

# **Trade of Metal Fabrication**

## **Module 1: Basic Fabrication**

### **Unit 1 Manual Handling**

#### **Phase 2**



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## Document Release History

Date	Version	Comments
June 2006	V.1.0	
13/12/13	SOLAS transfer	

## **Module 1 – Basic Fabrication**

### **Unit 2 – Manual Handling**

**Duration – 3 Hours**

**Learning Outcome:**

By the end of this unit each apprentice will be able to:

- List the main statutory requirements of both employers and employees in relation to manual handling and general safety in the workplace.
- Explain the structure of the spine.
- Explain the functions of muscles, tendons and ligaments.
- Explain the types of injury that may occur from lifting and handling loads.
- Explain the requirement for a pre-lift analysis of a load.
- Explain how the body should be positioned before attempting a lift.
- Explain and demonstrate good handling techniques for lifting workplace objects.
- Explain and demonstrate good handling techniques for pushing and pulling a workplace object.
- Demonstrate the correct procedures for team lifting a load.
- Describe the various types of handling devices and in what situations they may be used.
- Correctly demonstrate how to handle a typical workplace load using a handling aid.



**Key Learning Points:**

<b>RK</b>	Duty of employer towards employee to: a). Take measures where possible to avoid manual handling. b) Carry out risk assessment where manual handling is unavoidable to reduce dangers involved. c). Provide employee with precise information about the load.
<b>RK</b>	Duty of employee to: a) Take reasonable care for his safety and welfare and that of others in the workplace. b) Use any equipment, protective clothing or other means provided by the employer for securing his safety and welfare in the workplace. c) Report any problems or defects to his employer which might endanger health and safety.
<b>RK</b>	Structure of the spine: spinal cord, spinal canal, vertebrae, intervertebral discs.
<b>H</b>	Injuries resulting from lifting heavy loads (Prolapsed/slipped disc, cuts and abrasions, crushed feet and hands, muscle and joint strain).
<b>RK</b>	Pre-lift analysis of a load (Checking object for sharp edges, difficult to grasp, unstable, teamwork required).
<b>H</b>	Workplace obstacles/hazards such as slippery/uneven surfaces, poor lighting conditions, steps.
<b>SK</b>	Other factors that may hinder movement such as clothing or personal protective equipment.
<b>SK</b>	Use of good posture before beginning to lift a load.
<b>SK</b>	Raising a load correctly.
<b>P</b>	Putting the load down correctly.
<b>RK</b>	Coordination of team learning outcome when team lifting.
<b>SK</b>	Good handling techniques for pushing and/or pulling an object using a handling device.
<b>P</b>	Safe working practices at all times when handling heavy objects.

**Training Resources:**

- Information sheets, instructional videos, samples of various materials/objects typical of the apprentices' workplace
- Various handling devices used in the apprentices' workplace

**Exercise:**

1. Apprentice to answer general questions on correct procedures for lifting heavy objects
2. Apprentice to state the main obligations of employer and employee in relation to safe handling in the workplace
3. Under supervision and using the correct handling techniques, the apprentice is required to lift a workplace object from:
  - i. Ground to ground
  - ii. Ground to bench
  - iii. Ground to height
  - iv. Bench to bench
4. Under supervision and using the correct handling techniques, the apprentice is required to operate a handling device to move a typical workplace object from one location to another

**Key Learning Points Code:**

**M** = Maths      **D** = Drawing      **RK** = Related Knowledge      **Sc** = Science  
**P** = Personal Skills      **Sk** = Skill      **H** = Hazards

## **Employee's Duty**

1. Take reasonable care for his safety and welfare and that of others in the workplace.
2. Use any equipment, protective clothing or other means provided by the employer for securing his safety and welfare in the workplace.
3. Report any problems or defects to his employer which might endanger health and safety.

## **Basic Manual Handling Course**

### **Course Objective**

After completing the course participants will be able to demonstrate the ability to apply safe manual handling techniques in the workplace.

### **Course Aims**

At the end of the training period participants will be able to:

Identify and avoid hazardous and unsafe manual handling situations.

Assess the characteristics of a load prior to lifting on the basis of weight, size, stability and position.

Assess their personal capacity to complete a manual handling task.

Apply the basic techniques involved in completing;

- A one person lift.
- A two person lift.

## Disc Troubles

It is well known that the vertebral column, or spine, has the shape of an elongated S. At chest level it has a slight backwards curve called a kyphosis, and in the lumbar region it is slightly curved forwards, the lumbar lordosis. This construction gives the spine elasticity, to absorb the shocks of running and jumping.

The loading on the vertebral column increases from above downwards, and is at its greatest in the lower five lumbar vertebrae. Each pair of vertebrae are separated by an intervertebral disc. Degeneration of the discs first affects the margin of the disc, which is normally tough and fibrous. A tissue change is brought about by loss of water, with the result that the fibrous ring becomes brittle and fragile and loses its strength. At first the degenerative changes merely make the disc flatter, with the risk of damage to the mechanics of the spine, or even of displacement of the vertebrae. Under these conditions quite small actions such as lifting a weight, a slight stumble or similar incidents, may precipitate severe backache and lumbago. When degeneration of the disc has progressed further, any sudden force upon it may squeeze the viscous internal fluid out through the ruptured outer ring, and so exert pressure either on the spinal chord itself or on the nerves running out from it. This is what happens in the case of a “Slipped Disc” or disc herniation. Pressure on nerves, narrowing of the spaces between vertebrae, pulling and squeezing at adjoining tissues and ligaments of the joints are the causes of the variety of aches, muscular cramps and paralyses including lumbago and sciatica which commonly accompany disc degeneration.

Back troubles are painful and reduce one’s mobility and vitality. They lead to long absences from work, and in modern times are among the main causes of early disability. They are comparatively common in the age group 20 - 40, with certain occupations (labourer, farmer, porter, nursing staff, etc.) being particularly vulnerable to disc troubles. Moreover, workers with physically active jobs suffer more from ailments of this nature, and their work is more affected than in the case with sedentary workers.



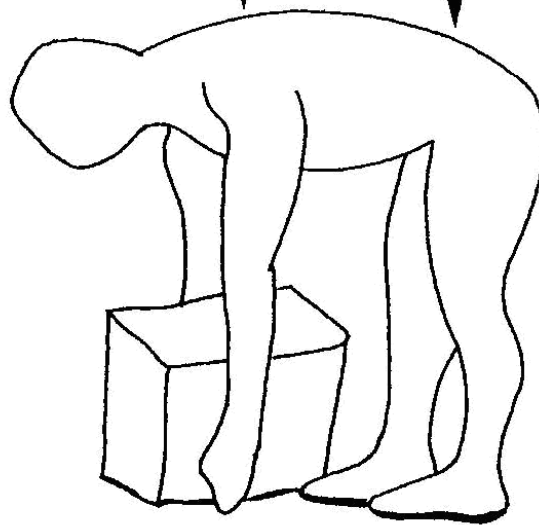
**Stooping to Lift**

# **STOOPING TO LIFT IS DANGEROUS !**

***Because :***

**The arched spine  
may cause a  
“slipped disc”**

**It can overload  
the lower back  
muscles.**



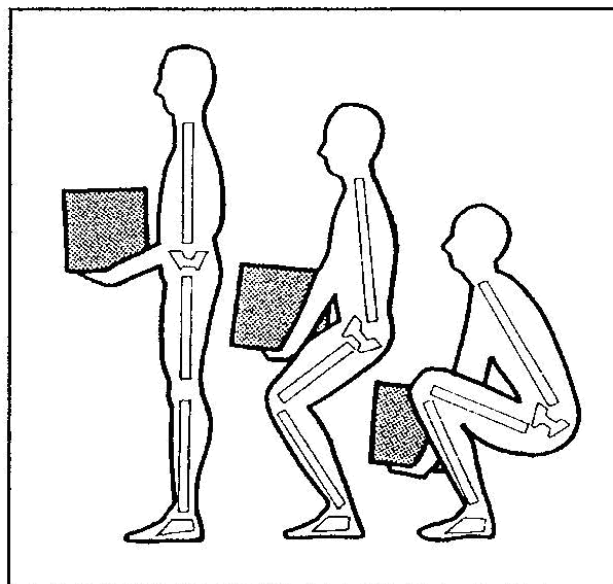
**We are lifting the  
load and the upper  
body weight in that  
posture.**

*Figure 1.      Stooping to lift*

## Bending the Knees

# BENDING THE KNEES TO LIFT ENSURES :

- That the leg muscles do the lifting (not the smaller back muscles)
- That a good lifting posture can be adopted.



- That the load can be reached without arching the spine

*Figure 2. Bending the knees*

## **Handling Loads**

### **Avoid**

- Very heavy loads.
- Arching of the spine.
- Excessive or repeated twisting.
- Over-stretching or over-reaching.

### **Ensure**

- A good secure grip
- Awareness of the weight and stability of the load.
- Correct stance and lift posture.
- Smooth quick lift.
- Correct protective clothing and equipment.
- Proper coordination of team lifts.



## The Right Way

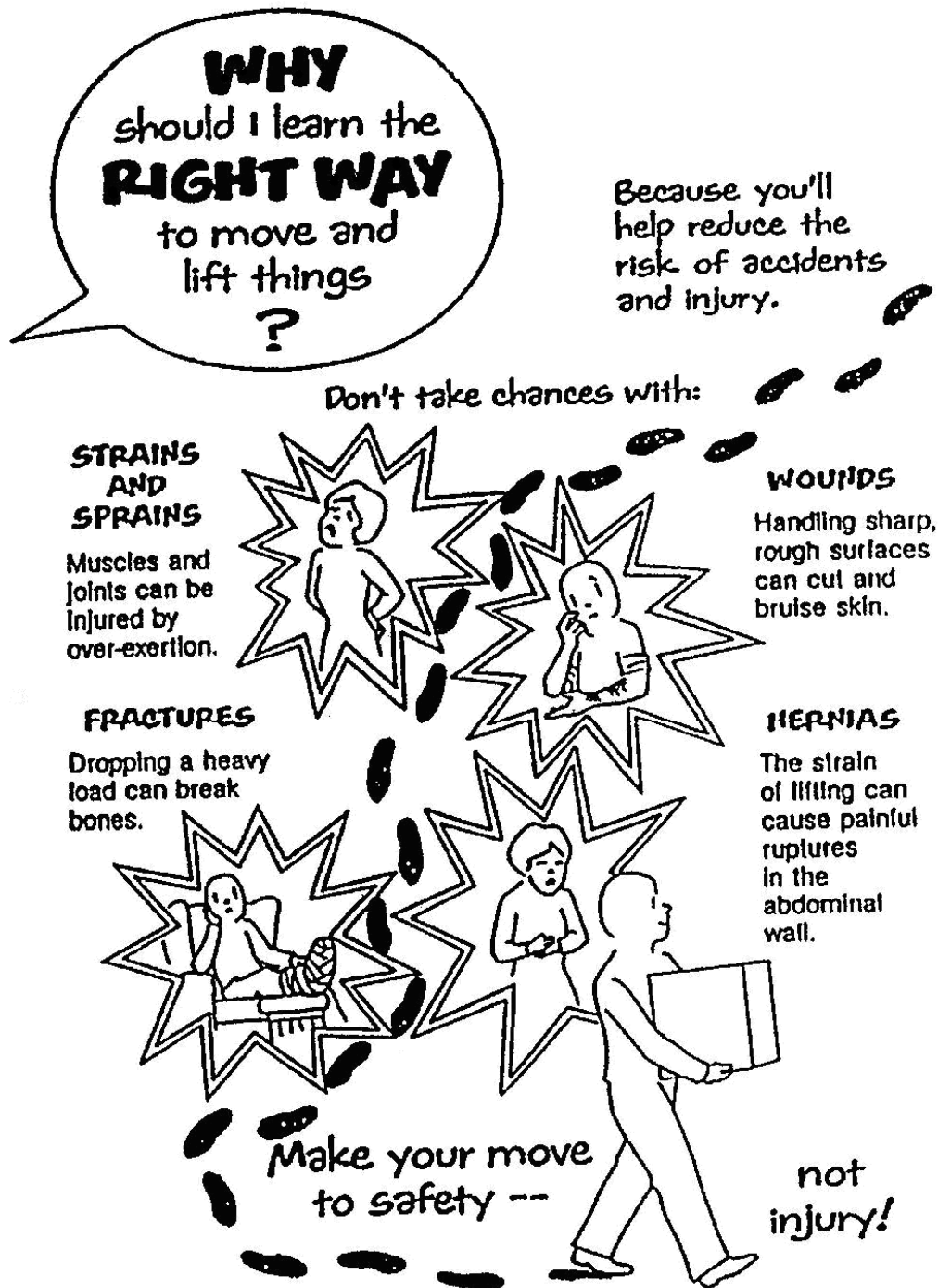


Figure 3. The right way to move things

## Moving Things the Wrong Way

### MOVING THINGS THE WRONG WAY

may injure your back!  
People may also be at risk  
if they are not:

**PROPERLY  
TRAINED**  
to work safely!

**PROVIDED WITH  
SAFE SYSTEMS**  
of work and adequate  
supervision

**PHYSICALLY  
SUITED**  
or in proper shape to carry  
out a given task

**WEARING THE  
PROPER CLOTHING,**  
footwear and other protec-  
tive equipment for the type  
of work they do

Fortunately, back injuries and other  
sprains, strains, cuts and bruises can  
usually be prevented!

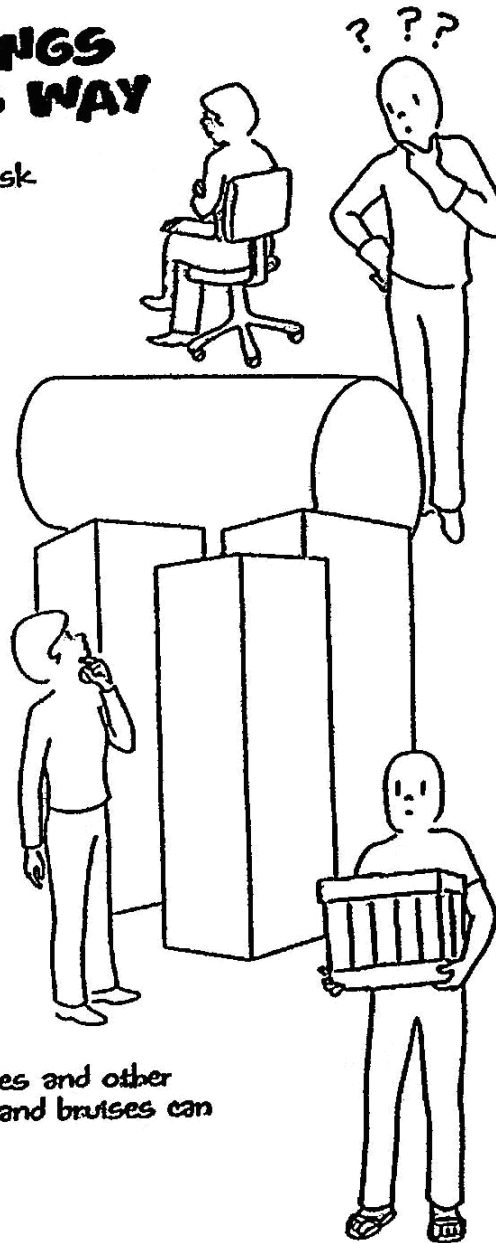


Figure 4. Moving things the wrong way

## Prevent Pain, Injuries and Damage

# PREVENT PAIN, INJURIES AND DAMAGE

Follow these basic tips to prevent accidents:

**EXAMINE THE OBJECT**

Determine its weight and look for sharp edges. All loads which are heavy or awkward should be marked. Check to see if the load is stable and equally distributed. This is a responsibility that your supervisor shares with you.

**PLAN THE JOB**

Check with your supervisor on a safe system of work. Plan a route that's free from tripping and slipping hazards. Know where the object will be unloaded and plan "rest stops" along the way.

**GET A GOOD GRIP**

Decide in advance how to hold the object. Protect your hands and feet by grasping the load firmly. If you wear gloves to prevent cuts or burns, make sure they fit properly.

**GET HELP**

Use the mechanical aids provided, and get help if you have any doubt about moving an object by yourself.

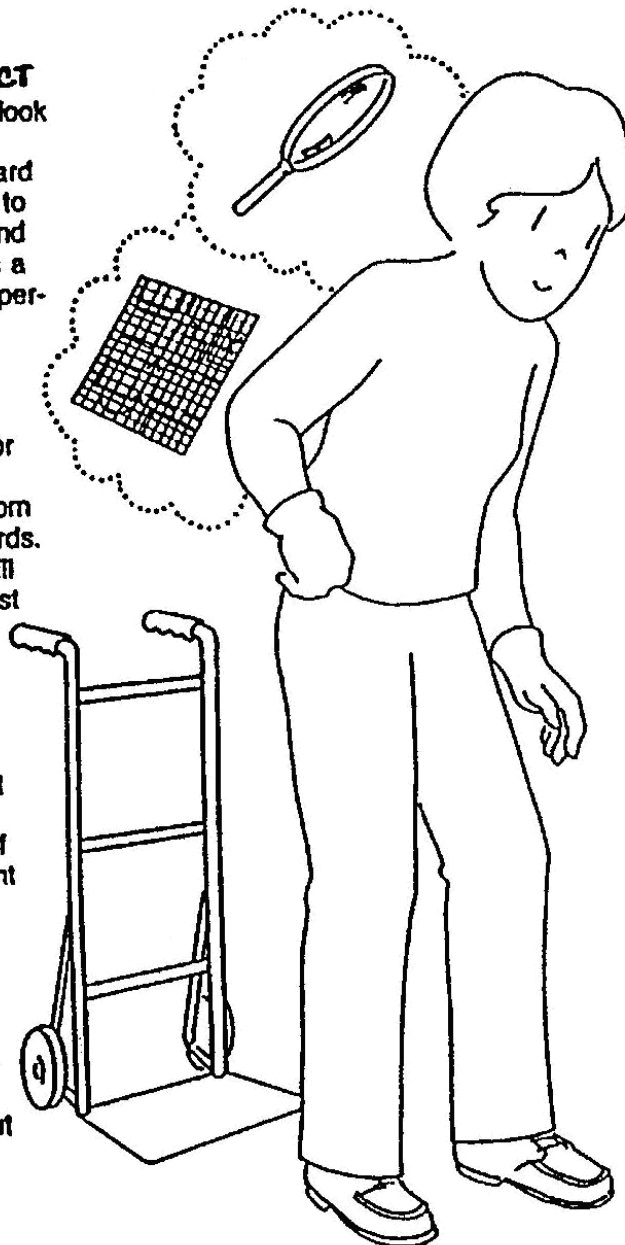


Figure 5. Prevent pain, injuries and damage

**WEAR THE RIGHT EQUIPMENT**

This may include:

- anti-slip safety shoes
- a hard hat
- safety goggles
- a respirator
- protective gloves
- durable clothing (loose enough for free movement, but tight enough to avoid snags).

**REST, OR ROTATE TASKS**

Avoid becoming over-tired! Frequent lifting, lowering and moving is demanding work, and can result in cumulative stress.

**TALK TO YOUR SUPERVISOR**

Do not hesitate to discuss any problems or moves you aren't sure about.

**LIFT WITH YOUR LEGS**

Assume a comfortable stance. Lift smoothly, keeping the load close to the body. Avoid twisting your body as you lift – move your feet instead. Minimise lifts above your shoulders or below your knees.

**KEEP HANDS IN THE "CLEAR"**

Be careful not to crush fingers when unloading.

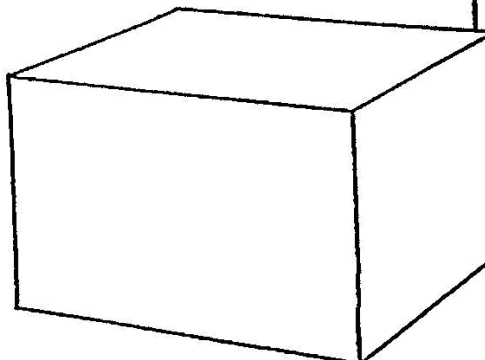


Figure 6. Prevent pain, injuries and damage continued

## Lifting

### LIFTING

Practise these methods whether lifting a shopping bag or moving goods:

#### ONE PERSON LIFT ("squat lift")

1. THINK before doing anything.
2. STAND as close to the load as possible. Spread your feet to create a stable base (slide the load close if it's on a shelf).
3. BEND your knees and keep your back in a natural line. Don't bend your knees fully, as this will leave little power to lift.
4. GRASP the load firmly.
5. RAISE your head.
6. LIFT with your legs. Use your leverage, momentum, balance and timing for a smooth action. Move your feet.
7. HOLD the load close to the centre of your body.

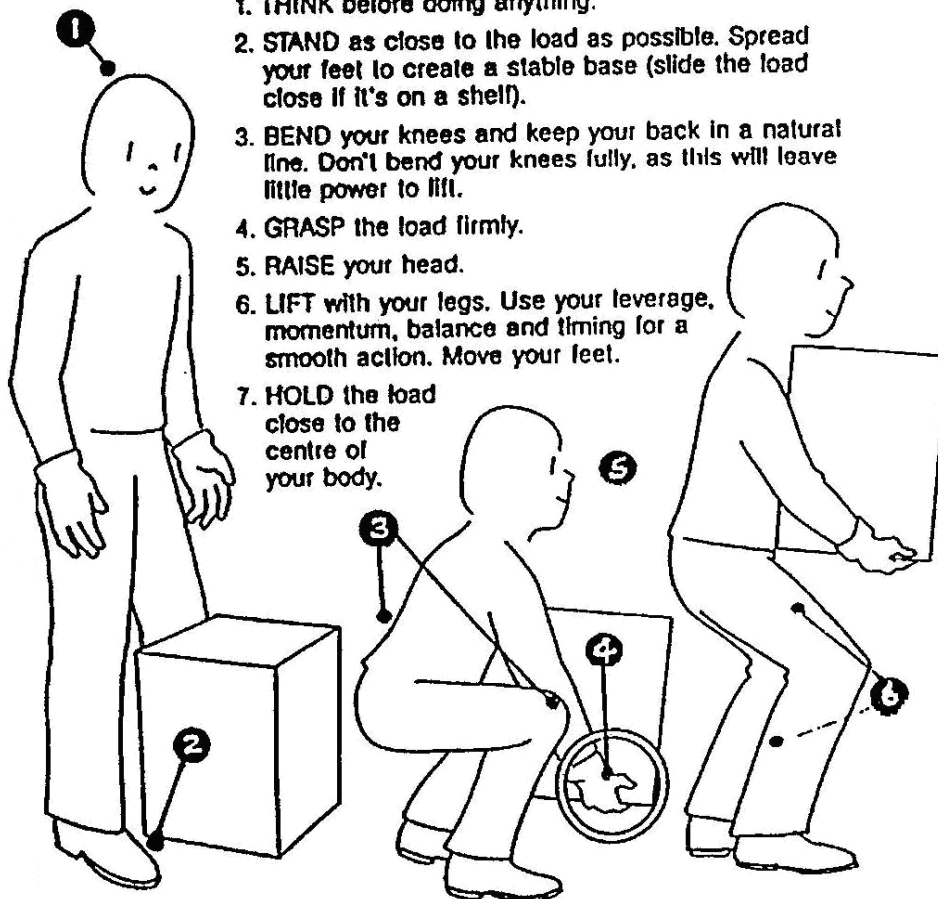


Figure 7. Lifting

To avoid injury do warm-up exercises before lifting.

## Carrying

# CARRYING

You can help prevent injuries when carrying objects, too! Here's how:

### KEEP THE LOAD CLOSE,

to take full advantage of the mechanical leverage of your body.

### KEEP YOUR ARMS TUCKED IN

to prevent injury or fatigue to your neck or shoulder muscles.

### DON'T CHANGE YOUR GRIP

on the load unless its weight is supported.

### AVOID TWISTING YOUR BODY,

stooping, bending or leaning back. If you must change direction, move your feet instead.

### DON'T BLOCK YOUR VISION

by carrying too large a load. Use a mechanical aid, or get help if you need it.

### FACE THE SPOT

the load will rest on by turning your feet and whole body in that direction.

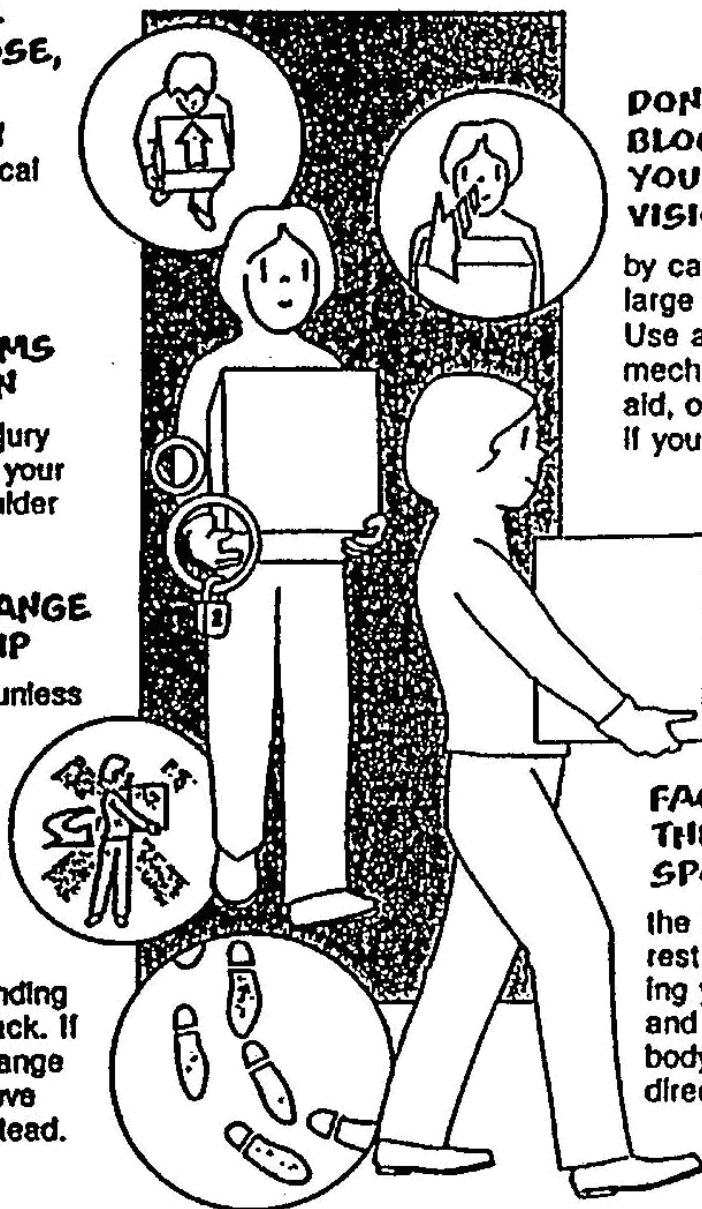


Figure 8. Carrying

## Unloading

# UNLOADING

Be as careful setting down the load as you are when lifting. Repeat the same procedure in reverse:

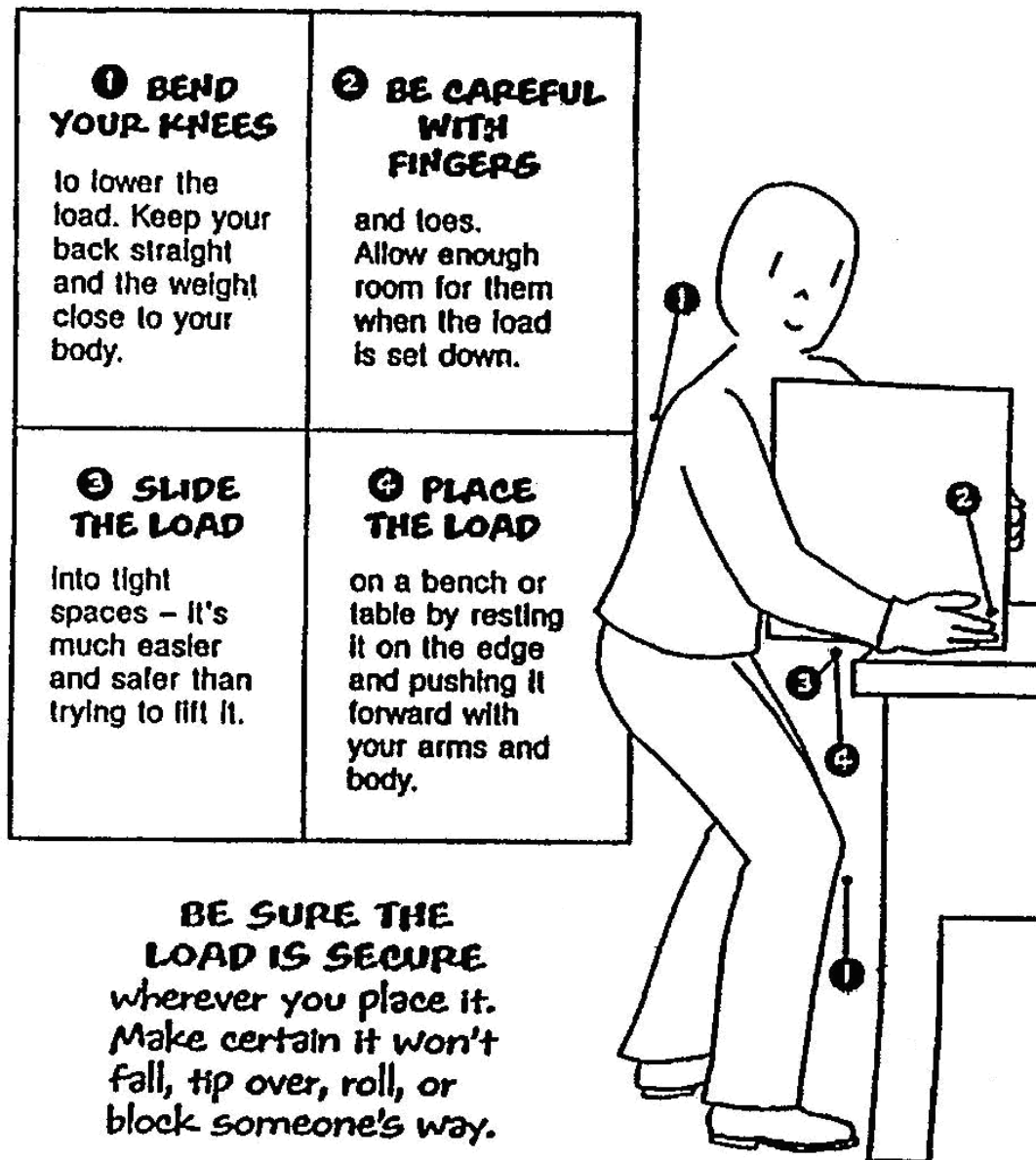


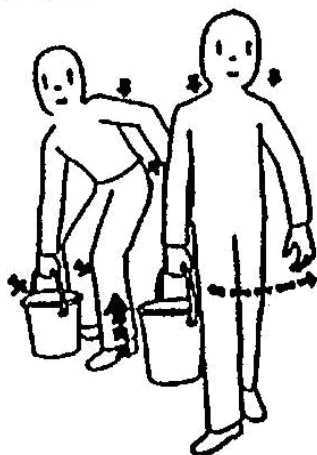
Figure 9. Unloading

## Special Lifts

### ONE-ARM LOADS

These are not a good idea.  
But, if they cannot be  
avoided:

- BRACE your body with the opposite arm, if possible.
- REACH for the load – bend your knees and waist, and keep your back straight.
- GRASP the load firmly (use a handle, if possible).
- LIFT with your legs, using the free arm for balance.
- KEEP your shoulders level – switch hands regularly.
- DIVIDE the load if possible.



### TEAM LIFTS

- WORK with someone of similar build and height, if possible.
- CHOOSE one person to call the signals.
- LIFT from the hips at the same time, then raise the load to the desired level.
- MOVE smoothly and in unison.

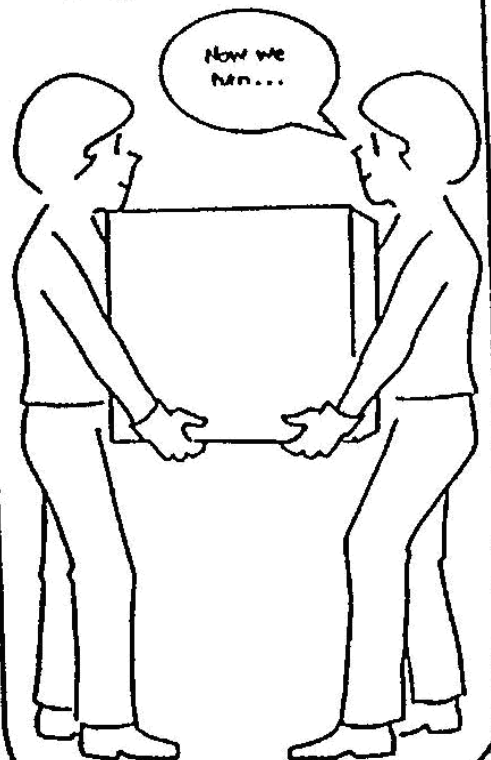


Figure 10. Special lifts



## Awkward Objects and Overhead Lifts

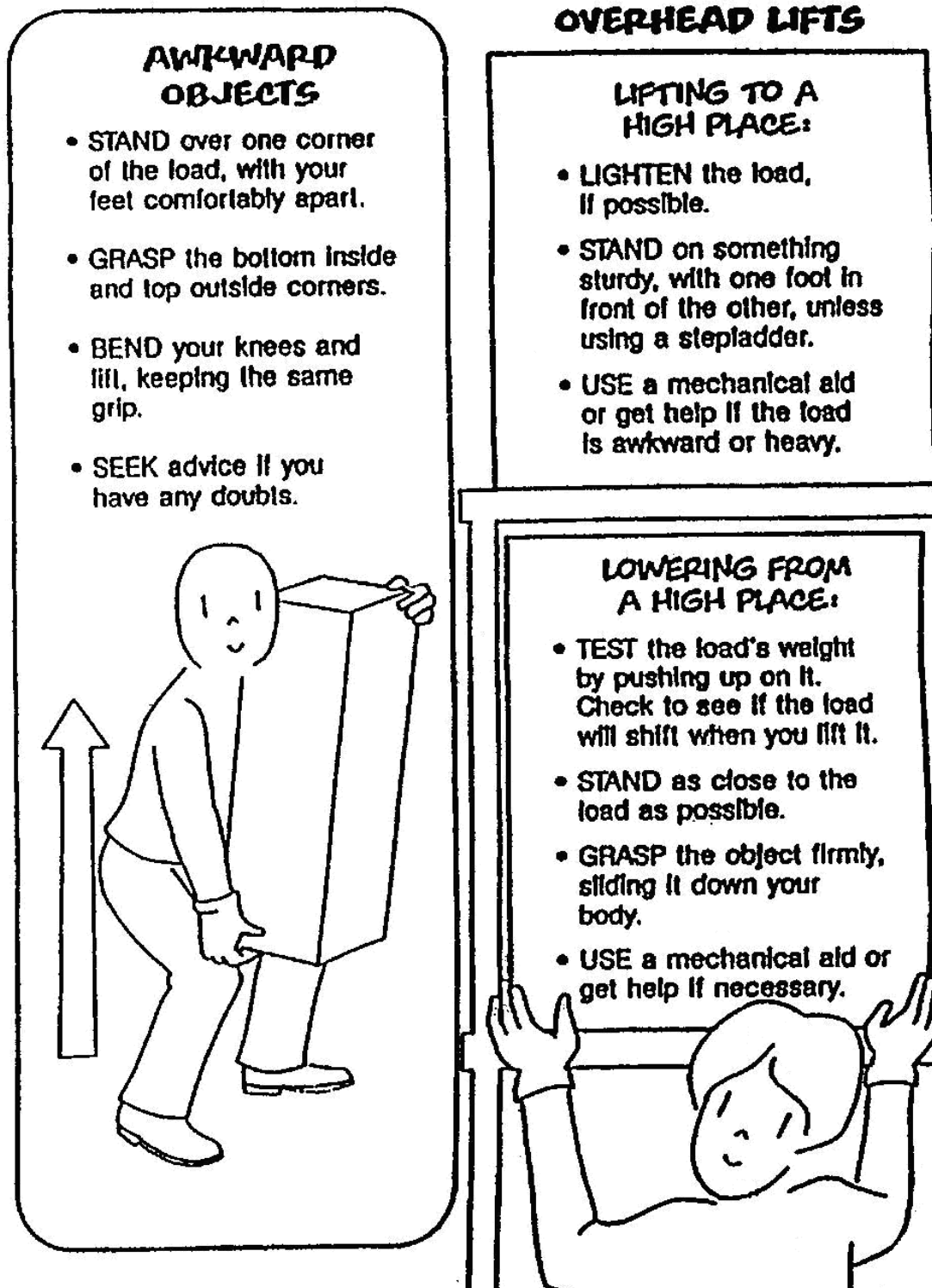


Figure 11. Awkward objects and overhead lifts

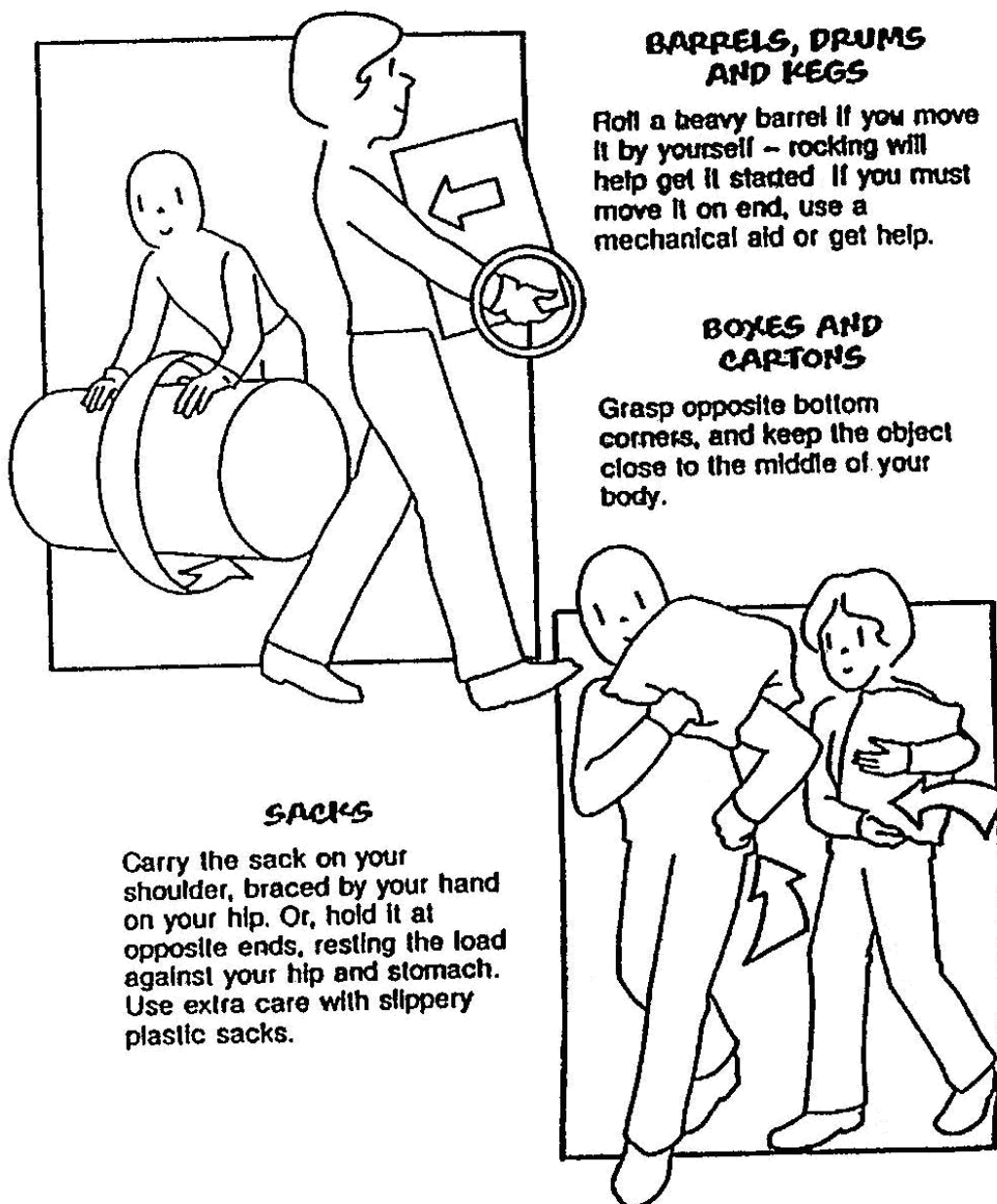
## Pushing and Pulling Safety



Figure 12. Pushing and pulling safety

**Special Objects Require Special Handling**

# **SPECIAL OBJECTS REQUIRE SPECIAL HANDLING**

**BARRELS, DRUMS  
AND KEGS**

Roll a heavy barrel if you move it by yourself – rocking will help get it started. If you must move it on end, use a mechanical aid or get help.

**BOXES AND  
CARTONS**

Grasp opposite bottom corners, and keep the object close to the middle of your body.

**SACKS**

Carry the sack on your shoulder, braced by your hand on your hip. Or, hold it at opposite ends, resting the load against your hip and stomach. Use extra care with slippery plastic sacks.

Figure 13. Special objects require special handling

## Team Effort

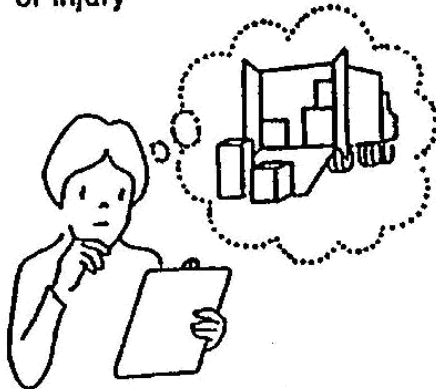
# IT TAKES A TEAM EFFORT

to organise safe systems for handling loads.

Your employer  
is working hard to:

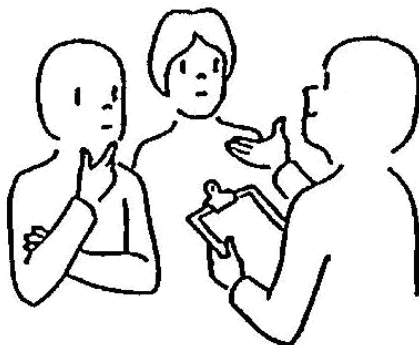
### ASSESS LOADS

and determine whether  
mechanical or other aids will  
be required to minimise risk  
of injury



### PROVIDE INFORMATION AND TRAINING

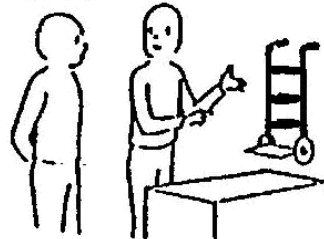
regarding safe work systems  
along with details (weight,  
centre of gravity, etc.) on  
various loads.



To do your part,  
you should:

### TAKE ALL TRAINING SERIOUSLY

and make use of what you know  
at all times



### NOTIFY YOUR EMPLOYER

of any medical conditions that  
could affect your ability to handle  
loads – for example pregnancy,  
illness or injury.



### REPORT ANY HAZARDS

or potential hazards to your  
supervisor at once. Make your  
safety and the safety of others  
a top priority!



Figure 14. Team effort



Figure 15. Handle objects safely

## Lifting and Lowering Whist Standing

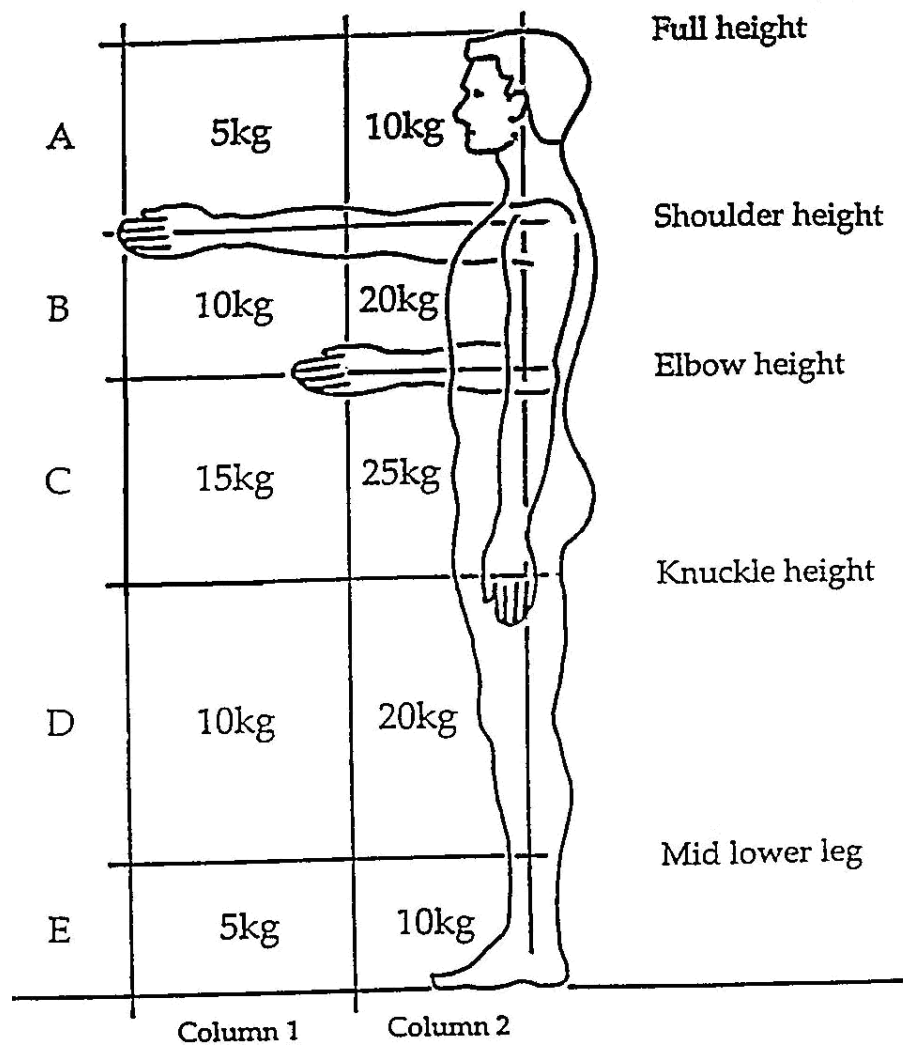


Figure 16. Lifting and lowering whist standing

## **Pregnant Employees Regulation 1994**

Risks due to manual work must be assessed for pregnant employees and employees who have recently given birth.

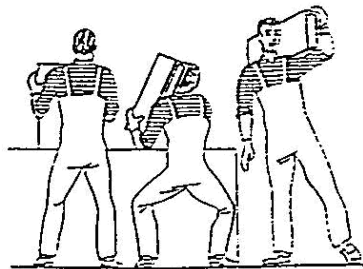
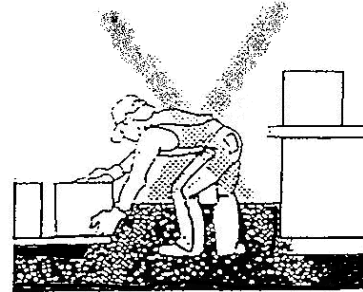
Health and safety leave must be given if the maternity employee cannot be protected from the risks identified.

Certification of risk by employer for social welfare purposes.

## Manual Handling Legal Obligations

If a manual handling task involves a risk of back injury the EMPLOYER must:

- Eliminate it or
- Mechanise it or
- Assess it and
- Train employees and
- Ensure they can cope



*Figure 17. Manual handling legal obligations*



## **Eight Principles of Lifting**

1. Access – the area  
Access – the load.
2. Bend Knees.
3. Broad stable base.
4. Keep back straight (not necessarily erect)
5. Firm palm grip
6. Arms close to trunk
7. Weight close to centre of gravity
8. Point/pivot feet in direction of movement.
9. Left with legs

## **Self Assessment**

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