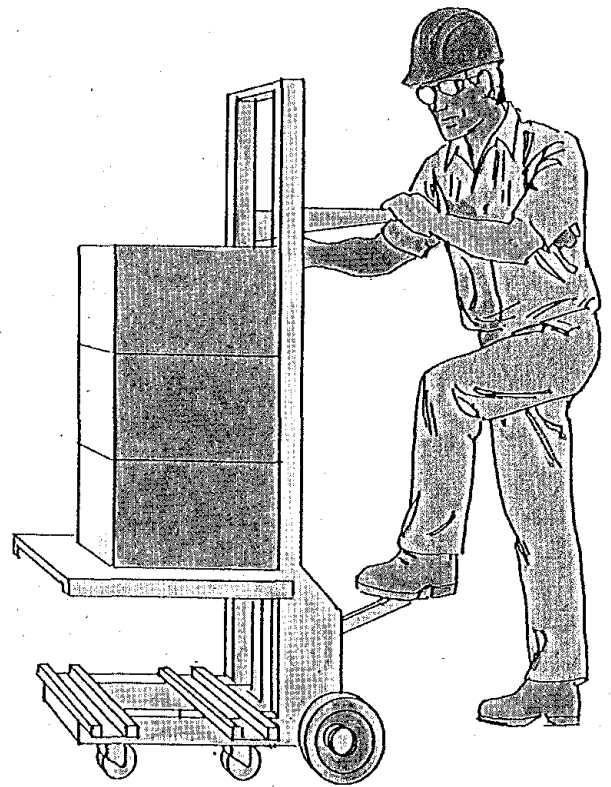
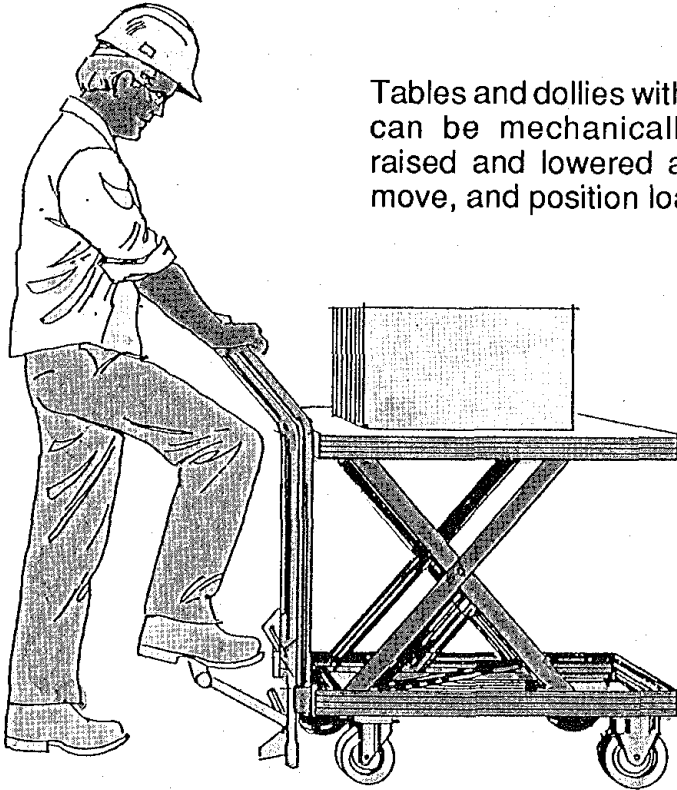


Consider using pallets where surface conditions allow.



Rollers are often used for moving heavy machinery. Light-duty rollers are available for manually moving lighter loads, pallets, and similar platforms or bases.

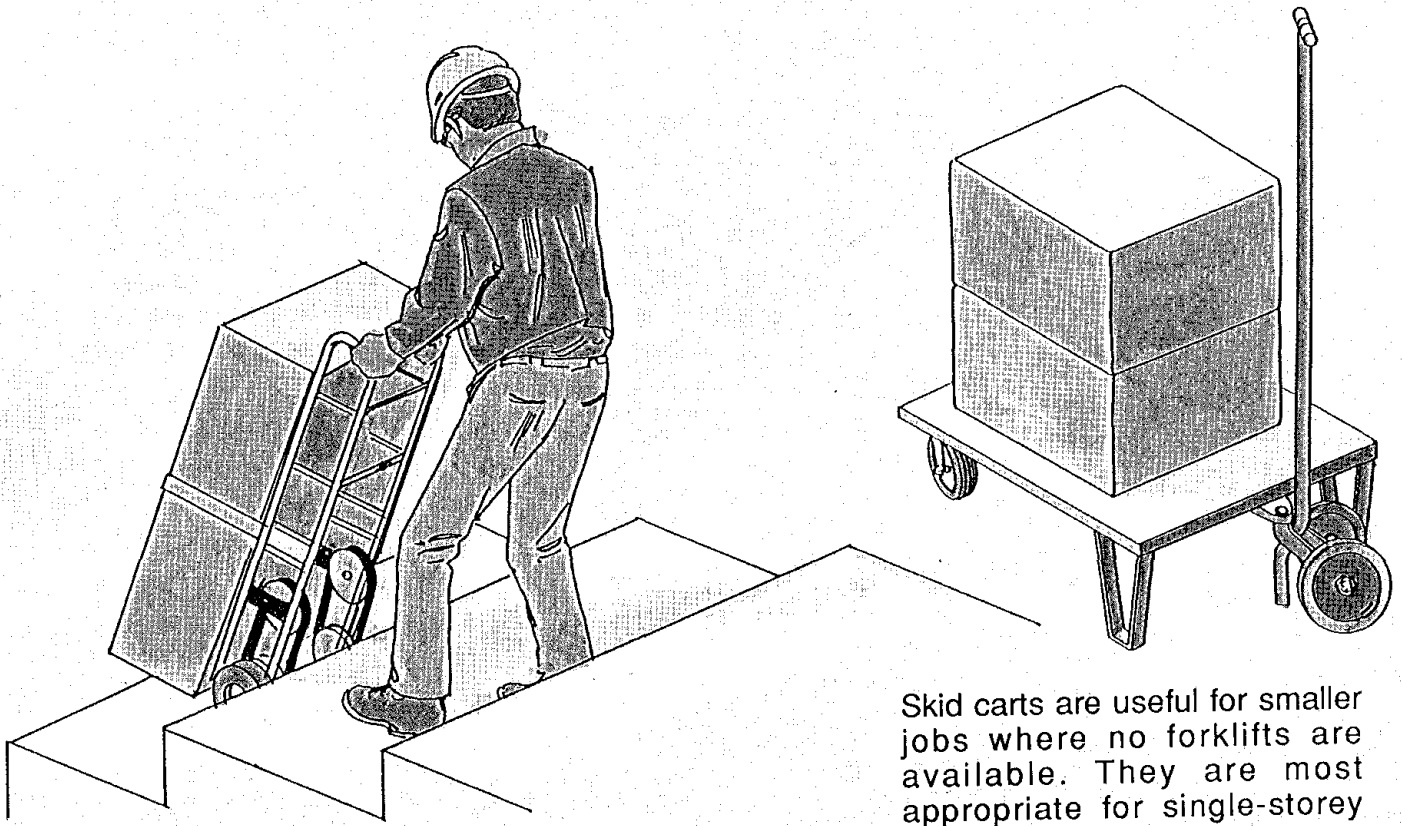
Tables and dollies with tops and forks that can be mechanically or hydraulically raised and lowered are one way to lift, move, and position loads effectively.



Manual forklifts with casters can lift and carry light pallet loads. They can also lift loads to a height of several feet.

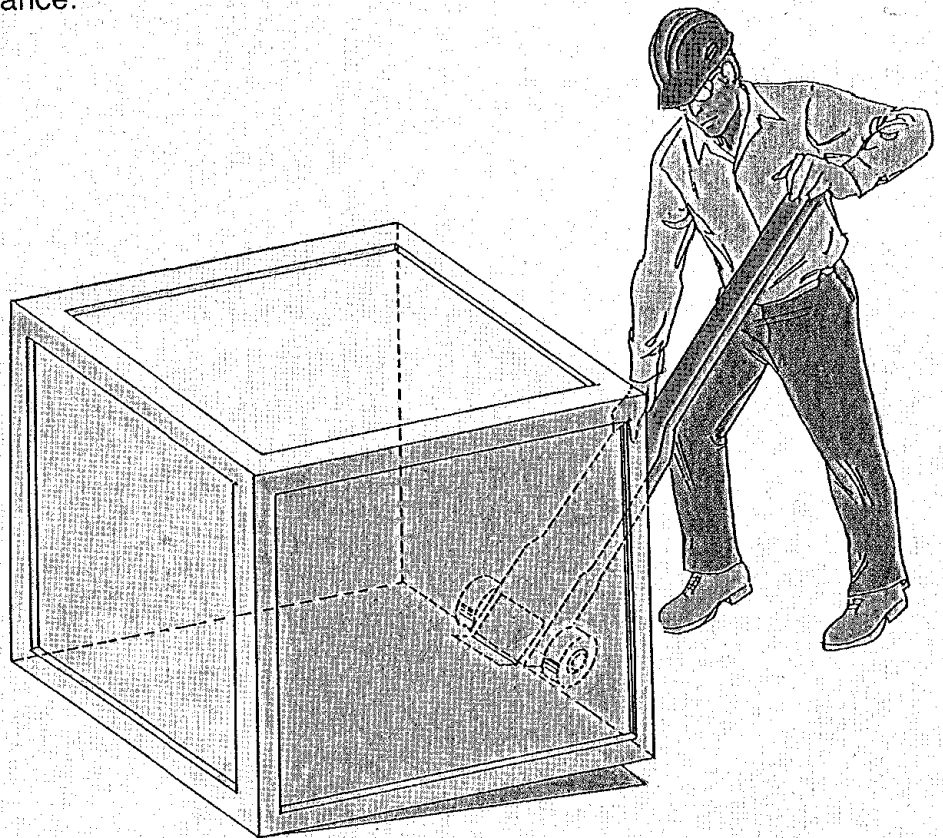


Drum handlers make the movement of drums or barrels much easier.

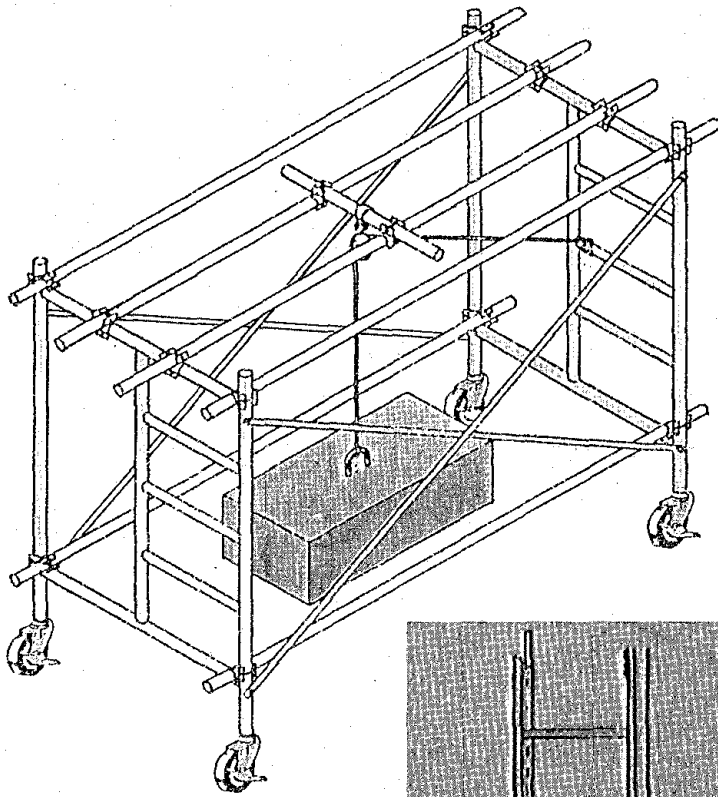


Skid carts are useful for smaller jobs where no forklifts are available. They are most appropriate for single-storey work once concrete floors are poured.

Appliance trucks with stair climbers may be useful for some operations such as mechanical maintenance.

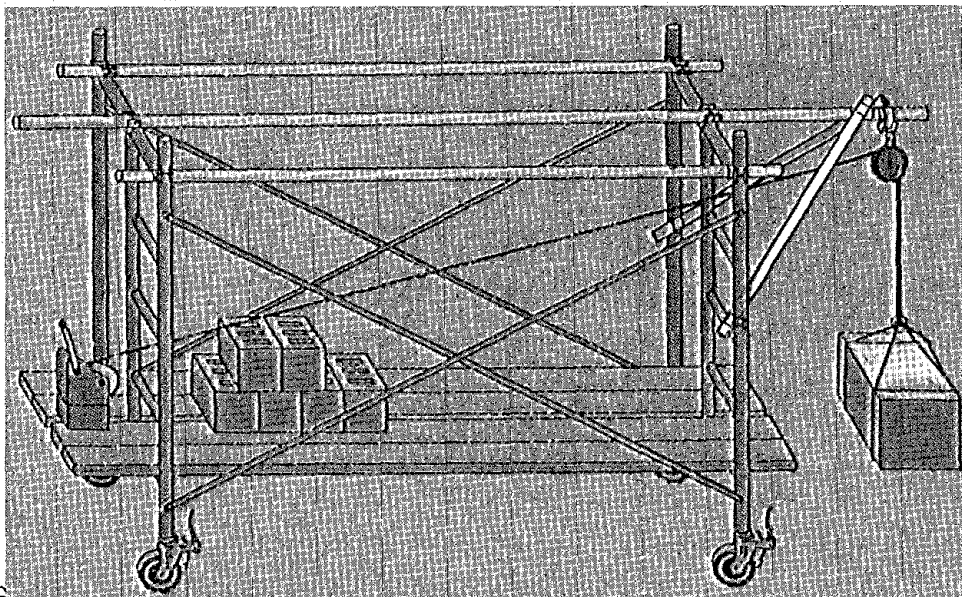
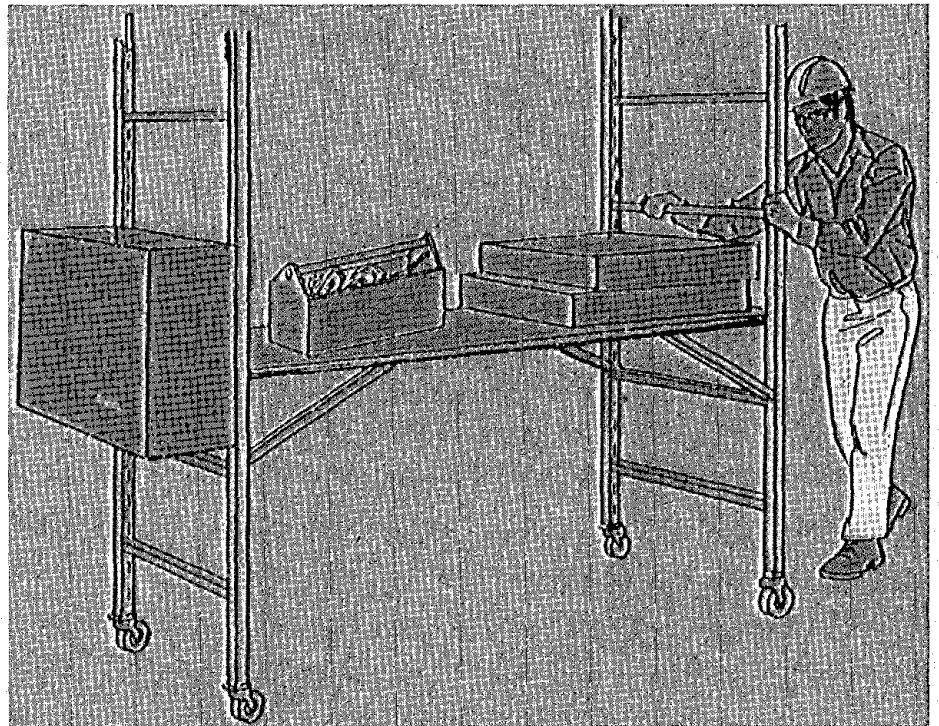


Pry dollies can be used to shift and adjust the position of heavy boxes or machinery. They are not designed to transport loads.

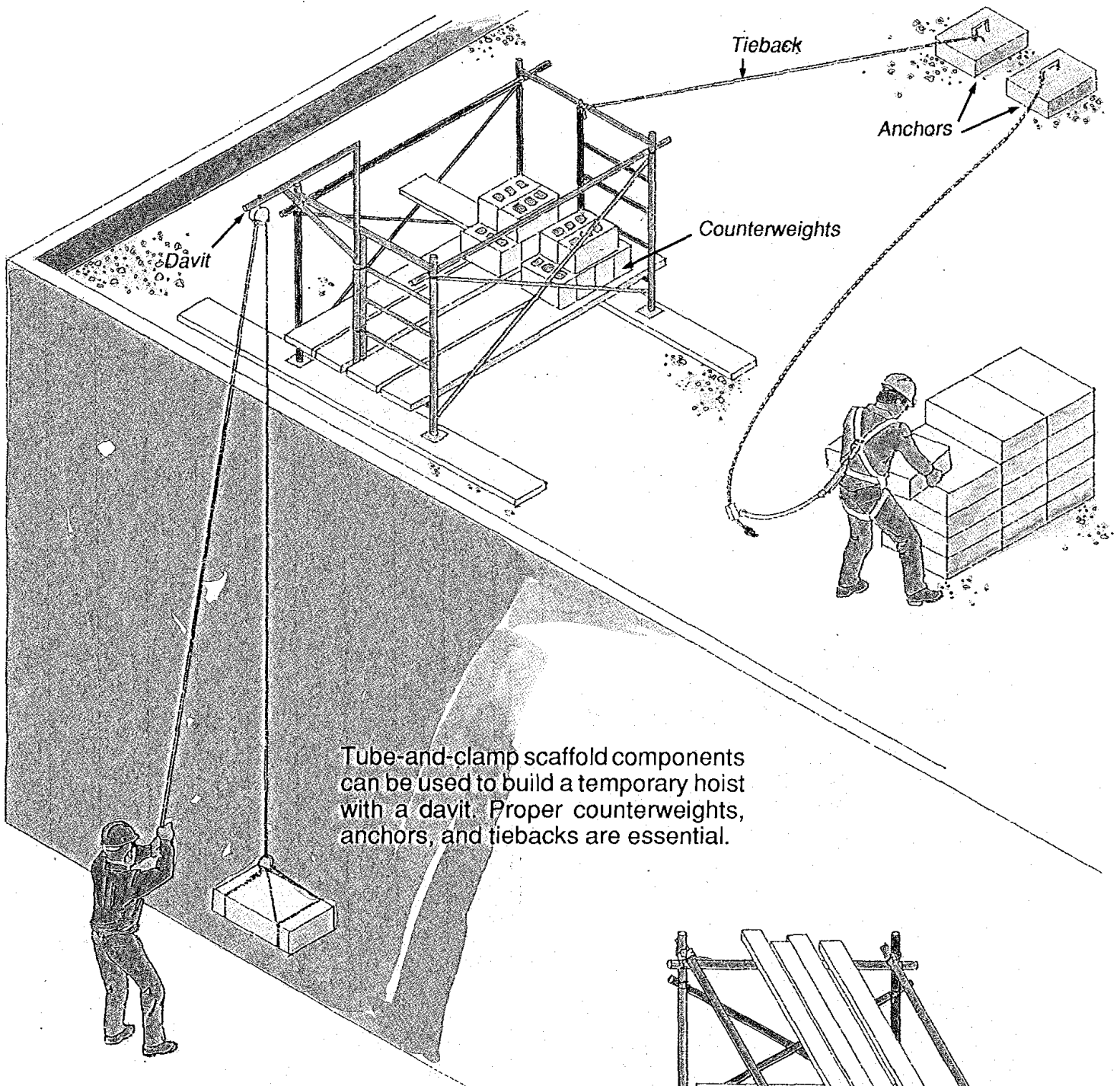


Rolling frame scaffolds with a few tube-and-clamp components may be useful for moving heavy objects such as motors or drives where other devices such as forklifts are not available.

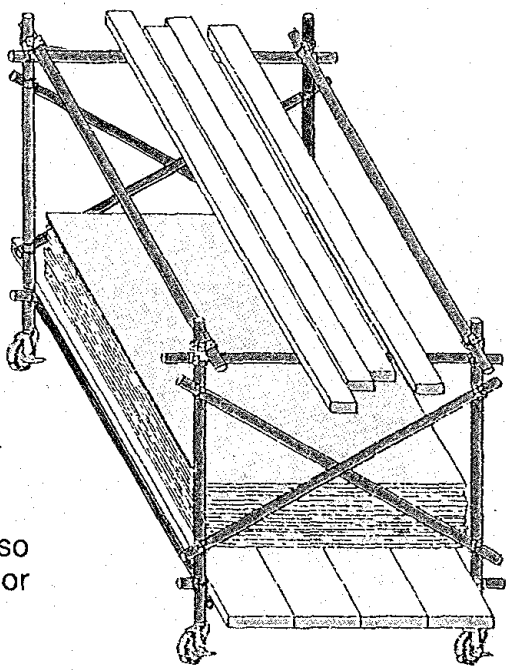
A small rolling scaffold can be used to transport tools and materials.



Scaffold frames combined with tube-and-clamp components, casters, and a small boat winch have many uses in moving and lifting.



Tube-and-clamp scaffold components can be used to build a temporary hoist with a davit. Proper counterweights, anchors, and tiebacks are essential.



Tube-and-clamp components and scaffold casters can also be used to build a temporary dolly for moving long, loose, or awkward loads.

Hoisting or Moving Heavy Loads

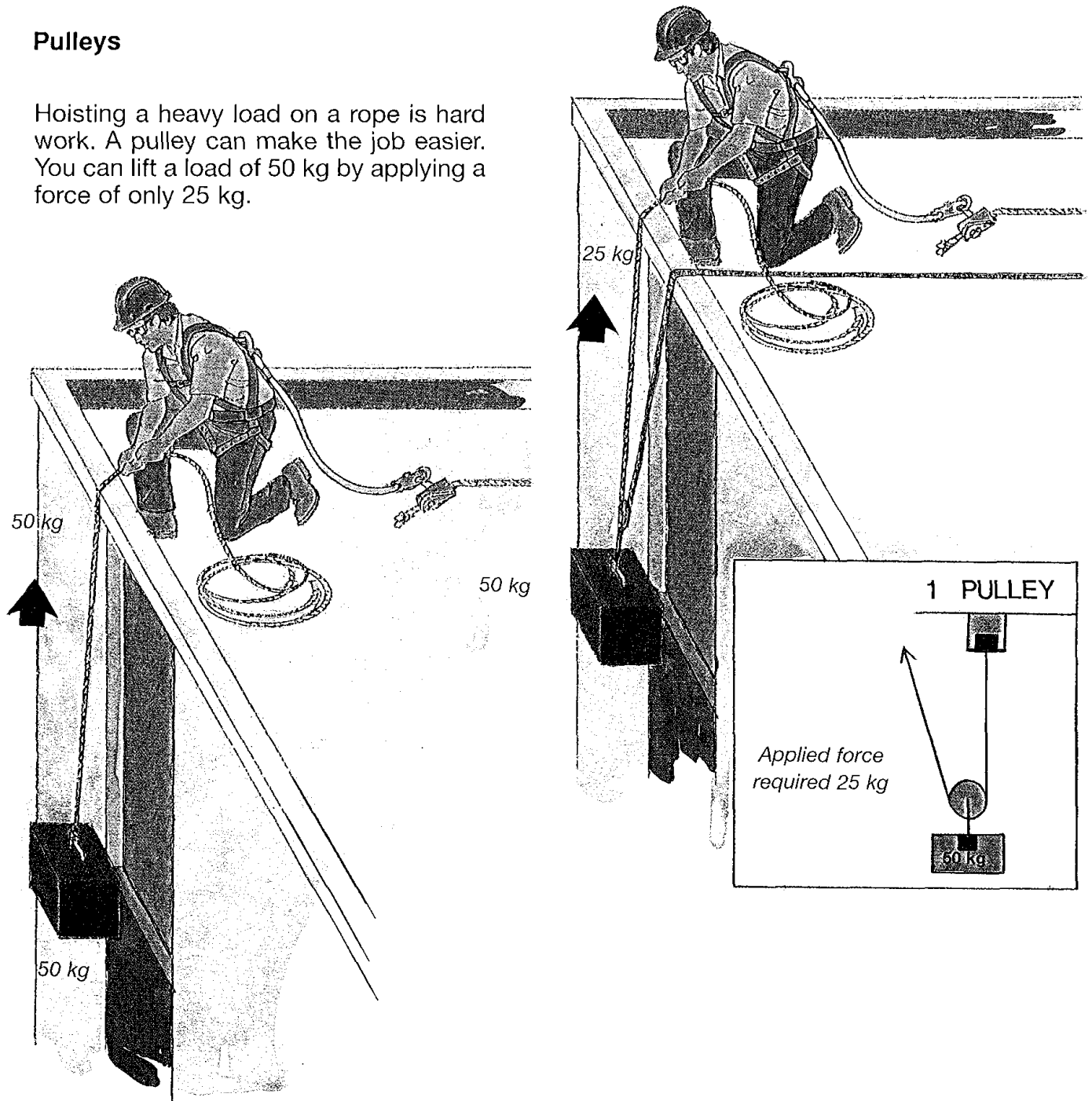
Special equipment is often required to hoist or move heavy loads manually.

Devices from simple levers and rollers to more complicated chain hoists and derricks can handle loads that would otherwise be difficult to move.

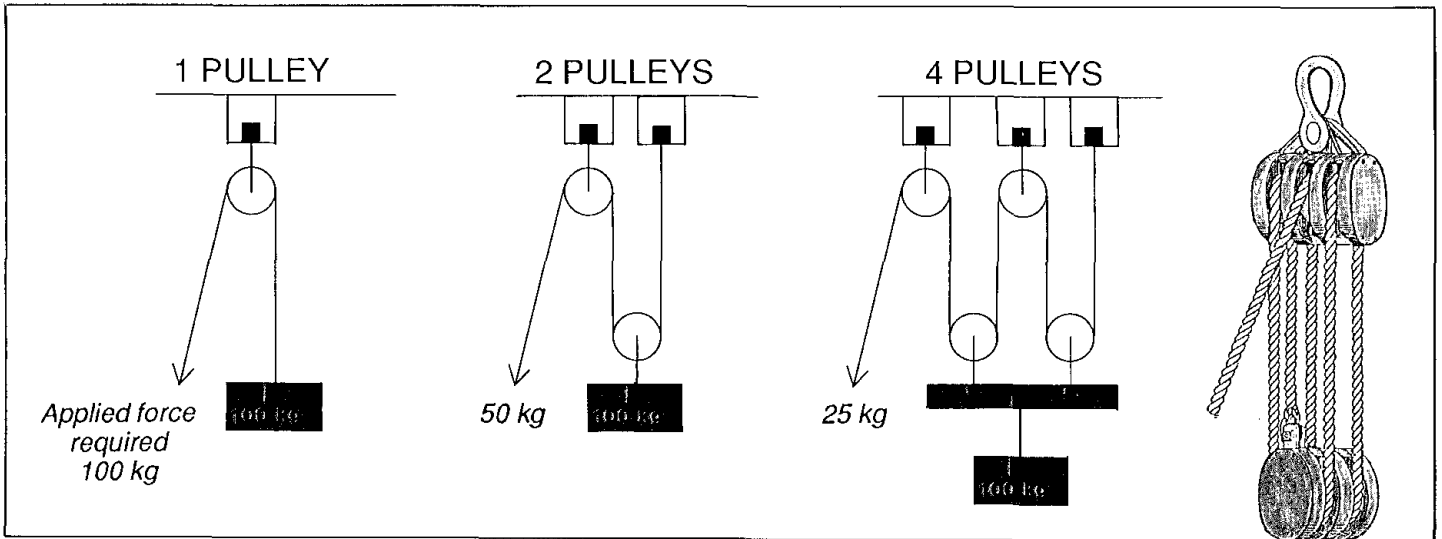
The mechanical advantage afforded by this equipment reduces the manual effort involved as well as the risk of back injury.

Pulleys

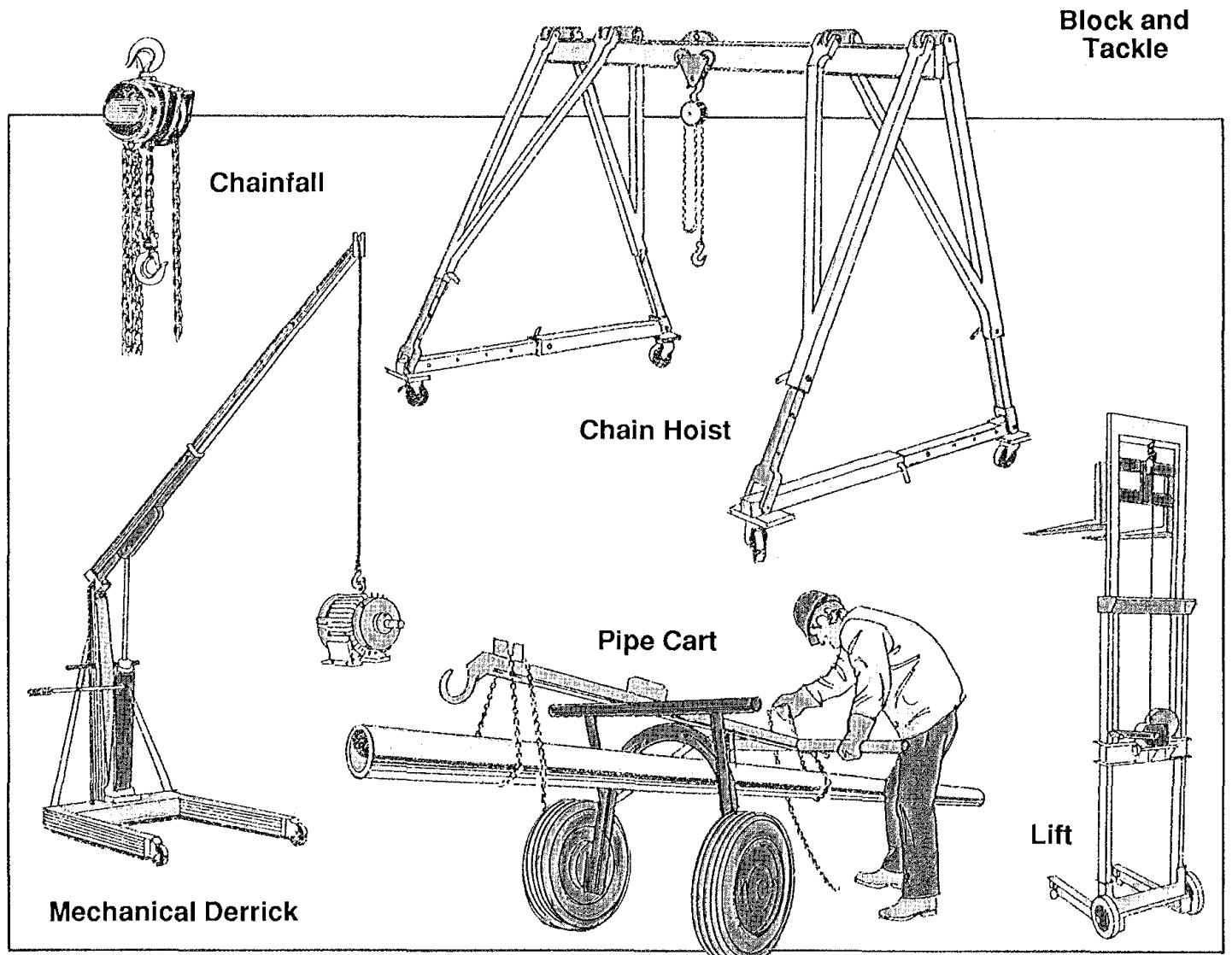
Hoisting a heavy load on a rope is hard work. A pulley can make the job easier. You can lift a load of 50 kg by applying a force of only 25 kg.



Pulleys combined in block and tackle can further reduce the applied force necessary to lift a load. Consider a load of 100 kg.

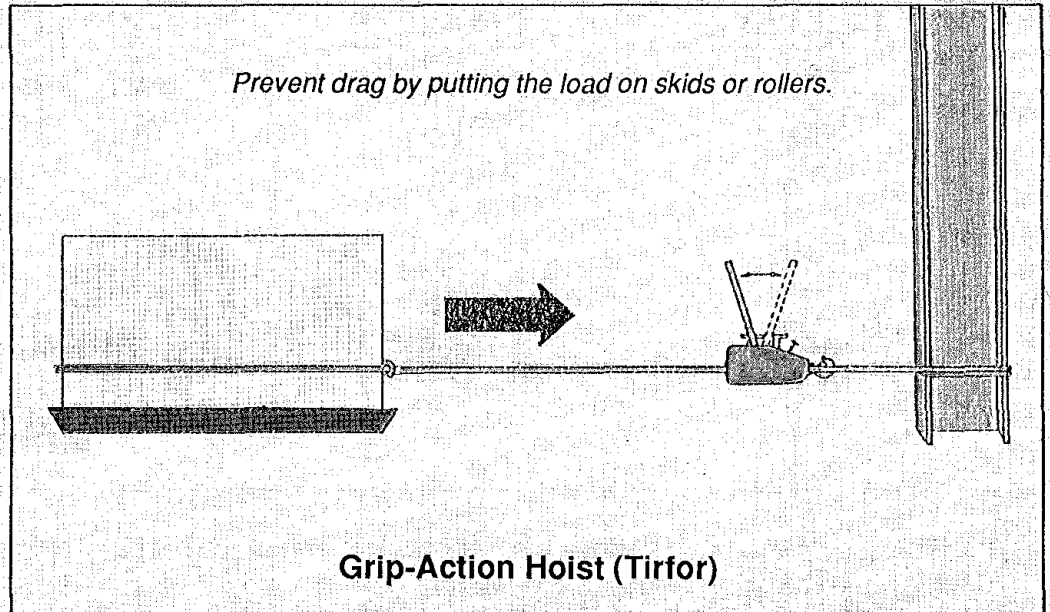
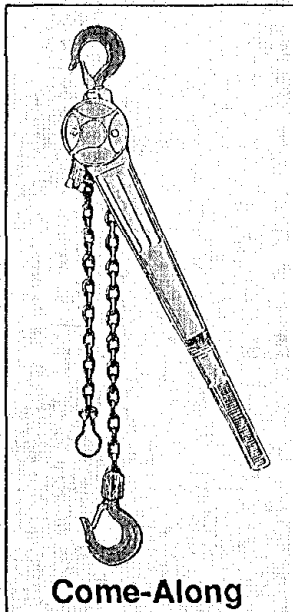


Besides block and tackle, there are a number of inexpensive hand-operated devices which make hoisting and moving easier.



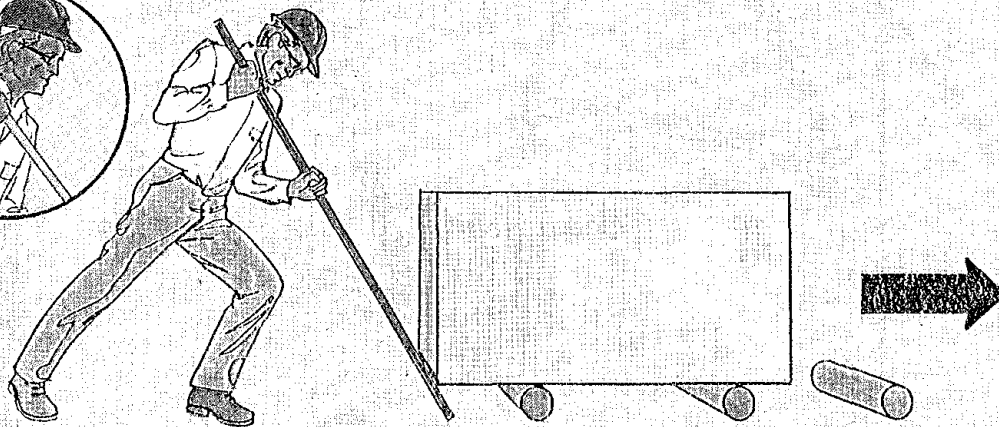
Come-Alongs and Grip-Action Hoists

Come-alongs and grip-action hoists (tirfors) can move objects weighing several tons over short distances.

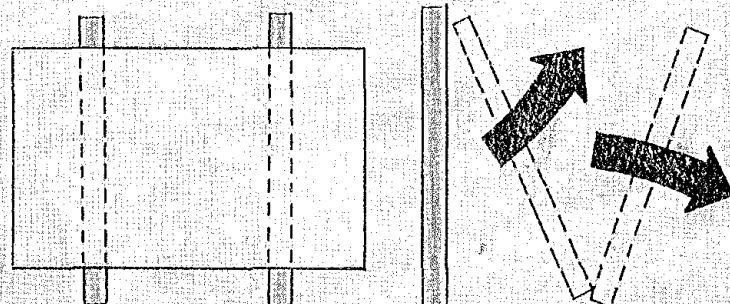


Rollers

To move heavy loads over even surfaces, lengths of steel pipe can be placed in front of the load and taken out from behind as the load moves along. A solid lever can be used to move the load over short distances.



Look up periodically at path ahead



Set rollers on an angle to turn left or right.

Lever

Whether used with or without a fulcrum block, levers give you a mechanical advantage in moving or raising heavy objects.

In Figure 1 the lever is used without a fulcrum block. It can raise a heavy load or move it horizontally. Note that force is applied up.

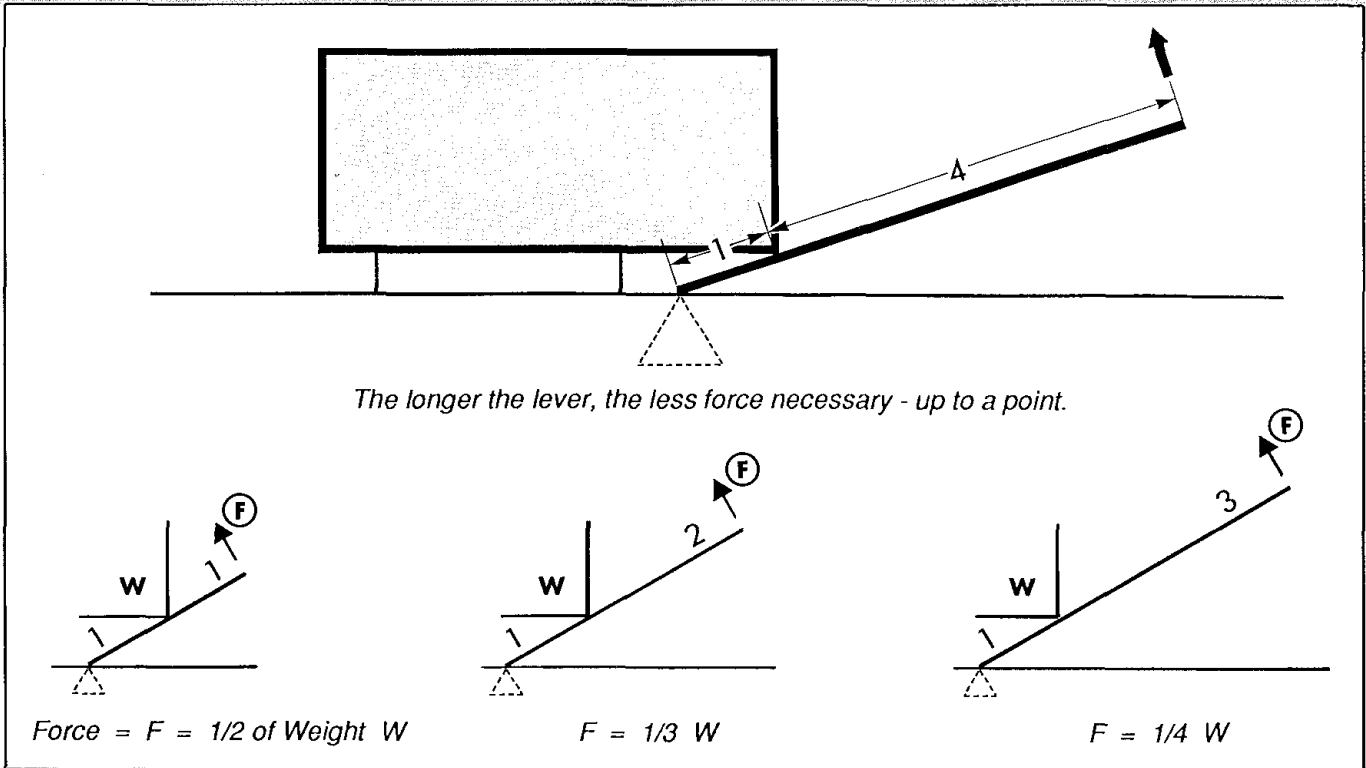


Figure 1

In Figure 2 the lever is used with a fulcrum block. It can raise objects too heavy to be lifted manually. Note that force is applied down.

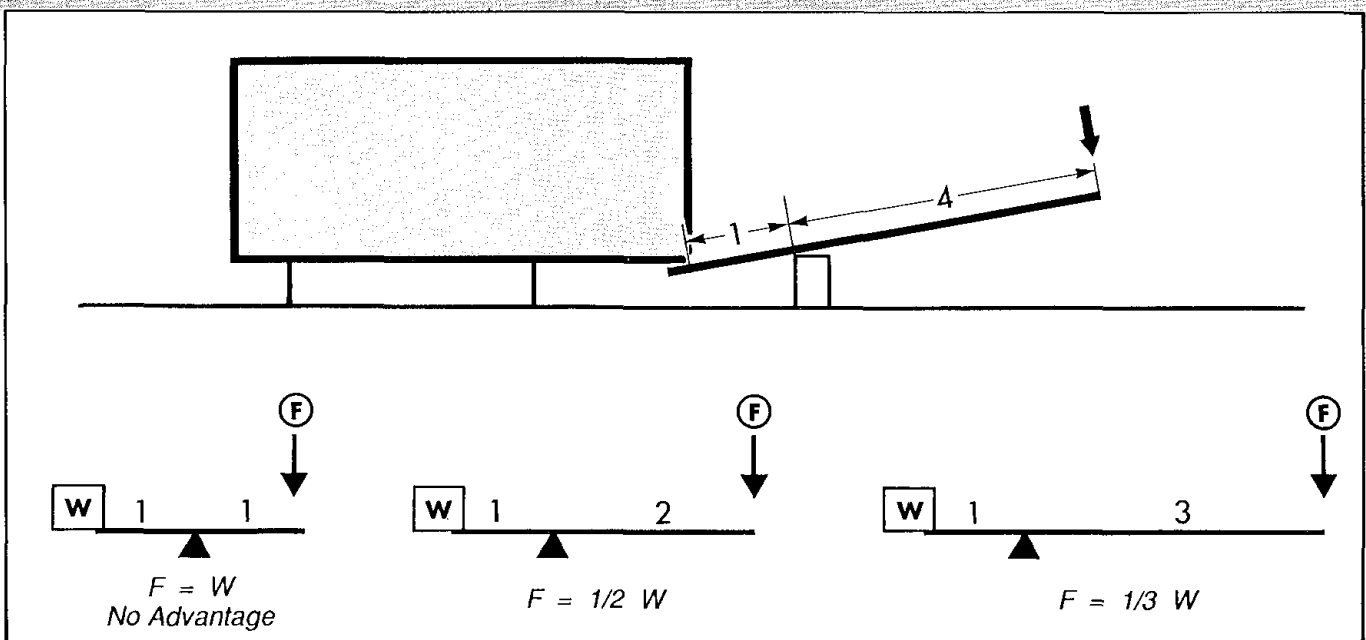
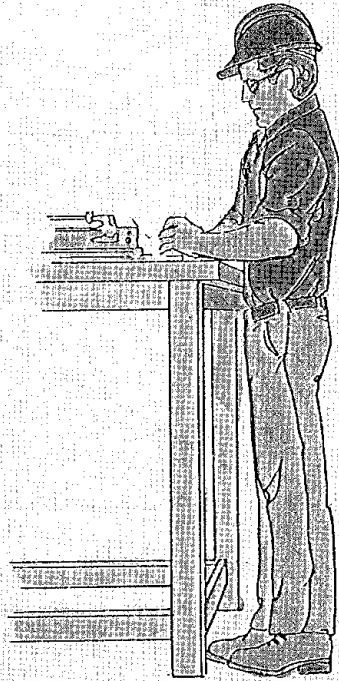


Figure 2

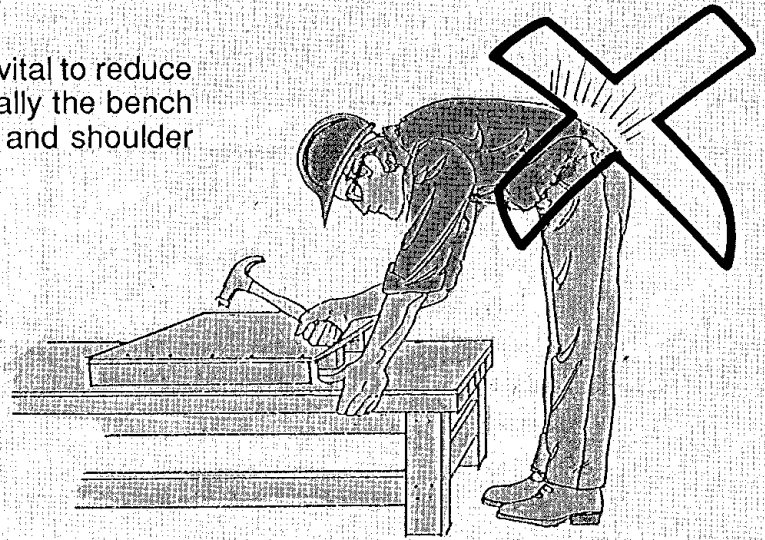
Work Techniques

Benches

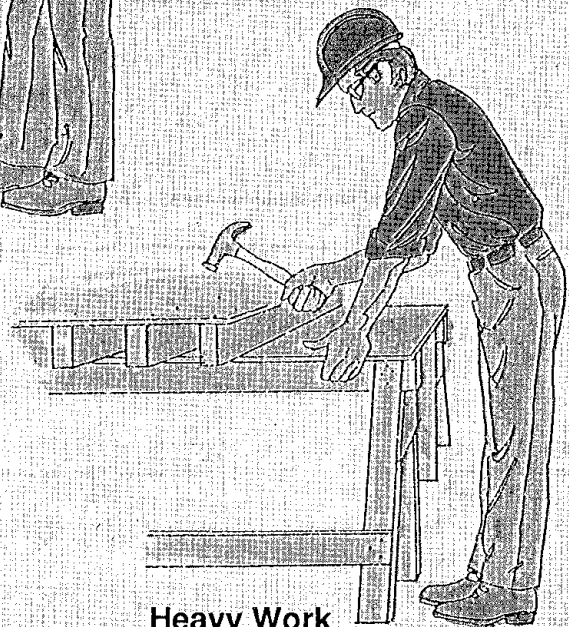
For bench work the right height is vital to reduce the risk of back injury or pain. Ideally the bench should keep work between waist and shoulder height.



Precision Work



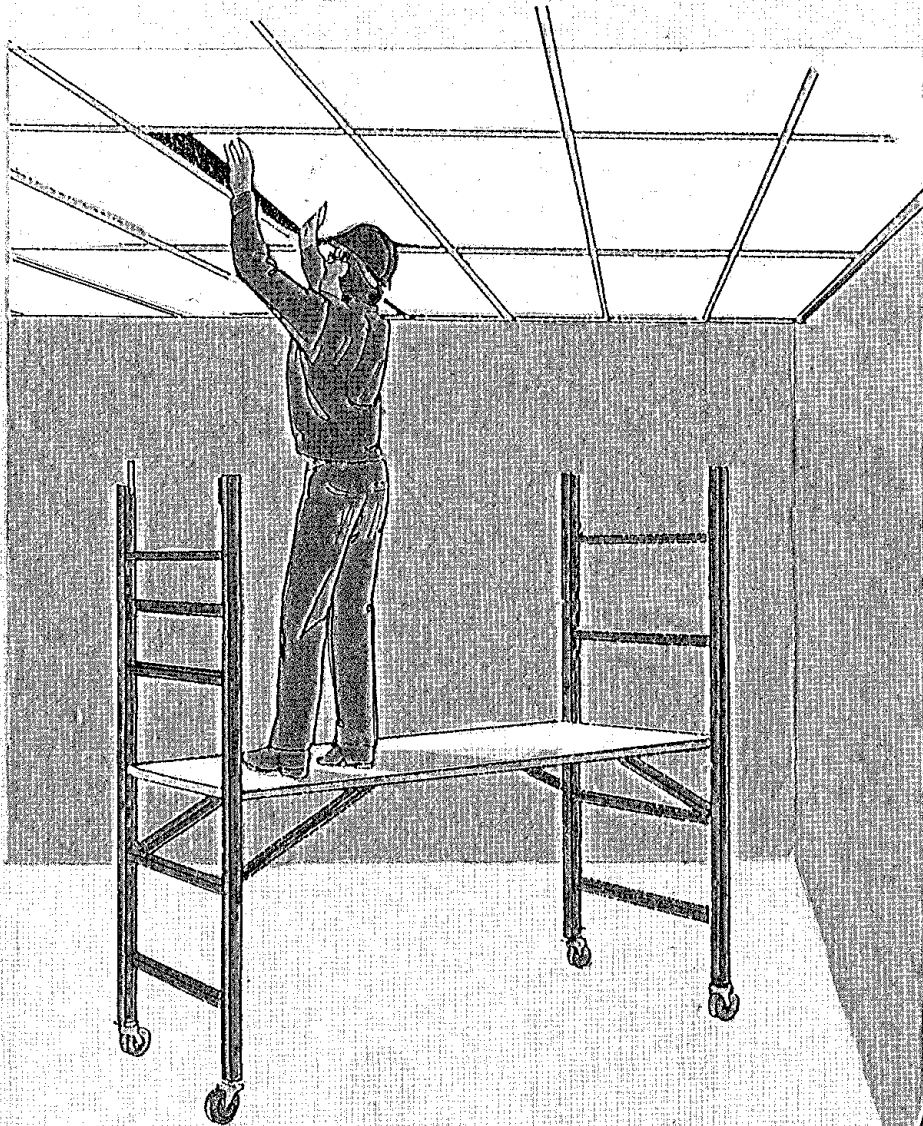
Light Work



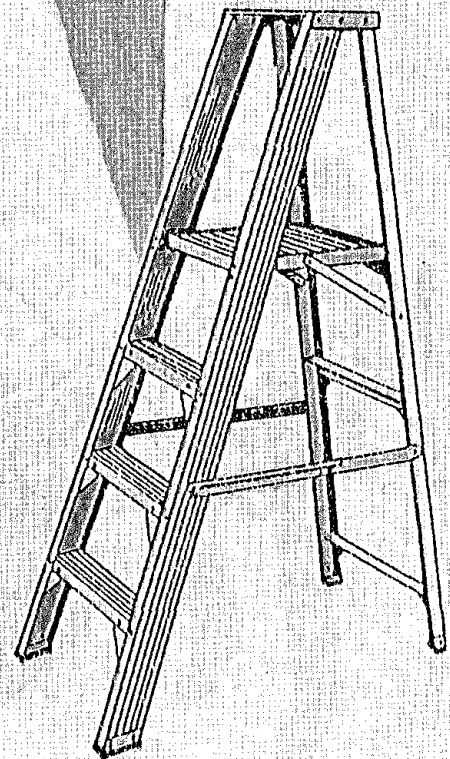
Heavy Work

Work Platforms and Ladders

For long-term work overhead or at heights, use scaffolds, scissor lifts, or other work platforms rather than ladders.

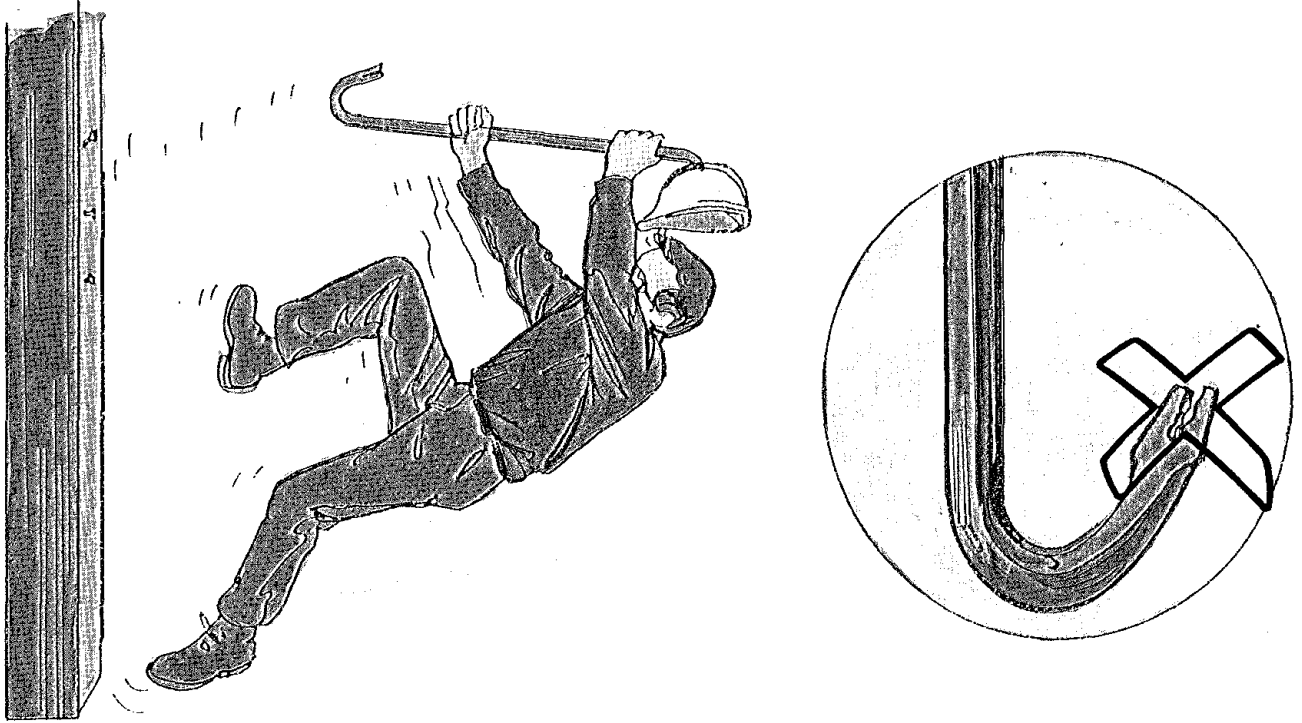


When it is necessary to work from a ladder, use a ladder with wide comfortable treads or, even better, a ladder with a platform you can stand on.

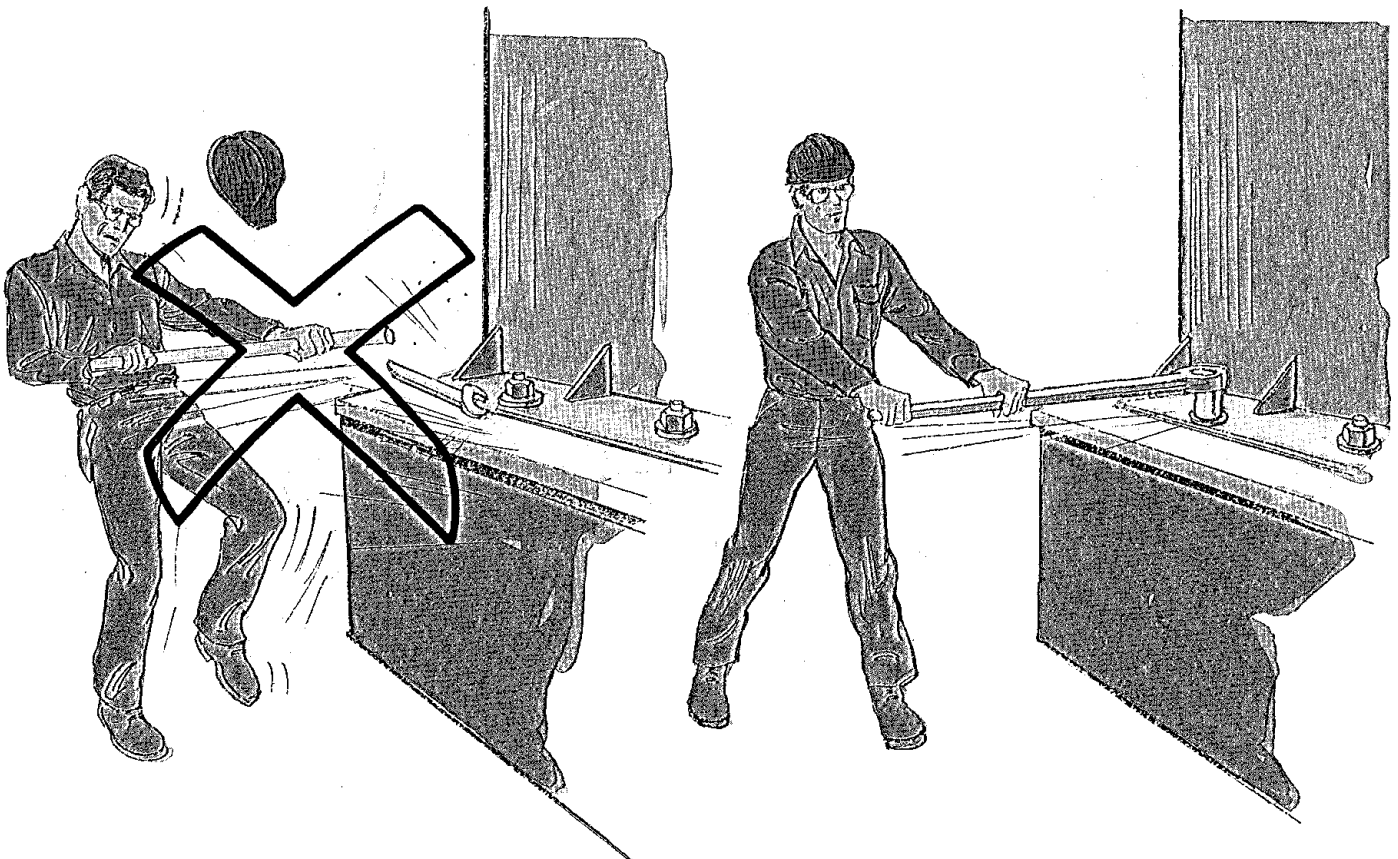


Tools

Choose the proper tools for the job and repair or discard badly worn or damaged tools.



Never use cheater bars for extra leverage on a wrench. Use the right length of wrench.



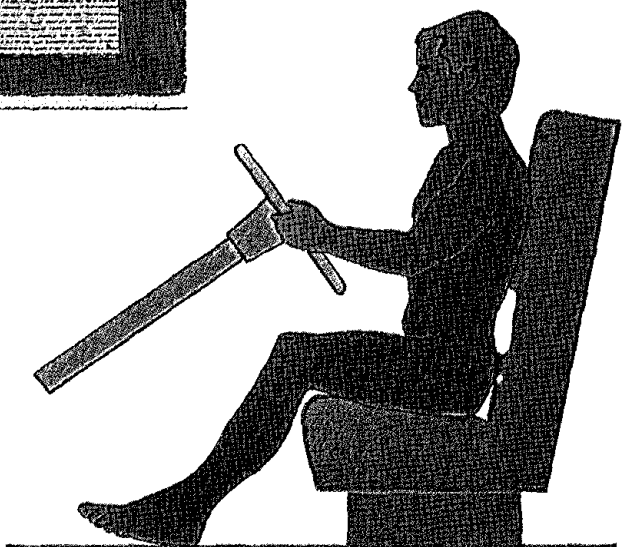
Heavy Equipment

People who operate heavy equipment over the rough terrain of construction sites are prone to low back problems. Constant and often violent bouncing in the seat can compress and injure discs and spinal joints.

Sitting tends to flatten the curve in your lower back and put pressure on your discs.

Practice good sitting posture by maintaining the natural curve in your lower back. If necessary, use a roll or cushion between your back and the seat.

Avoid sitting in one position for long periods. Change position by arching your back to reduce muscle tension.

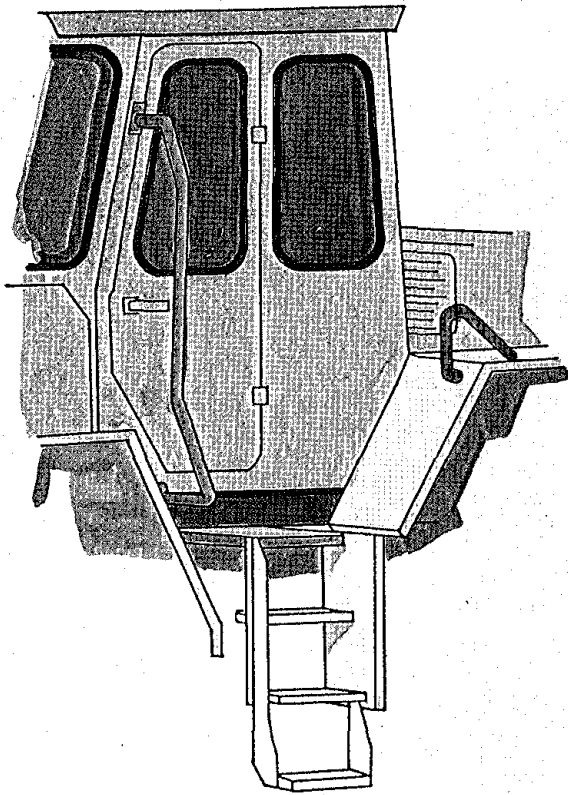


Vibration-absorbing seats are recommended.

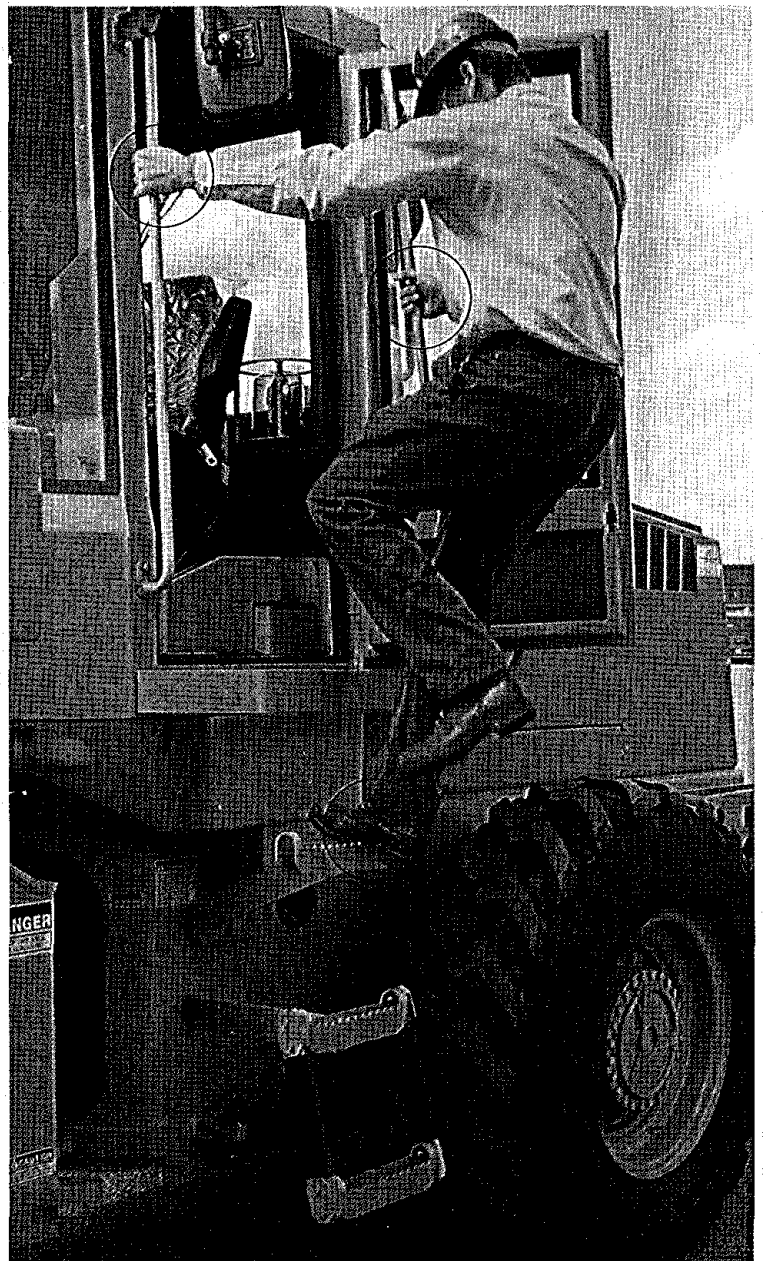
Operators and mechanics working on heavy equipment should dismount safely. Never jump down from equipment. This causes shock loads on the spine and can lead to injury.

Proper access facilities such as slip-resistant steps and grabrails should be installed on heavy equipment to help operators mount and dismount safely.

Always face the ladder or access equipment and use 3-point contact when climbing up or down. That means two hands and one foot or two feet and one hand must be on the equipment at all times.



Access Steps and Rails



3-Point Contact

Exercise Program

To protect your spine, the muscles supporting your back must be both strong and flexible.

Construction work strengthens some muscles while others that are not being used become shorter and weaker, creating a muscle imbalance. A regular exercise program can help to keep muscles balanced and reduce the risk of lower back injury.

A good exercise program should include both stretching and strengthening exercises. The three essentials are

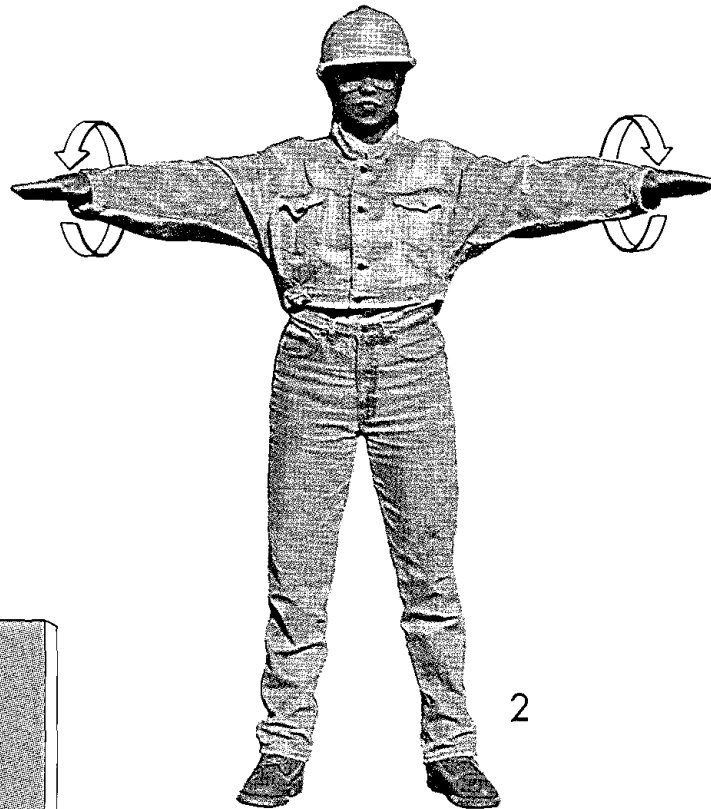
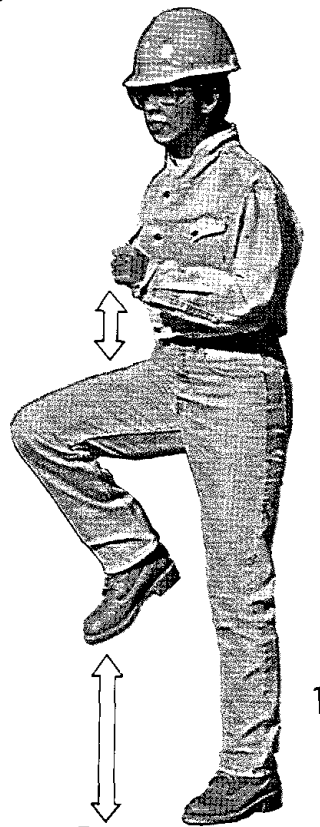
1. warmup
2. workout
3. cooldown.

Remember—check with your doctor before starting any exercise program.

Disregard the old maxim “no pain—no gain.” Your muscles can be brought to excellent condition by using a sensible and slow approach. If an exercise causes pain, don't do it. With a new exercise program, however, temporary muscle ache is normal and may be expected.

A pre-work stretching program is highly recommended. Warming up prepares your body for the physical work ahead and helps minimize the risk of injury.

Spending 5-10 minutes a day on back exercises can help make a significant difference in how good your back feels and how well you function during the day.



Before You Start Work

Exercises

This is a general exercise program only. Before starting any exercise program, consult your doctor.

If you have any concerns or experience any pain while doing the exercises, **stop** and consult your doctor.

Warm-Up

1. March in Place

Start: Stand in position.

Action: Pump arms and legs in opposite directions. Make sure heels contact the ground. Continue 3-5 minutes.

2. Arm Circles

Start: Stand with arms raised horizontally and slightly in front of shoulders, palms down, and feet shoulder-width apart.

Action: Rotate arms in forward circular motion for 15 seconds. Relax. Repeat sequence three or four times.

Stretching

The following stretching exercises are of greatest value before work starts. They may, however, be done at any convenient time. Whenever they are done, a brief warm-up such as 1 and 2 above is a big help.

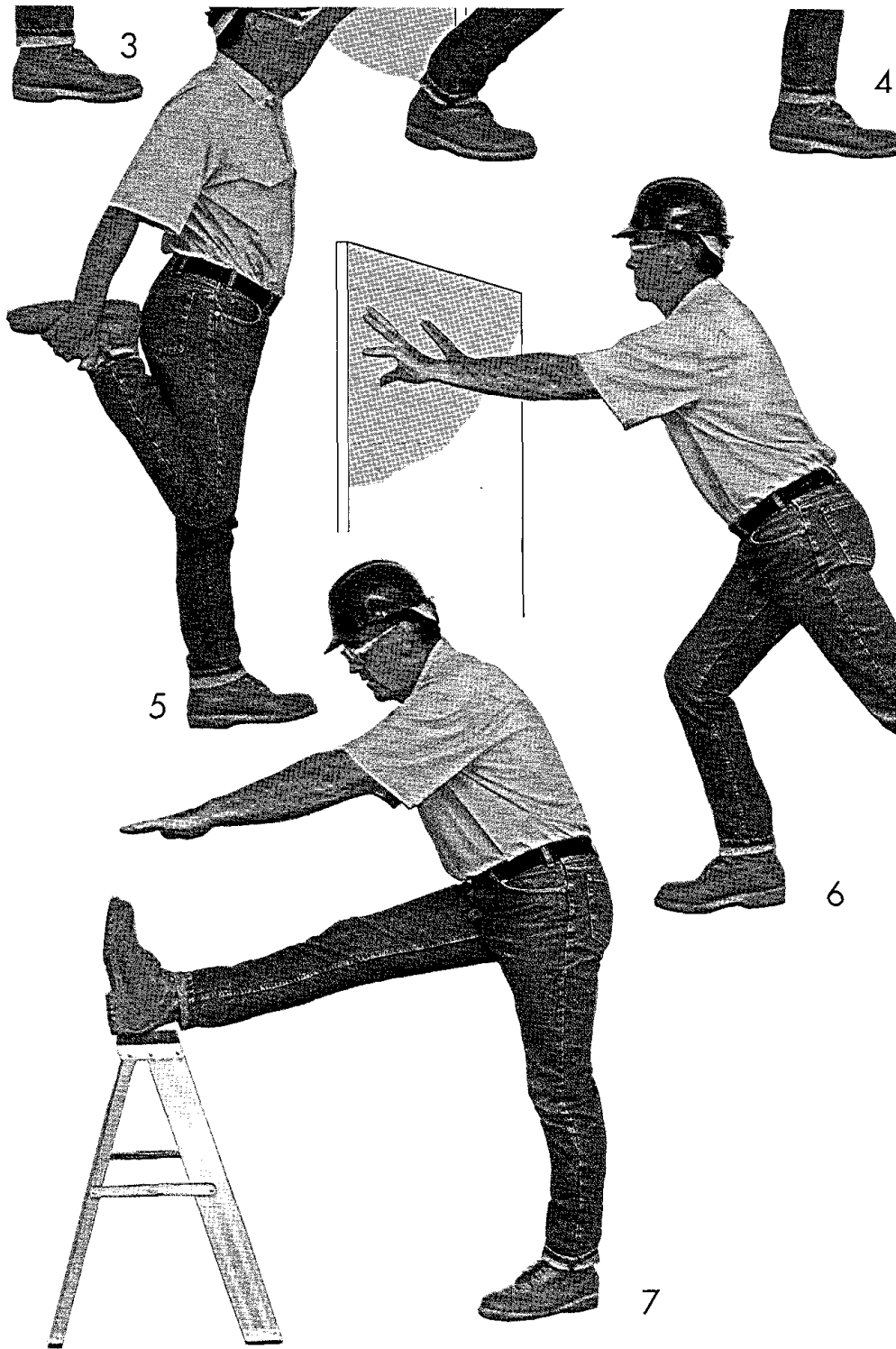
The exercises should be performed in a slow, controlled manner and held in a sustained stretch.

Avoid any bouncy, jerky movements which may tear muscle fibres.

3. Knee to Chest

Start: Support yourself securely with one hand.

Action: Pull your knee toward your chest and grasp around your knee with your free hand. Hold the



stretch for 30 seconds. Lower your leg to the ground and repeat with the other leg. Repeat three times for each leg.

4. Hip Stretch Lunge

- Start: Stand with one foot in front of the other. Place hands above the knee of the front leg.
- Action: Gently bend front knee, keeping back foot flat on the floor. Hold 20-30 seconds. Repeat with other leg. Repeat three times for each leg.

5. Thigh Stretch

- Start: Support yourself with one hand on something secure.
- Action: Bend your leg back and grasp your ankle with your free hand. Gently pull your ankle towards your body, keeping your trunk straight. Hold 20 to 30 seconds then repeat with other leg. Repeat three times for each leg.

6. Calf Stretch

- Start: Stand slightly away from a solid support and lean on it with your outstretched hands. Bend the forward leg and place the other leg straight behind you.
- Action: Slowly move your hips forward, keeping the heel of the back leg on the ground. Hold 30 seconds, relax, and repeat with other leg. Repeat three times for each leg.

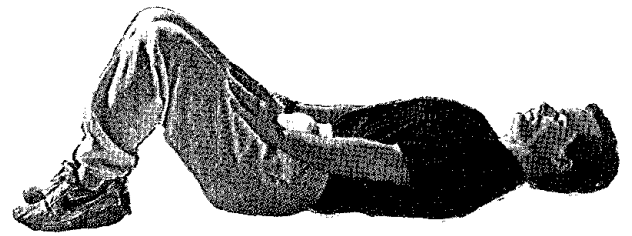
7. Hamstring Stretch

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

8. Strengthening Exercises

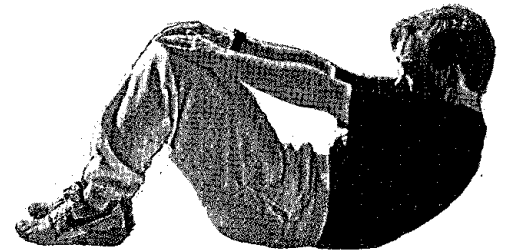
These exercises are to be done lying down, preferably on a carpeted floor. You may use a small, flat pillow under your head if desired.

Start: a) Head and shoulders are relaxed in a neutral position. Knees are bent and feet are about a shoulder-width apart.

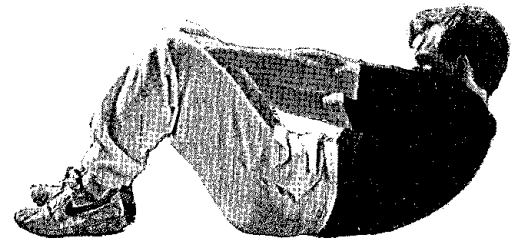


Action: Stretch hands towards knees, keeping hands on thighs.

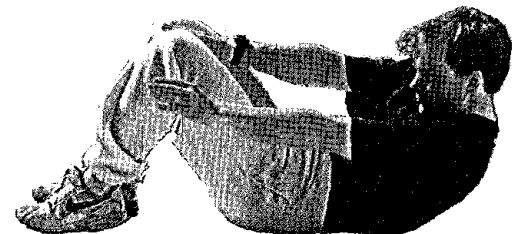
b) Raise head and shoulders off floor. Breathe out on way up and try to touch top of kneecaps. Hold position 3-5 seconds and slowly lie back down. Repeat 10 times.



c) As in b) but point hands slightly to the right of knees and lift head and shoulders in this direction. Repeat 10 times.

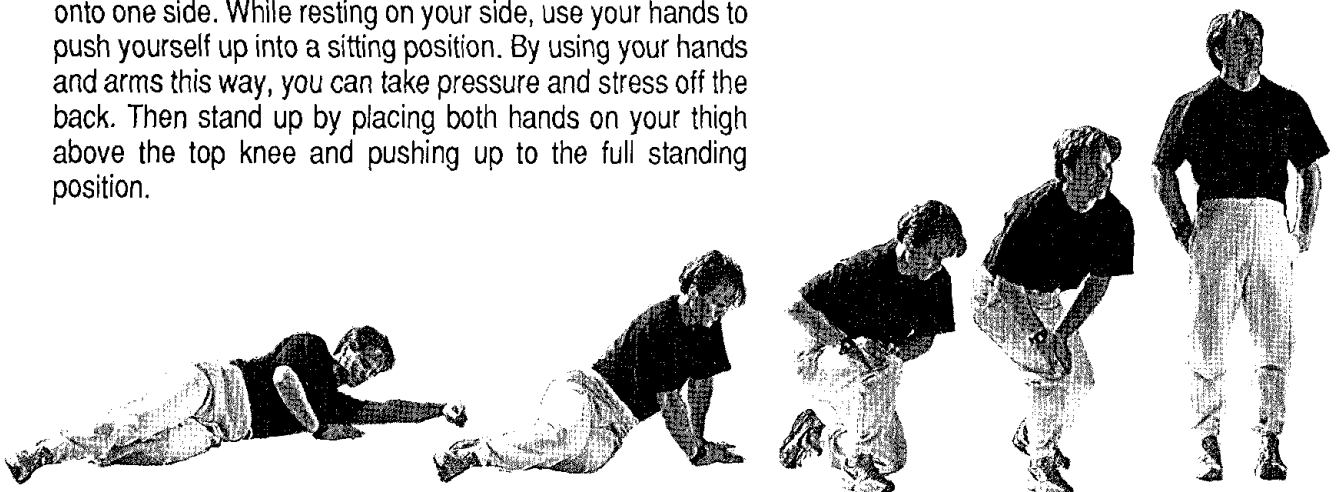


d) As in b) but point hands slightly to the left of knees and lift head and shoulders in this direction. Repeat 10 times.



Lie/Sit/Stand

To sit up from a lying position, bend both knees and roll over onto one side. While resting on your side, use your hands to push yourself up into a sitting position. By using your hands and arms this way, you can take pressure and stress off the back. Then stand up by placing both hands on your thigh above the top knee and pushing up to the full standing position.



Summary

Remember—practicing the principles of proper back care will help to prevent or minimize back problems. Follow these four rules for good back health.

1. **WARM UP**—before you start work.
2. **TONE UP**—with a good exercise program.
3. **SIZE UP**—the load. Don't lift more than you can safely handle.
4. **WISE UP**—by using good lifting techniques and materials handling equipment.

Common Questions about Back Care

1. ARE SIT-UPS GOOD FOR MY BACK?

Full sit-ups are not recommended because they put considerable pressure on the discs and do not work the abdominal muscles efficiently. Head and shoulder raises (page 40) effectively work the abdominal muscles without putting undue stress on the back.

2. IS A WATERBED GOOD FOR MY BACK?

Whether you sleep on a waterbed or a box spring and mattress is an individual choice. The bed should provide support and allow for the naturally occurring curves in your spine. Waterbeds that aren't sufficiently filled or mattresses that sag can't give your back the support it needs. If you wake up with back pain, you may consider trying a different type of bed.

3. WHAT IS THE BEST POSITION TO SLEEP IN?

Traditionally, lying on your side with both knees bent up and a pillow between your legs is recommended as the best sleeping position. If you do sleep on your back, make sure you have both legs bent with a pillow under your knees. This helps to reduce stress on your low back. If you sleep on your stomach, a flat pillow under your hips is recommended.

4. CAN CHIROPRACTORS, PHYSIOTHERAPISTS, OR MASSAGE THERAPISTS HELP WITH A BAD BACK?

Any form of professional treatment that reduces back pain and increases function is acceptable. Regardless of the treatment, however, the patient should take an active role in recovery and be responsible for a lifelong program of good back care maintenance, including a daily back exercise routine.

5. WHAT IS THAT POPPING OR CRACKING SOUND I HEAR WHEN MY BACK IS "ADJUSTED"?

It's the same sound you hear when people crack their knuckles. Joints contain nitrogen under pressure in solution. Pulling on a finger suddenly, or having your back adjusted, decreases the pressure in the joint. The nitrogen comes out of solution and makes a popping sound.

6. ARE DISC HERNIATIONS OR MUSCLE TEARS VISIBLE ON AN X-RAY?

X-rays can show bones clearly, but they cannot show discs, muscles, or nerves. An x-ray is like a shadow picture. You cannot see many details. X-rays therefore have a limited use in diagnosing a back problem.

7. WHAT IS A CAT SCAN?

CT, or CAT, is short for computerized axial tomography. It is an image produced by a sophisticated computerized x-ray machine. The CAT scan allows the physician to see things such as discs that are invisible on a regular x-ray. The CAT scan has become a valuable aid for diagnosing certain problems of the spine.

8. WHAT IS AN MRI?

MRI stands for Magnetic Resonance Imaging. This test allows a physician to view structures of the spine such as discs and nerves which can't be seen on a regular x-ray. The basic component of the MRI is a huge doughnut shaped electromagnet about the size of the mixer on a ready-mix truck. The MRI uses magnetic energy and radio frequency wave pulses to take pictures inside the body. The MRI is an important diagnostic tool for the spine—especially any kind of nerve involvement.

9. SHOULD I USE BACK SUPPORT SUCH AS A BELT OR BRACE?

There are situations where you might need back support temporarily—for instance, returning to work after an injury. In most cases, however, you should not use a back support continuously. Over time, you may become dependent on a back belt and your muscles may weaken from disuse. If you do use a back support, it should be on the advice of your health care professional.

10. I HAVE A BAD BACK AND CAN'T EXERCISE WITHOUT PAIN. WHAT SHOULD I DO?

Exercise for your back does not necessarily mean a strenuous workout in a gym. Back exercises are gentle stretching and strengthening exercises that should not cause pain. With any exercise program, consult your health care professional first to ensure that the exercises are right for your condition. Stop if you experience any pain and consult your health care professional about your exercise program.

11. IF I LOSE WEIGHT, WILL MY BACK GET BETTER?

Weight loss alone will not necessarily reduce back pain, but it's a step in the right direction. Extra weight, especially when it's carried predominantly in the stomach area, can put additional stress on your spine. For your general health, a balanced diet and regular exercise are important.

12. I TWIST FROM SIDE TO SIDE WHEN DOING SIT-UPS. IS THAT BAD FOR MY BACK?

Vigorous twisting may be harmful to your low back. Instead of full sit-ups, which put a lot of pressure on your discs, do head and shoulder raises to exercise your stomach muscles effectively. To exercise the muscles on your sides, angle yourself towards the right and the left. This will work your side muscles without causing undue stress on your spine.

13. WILL DOUBLE-LEG RAISING STRENGTHEN STOMACH MUSCLES?

Double-leg raising is not recommended as an exercise to strengthen stomach muscles because it puts undue stress on your low back. Do head and shoulder raises instead. These will work your stomach muscles effectively without stressing your low back.

14. I OFTEN WORK IN THE COLD. CAN THIS CAUSE A BACK INJURY?

Cold weather itself will not cause a back problem; however, many people claim that cold and/or rainy weather makes their symptoms worse. The rationale for weather-dependent symptoms is still controversial; some experts now maintain that it is the change in barometric pressure accompanying rain or snow which may affect arthritic-type symptoms.

15. WHY DOES STRETCHING HELP MY BACK?

People with back problems tend to have tight muscles. When people experience pain, they often stiffen up out of fear of hurting themselves. Stretching exercises will help lengthen these contracted muscles and make you less vulnerable to further injury.