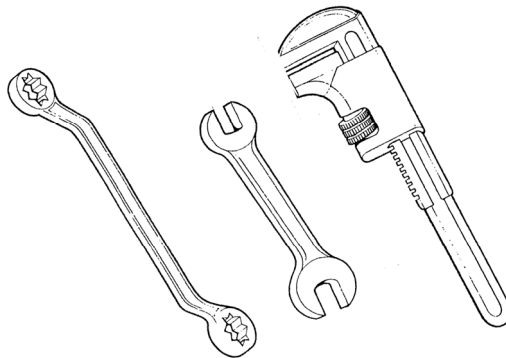


# **Trade of Plumbing**

## **Module 2: Thermal Process and Mild Steel Pipework**

### **Unit 1: Related Safety**

#### **Phase 2**



Over 70,000 people are employed in construction - either on building sites or repair work. It is very easy to be seriously injured or killed at work. Yet there is always a safe way to do any job – in building it is also the quickest and cheapest.

The simple message of this booklet is that it is easy to take the right precautions.

So what are the dangers? In the last 10 years, 72 workers were killed and over 5,000 injured, many disabled for life. These are the facts. NOT scare stories.

And here is another fact. If you cut corners you may end up with extra cash. But you're just as likely to end up in hospital or six foot under.

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## Document Release History

Date	Version	Comments
June 2006	V.1.0	
04/03/14	2.0	SOLAS transfer

## Module 2 – Thermal Process and Mild Steel Pipework

### Unit 1 – Related Safety

**Duration – 2 hours**

#### Learning Outcome:

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

State the hazards associated with working on construction sites.

Describe correct safety precautions for working on construction sites.

#### Key Learning Points:

<b>RK</b>	<b>General site safety – personal protection equipment, tidiness, hygiene etc.</b>
<b>P</b>	<b>Good working practice.</b>
<b>RK</b>	<b>Safety signs.</b>
<b>RK</b>	<b>Working outdoors.</b>
<b>RK H</b>	<b>Working on ladders.</b>
<b>RK H</b>	<b>Working on scaffolding and platforms.</b>
<b>RK H</b>	<b>Working in trenches and excavations.</b>
<b>RK H</b>	<b>Working with electricity / power tools.</b>
<b>RK H</b>	<b>Storing pipes and cylinders.</b>
<b>RK H</b>	<b>Contact with dangerous substances – solvents, chemicals, asbestos etc.</b>
<b>RK</b>	<b>Fire protection – flammable material, safe use of gas torches / grinders etc.</b>
<b>P</b>	<b>Safety, Health and Welfare at Work.</b>

#### Key Learning Points Code

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



**Training Resources:**

Classroom facilities.

Rules and procedures of training location (information sheet).

SOLAS Industrial Safety and Hygiene booklet.

SOLAS booklet on noise.

## Team up for Safety

Everyone on site has a responsibility to make work safe. The law is here to protect you. Your employer must ensure your safety. He must have a written Safety Statement outlining safeguards on the site. But safety is a two way thing; you also have to look after yourself.

### Did You Know?

If you take chances, chances are you'll loose. Don't let anyone talk you into being stupid.

Your employer is obliged by law to plan and cost every job so as to include proper safety measures.

Your employer has to tell you:

- the dangers of the job.
- the safety precautions you'll need to take.
- about the safety equipment / clothing you are given to use.

and has to:

- give necessary training to keep you safe.
- supervise the work properly.

### A Few Hard Facts

The first week on the site is the most dangerous.

Accidents are more frequent at the end of the day.

Small building jobs are the most risky.

Safety helmets and equipment do prevent injury and death.

Most light weight shoes – such as trainers or runners aren't suitable on site.

The Health and Safety Authority is on your side. We have the support of the unions, the employers' organisations (including the Construction Industry Federation) and the Government.

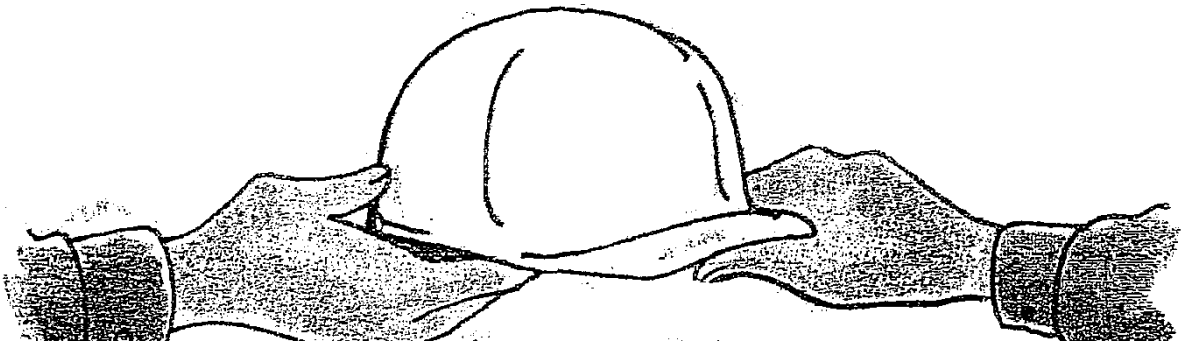
If the safeguards are not adequate, discuss immediately with your supervisor or Safety Representative. If this fails you can contact the local Health and Safety Inspectors directly (in confidence if you want). You'll find the addresses and phone numbers at the back of this leaflet.

70% of all accidents can be predicted. If they can be predicted they can be prevented. That means there have been more than 50 needless, avoidable deaths on sites in the past 10 years. Likewise, 3,500 serious accidents.

So, team up for safety and follow these guidelines. Together we can prevent further tragedies.

**NEVER, NEVER** take extra money as compensation for working without safeguards.

**Remember:** Nobody has the right to give you a dangerous job. All jobs can be made safe if the right guidelines are followed, the correct equipment used and all the proper safety precaution taken.



*Figure 1. Safety First*

## First Things First: Site Access and Maintenance

Half the accidents that happen on sites are very simple; people slip, trip or fall. So check to make sure that:

Everyone can move around safely.

Roads, gangways, hoists, passageways and staircases are kept clear and safe.

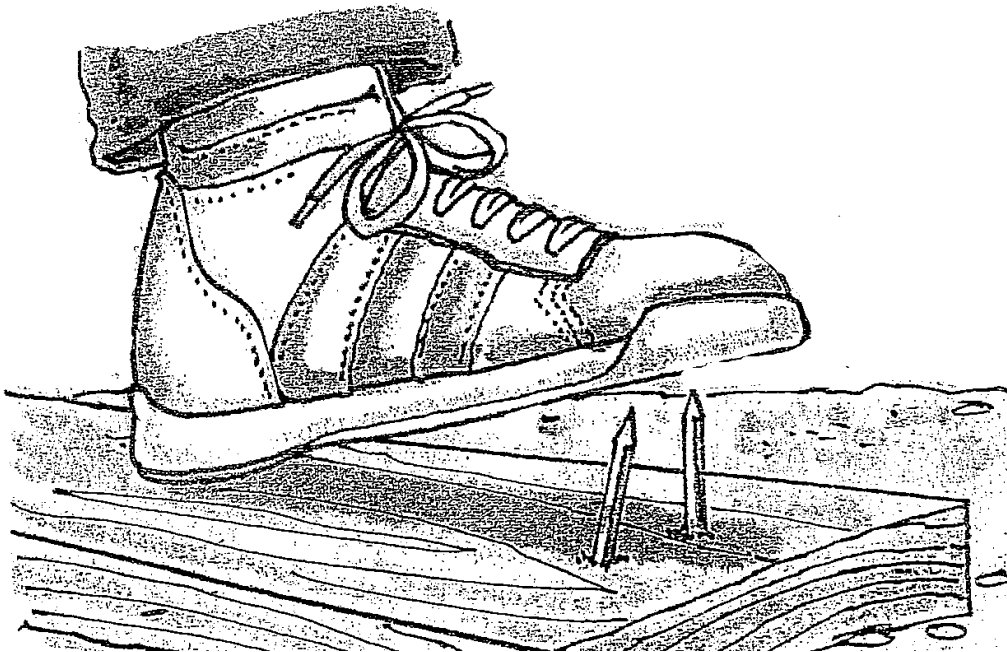
Materials are stored safely.

Rubbish is put in its place – skips or bins.

Nails are removed or hammered in.

Openings are fenced off and there are barriers to stop falls.

**Keep the place tidy – that means SAFE.**



*Figure 2. Stay Safe*

## A Head for Heights

Be smart enough to take precautions. Working at heights is the most dangerous job – be VERY CAREFUL. Apply these commonsense rules:

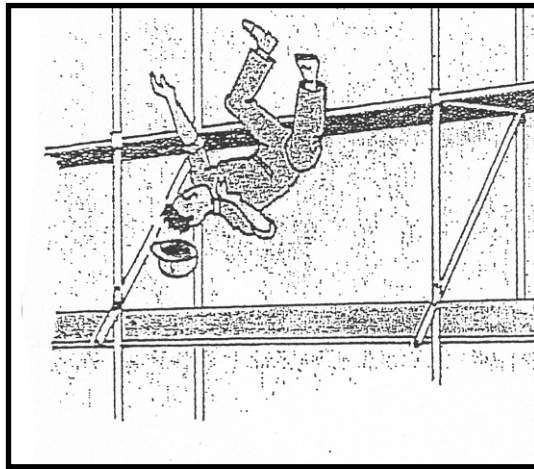
Using ladders or scaffolding without proper fixing is crazy. Don't take the risk.

Putting up scaffolding – and taking it down again – is a job for experienced scaffolders. Leave it to them.

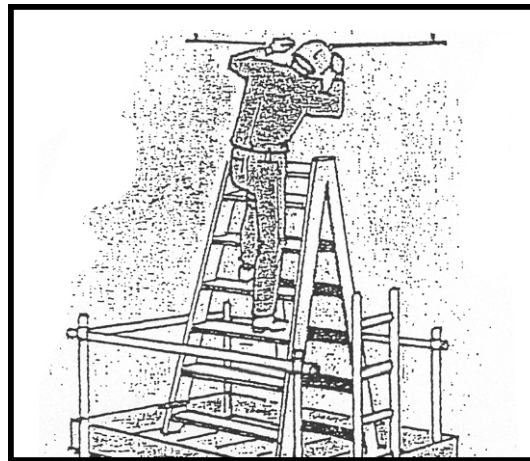
Never use scaffolding that's incomplete.

Make sure there are hand rails and toe boards.

Things fall on sites, keep your head, wear your helmet.



*Figure 3. No Guard Rails and Toe Boards*



*Figure 4. Ready to Topple*



## Lethal Ladders

Ladders kill a lot of people. Make sure the ladder is:

Right for the job. Would scaffolding be better?

In good shape.

Secured near the top.

On a firm base and footing.

Rising at least 1 metre beyond the landing place,

OR that there is a proper hand hold.

Always have a firm grip on the ladder and keep a good balance.

### Ladder safety

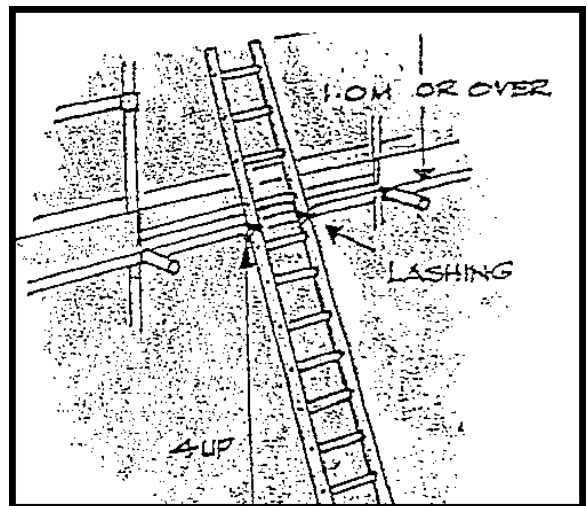
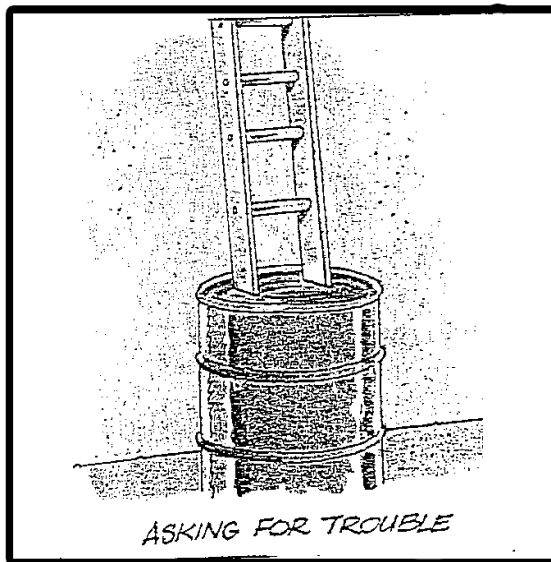


Figure 6. Never Attempt any of the Above

## The Roof: A Risky Place to Be

So risky, in fact, that one in five deaths on sites arise from roof work. Many of these accidents happen in the course of routine cleaning and maintenance. Almost all of them could be prevented. Very simply:

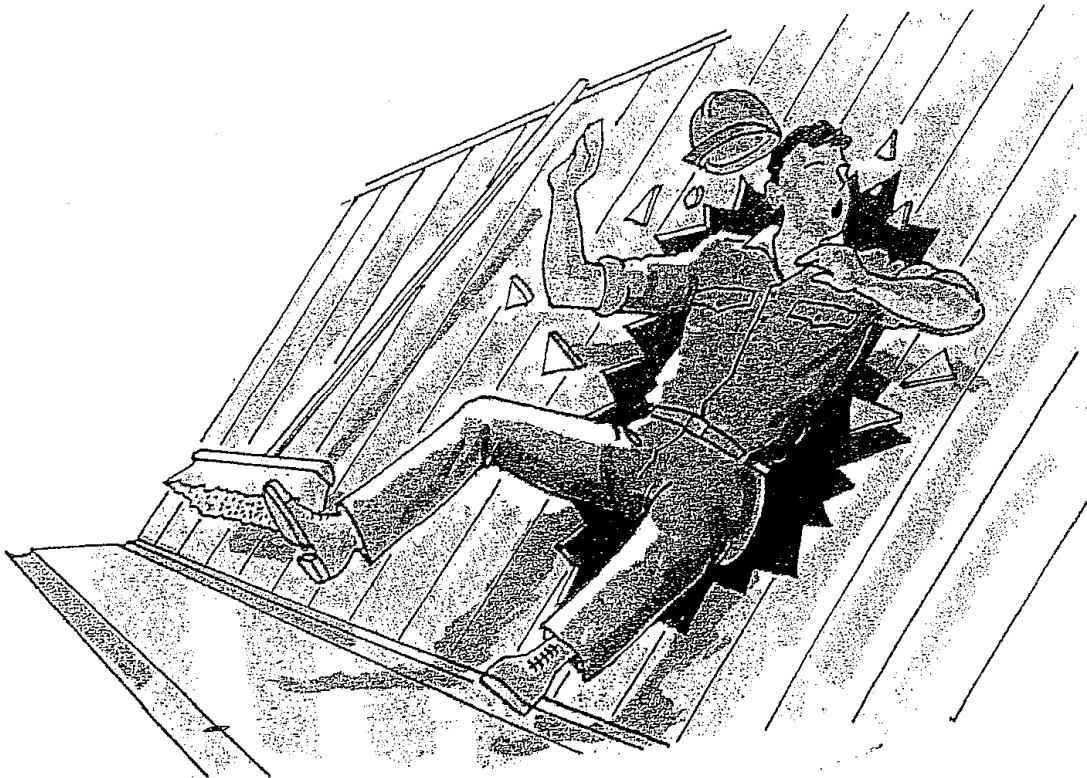
Always inspect a roof before you walk on it.

You must have protection to stop you from falling off the edge.

You have to use proper roofing ladders / crawling boards on sloping or fragile roofs.

If there are others working underneath the roof, make sure debris can't fall on them.

Remember: a walk along a fragile roof could be your last.



*Figure 7. The Roof is a Risky Place to Be*



## Excavation Work

If you want to avoid being buried alive you'll apply these rules:

All excavations deeper than 1.25 metres **MUST** be shored or battered. That's the law.

Excavations deeper than 2 metres **MUST** have a guard rail or barrier.

Vehicles working too close to the sides of the trench or rubble piled on the sides may cause collapse.

Vehicles tipping into the excavations must use stop blocks.

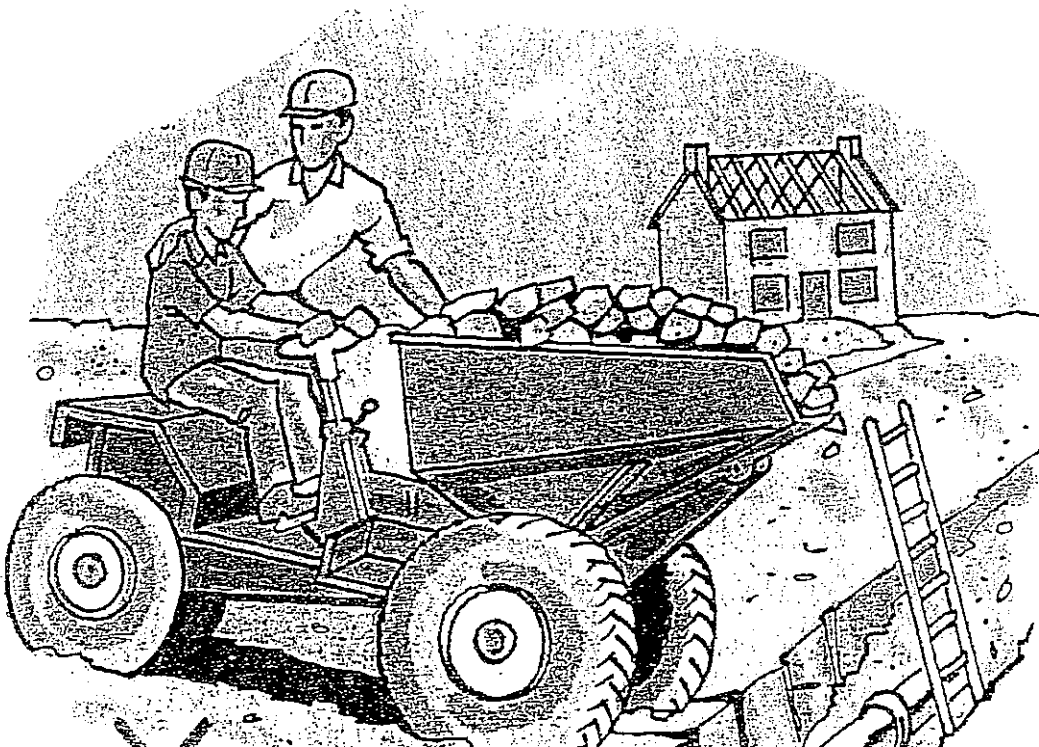
Make sure the excavation is inspected daily.

Make sure you know where any underground pipes and cables are before you hit them.

**REMEMBER:** There is no safe ground that “will not collapse”.

Trench sides can collapse without any warning. Never drive too close to an excavation.

Don't carry passengers.



*Figure 8. Never Carry Passengers*

## Transport

Site vehicles must only be driven by a person competent and authorised to do so. Stick to this rule, for your own safety and the safety of everyone on site:

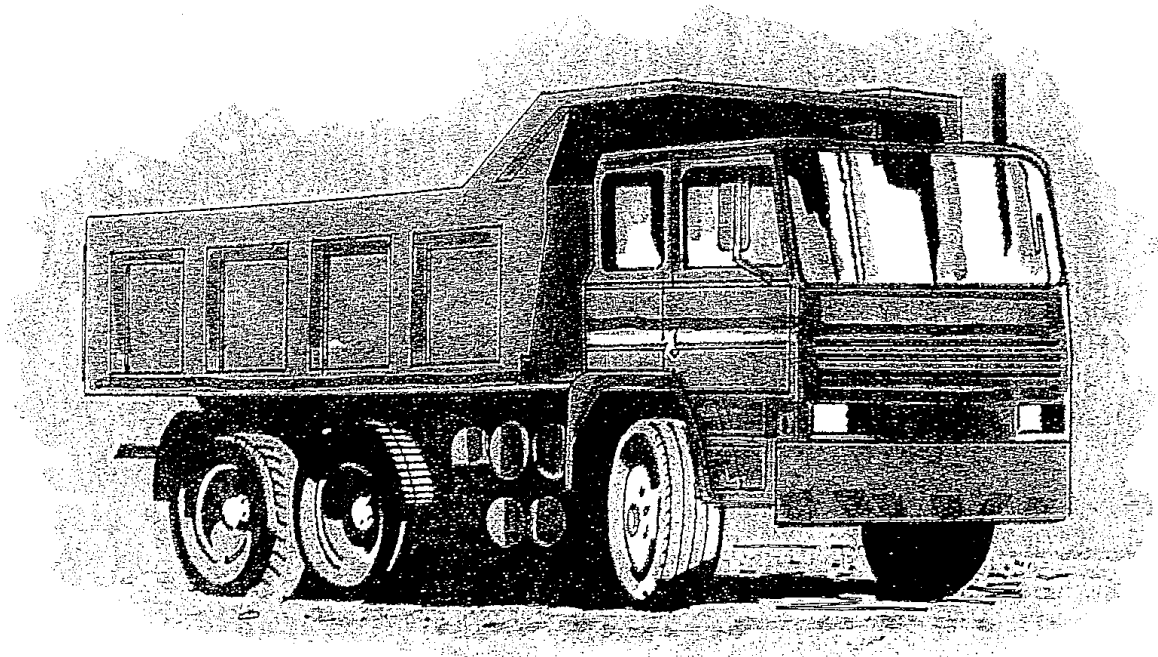
All vehicles should work properly. Ensure the steering and brakes are okay.

Get help when reversing.

Switch off engine, remove keys and starting handle when leaving a vehicle.

Never carry anybody on a vehicle not designed for passengers.

**REMEMBER** sloping sites are inclined to kill – take extra care.



*Figure 9. Excavation Work*

## Cranes

Avoid, if possible, walking under or too close to a raised load. The crane itself must only be operated by someone who is fully trained and is over eighteen. It must be inspected each week and regularly examined by a competent person.

The weight of the load must be carefully estimated.

The crane must be fitted with an automatic safe load indicator (one that works).

The crane must always work on a hard, level base.

The load must be properly fixed and secured.

The Banksman must be trained to give clear signals.

**NEVER, NEVER** be carried with a load.

A wire rope must not be used when more than five per cent (one in twenty) of the wires can be seen to be broken in any ten diameter length.

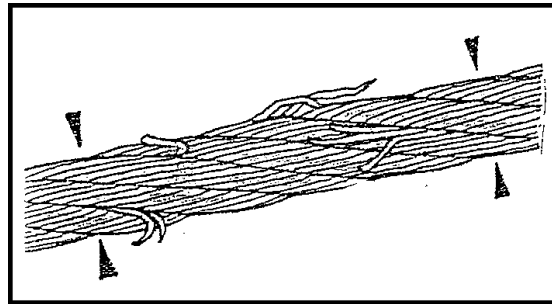


Figure 10. Frayed Rope

All loads, irrespective of shape or size, should be slung so that their centre of gravity fall immediately below the crane hook. Slings may need to be of different lengths to achieve proper balance

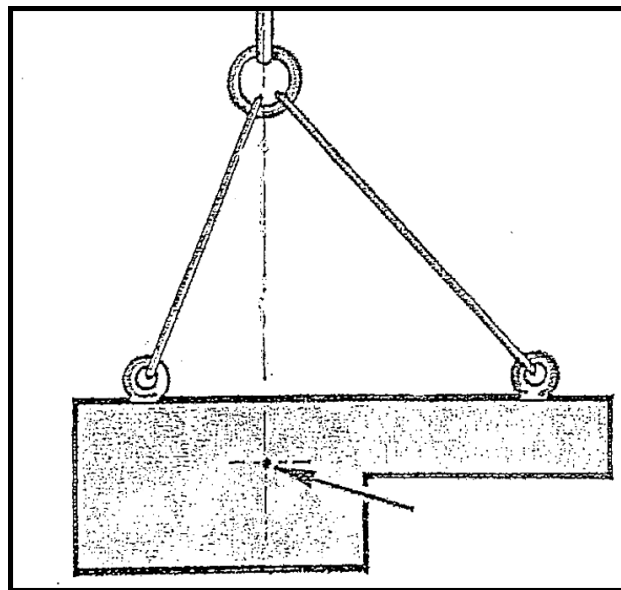


Figure 11. Centre of Gravity

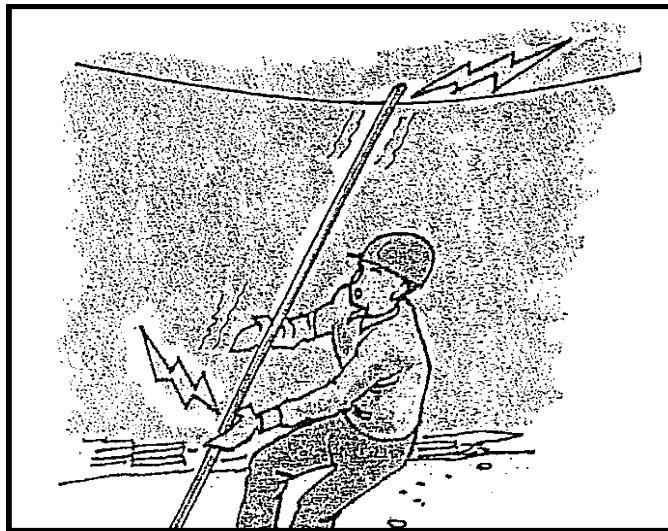
## Electricity: A Killer when Misused on Site

Electrical accidents, many of which are fatal, are often caused by contact with

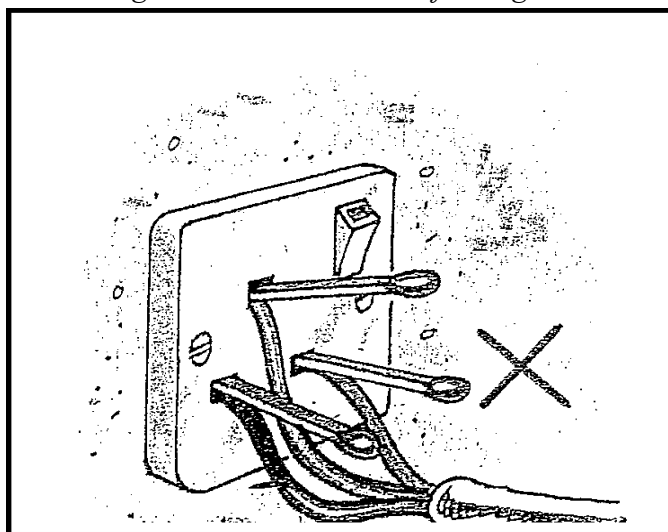
- Underground or overhead power lines.
- Unsuitable or badly maintained equipment.
- Bad connections to the supply.

Here's how to handle electricity on site:

- Treat electricity with respect.
- Check constantly that cables are not damaged or worn.
- Keep trailing cables off ground and away from water.
- Never overload or use makeshift plugs and fuses.
- For mains voltage, screened cables must be used and circuits must be protected by proper circuit breakers.



*Figure 12. Watch out for High Wires*



*Figure 13. Never use Makeshift Plugs*

## Portable Power Tools – Portable Power Danger

Always use the right tool for the job and don't make do with a defective tool.

Check all tools before use (ensure they are properly earthed).

Don't adjust power tools unless the supply is disconnected.

Always be careful of angle grinders and power saws and check suitable guards are fitter and used.

They must operate at a reduced voltage (110V).

### Cartridge operated tools

Always follow maker's instructions.

Keep in a secure place when not in use.

You should be trained to use all tools.

### If working on hard material wear goggles

Don't be blind to the risks.



*Figure 14. Portable Power Tools*

## How to Handle Platform Hoists

A hoist must be protected by an enclosure and fitted with access gates where required. The law says it must be inspected once a week and thoroughly checked out by a qualified person every six months. When you're using a hoist remember

### NEVER

- Do so without authorisation.
- Overload beyond the safe working.
- Load (S.W.L.).
- Ride on the platform.
- Mess around with the mechanisms.

If the hoist is in use there should be a clearly understood signalling arrangement so everybody using it knows what's going on.

Finally **NEVER** walk under a hoist.

- Landing Gates
- Landing Gates.
- Hoist Enclosure.
- Hoist Mast Tied into Building.
- Hoist Operated From One Position Only,
- Giving Driver Unobstructed View.

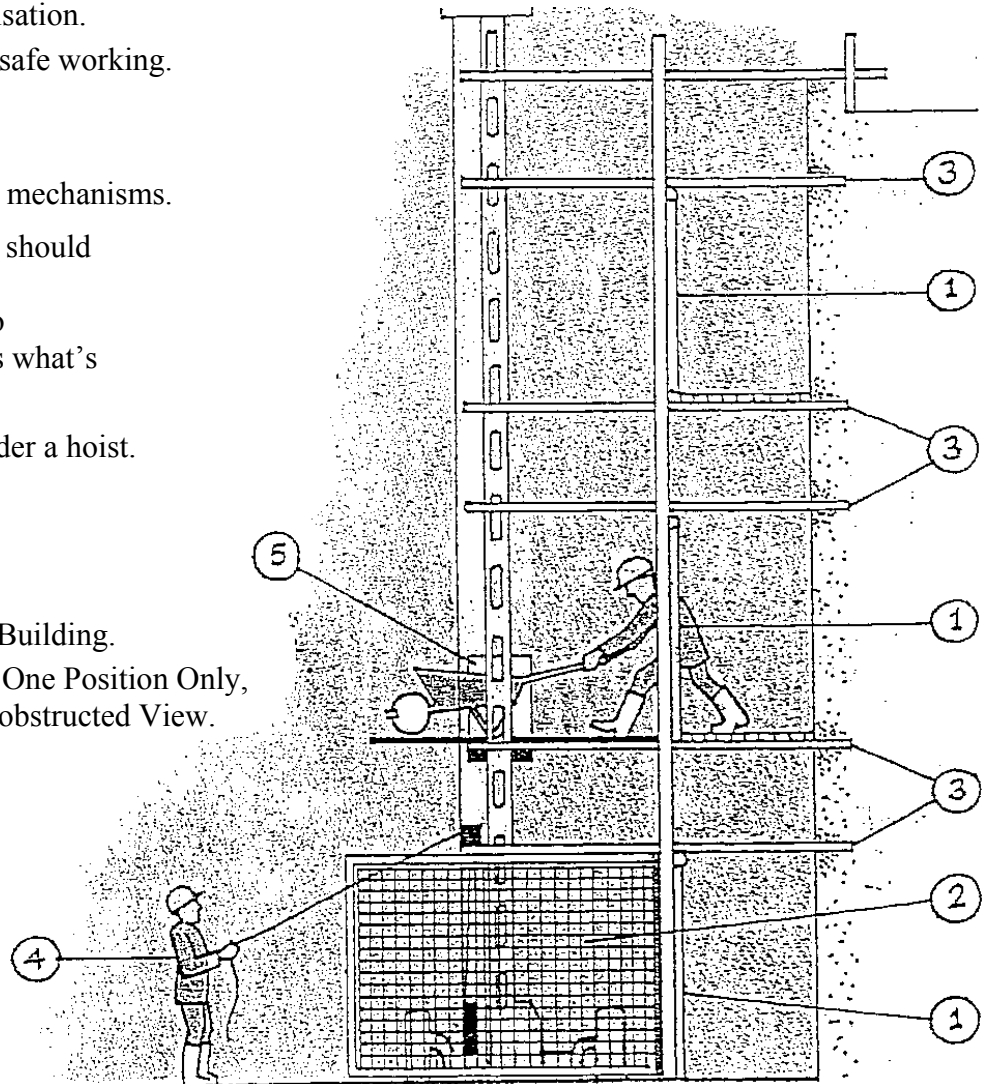


Figure 15. Sketch of Goods Hoist

**Note:** The wire mesh surrounding the hoist way has been omitted allowing detail to be shown.

## Lifting by Hand can Damage Your Back

Lifting weights that are too heavy for you, or just lifting weights the wrong way, will do your back a permanent damage.

You may feel the damage straight away or, more likely the back pain will show up over time. It is very easy to avoid this back damage. It just takes commonsense.

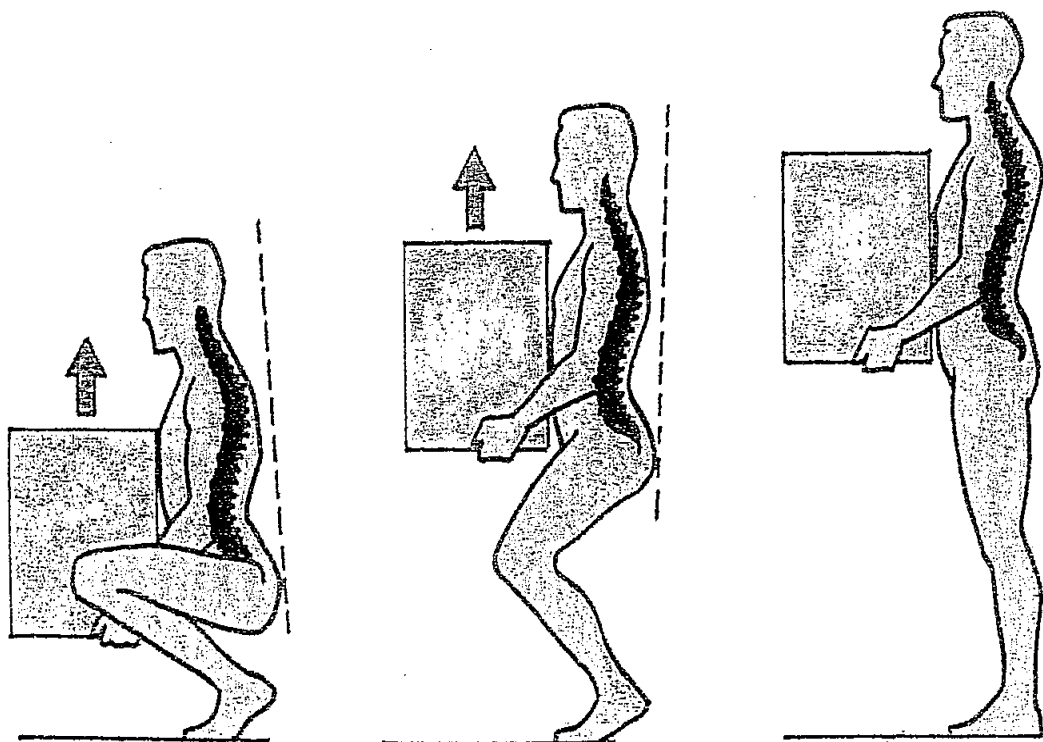
Get a good grip, keep the load close to your body.

Keep the back straight.

Bend your knees, lift your leg muscles not your back.

If it's too heavy, get help.

Start lifting sensibly if you don't want to end up permanently disabled with a bad back before you're 30.



*Figure 16. Correct Method for Lifting*

The correct method of manual lifting is to use the strong leg and thigh muscles and to maintain the natural shape of the spine through the lift.

## Watch your Health

It's so precious you don't notice it until it's gone. There are many causes of ill health in construction:

**Dust** - plaster and mineral fibres – cause chest problems.

**Paints** - there are many different types ranging from harmless to toxic.

**Glues** - cause chest problems.

**Welding** - causes eye damage “arc eye” and chest problems from fumes.

## Dangerous Chemicals

Read all instructions carefully. Only handle if the correct safeguards are in place. Make sure you use only in well-ventilated areas otherwise you will have to use breathing equipment.

Always wear the right protective clothing. Usually damage to health is a slow process, it doesn't happen overnight.

**Asbestos** - is deadly. The law requires strict precautions to be taken.

**Cement** - can severely damage your skin, causing a disease called dermatitis. You must have proper washing facilities and suitable gloves if you are handling cement.

## Your hearing

If the noise is loud enough to prevent you hearing normal conversation, the noise level is dangerously high and you could, in time, go deaf.

Equipment should be fitted with silencers.

Wear ear defenders, when noise is unavoidable.



*Figure 17. Hearing Protection*



## Welfare and First Aid

You should wash your hands thoroughly before eating and before going home.

On every site

There should be proper toilets.

Washing facilities must be provided.

There should be a place where you can eat in comfort.

There should be a well-maintained first aid box.

There should be someone who knows about first aid.

All accidents should be reported and recorded.

EVERYONE should know where the nearest phone is so they can call an ambulance (999) in an emergency.

These are your facilities, don't mess them about.



## Fire

Make sure you know where the fire fighting equipment is kept.

Make sure you know how to use it.

Always obey no smoking signs – there may be flammable liquids.

Know how to call the Fire Brigade.

## Protective Clothing

Every effort must be made to make the site as safe as possible, and not rely on protective clothing alone.

HOWEVER there are many situations where safety is only possible if you wear correct protective clothing.

The employer must provide this and maintain it.

You must wear it.

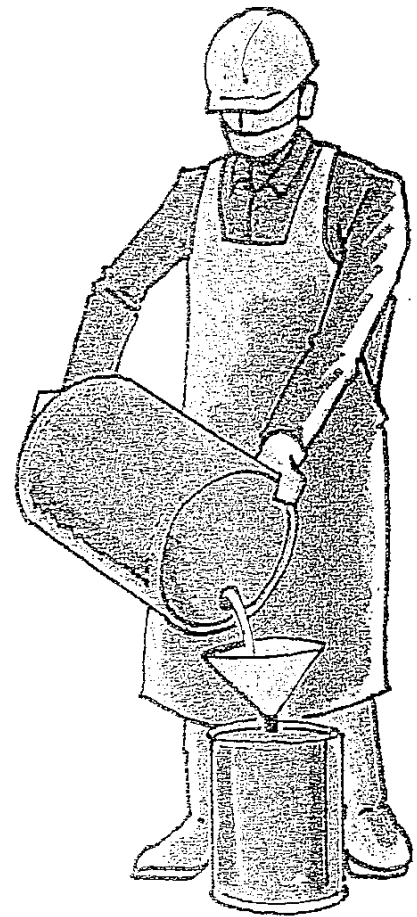
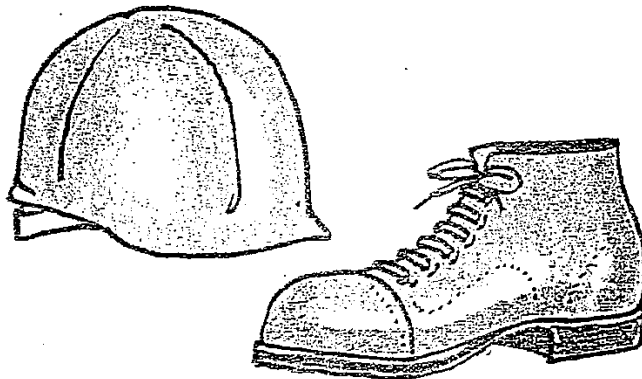
### In general

Safety helmets must be worn on all construction sites.

Hard-toed footwear should be worn.

Goggles, ear defenders and gloves may be necessary.

It is up to you to report any loss or damage to the protective clothing provided.



---

## You, Your Safety and the Law

The Safety, Health and Welfare at Work Act came into effect in November, 1989. It was put together with the co-operation of trade unions, employers' organisations and government. Its single aim was to prevent accidents and illness in the work place.

The Health and Safety Authority representing workers, employers and Government, was set up to put the Act into effect. With your support, we will make the work place as safe as possible.

**EMPLOYERS** must provide a safe and healthy work place. There should be safe work practices. Protective clothing and equipment must be provided where required. Everything must be maintained and kept working safely. There must be someone who can give advice on health and safety to workers and there must be welfare facilities. The employer must also ensure the safety of people who are not employed by him but who are affected by the work.

In every work place the employer must identify all the hazards to health and safety and ensure suitable safeguards. This must be written in a Safety Statement. All employees and others who may be affected by the work should have access to the Safety Statement. All employees have the right to be consulted about all aspects of health and safety.

**DESIGNERS AND MANUFACTURERS** must ensure that equipment and substances for use in the work place are safe to use and that full information about them is made available to the people who use them.

**EMPLOYEES** are required to take reasonable care of their own health and safety and that of others affected by their work. Employees must also co-operate with the employer in obeying the law and by following all the necessary safeguards.

Thanks to the new law it is no longer acceptable for anyone to gamble with the safety of their workers. There are severe penalties for those who disregard this law.

### If your work is not safe

Speak immediately to your supervisor.

The safety representative or trade union representative.

### If there is no action

Call the Health and Safety Authority at the addresses and phone numbers overleaf. (In confidence if you want).

We can arrange for immediate action where necessary.

**Safety is team-work.**

---

## Health and Safety Authority Addresses and Phone Numbers

### Headquarters

#### *Health and Safety Authority*

10 Hogan Place	Tel	01-6620400
Dublin2	Fax	01-6620417

#### *Athlone Regional Office*

Government Buildings	Tel	0902-92608
Pearse Street	Fax	0902-92914
Athlone		
Co. Westmeath		

#### *Cork Regional Office*

Government Buildings	Tel	021-964900
4th Floor	Fax	021-961663
Sullivan's Quay		
Cork		

#### *Drogheda Regional Office*

Abbey Centre	Tel	041-38536
West Street		
Drogheda		
Co. Louth		

#### *Galway Regional Office*

Newtownsmyth	Tel	091-63985
Galway	Fax	091-64091

#### *Limerick Regional Office*

11-16 O'Connell Street	Tel	061-419900
Limerick	Fax	061- 419559

#### *Sligo Regional Office*

Government Offices	Tel	071-43942
Cranmore Road	Fax	071-44078

*Waterford Regional Office*

Government Buildings

Tel

051-75892

The Glen

Waterford

## Self Assessment

### Exercises:

Answer sample questions on Exercise N0. 2.2.1 in the curriculum document.

1. Name five potential hazards that could be encountered when working on construction sites.
2. List four items of personal protection equipment necessary for working on construction sites.
3. Describe the safety precautions to be taken when using a gas torch in a timber roof spaces.
4. Describe two safety precautions to be taken when working in or near a trench.

The following pictures show accidents and injuries which were caused by unsafe acts.

Go to your instructor and ask him/her to write down the picture numbers of the accidents that could happen in your own class. Then ask your instructor to foreman to tell you how to avoid the same accidents and injuries.

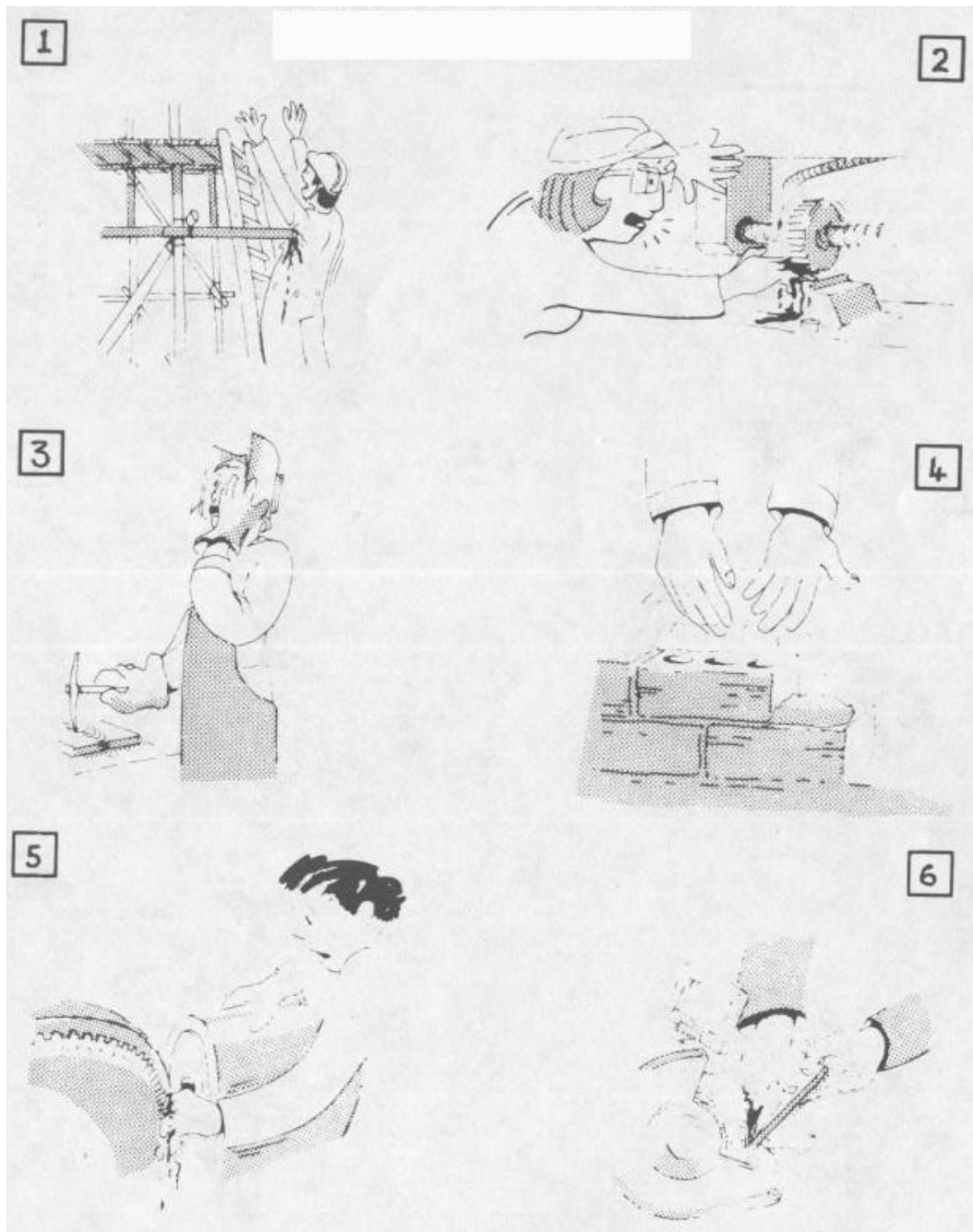


Figure 18. Safety Questions 1 to 6

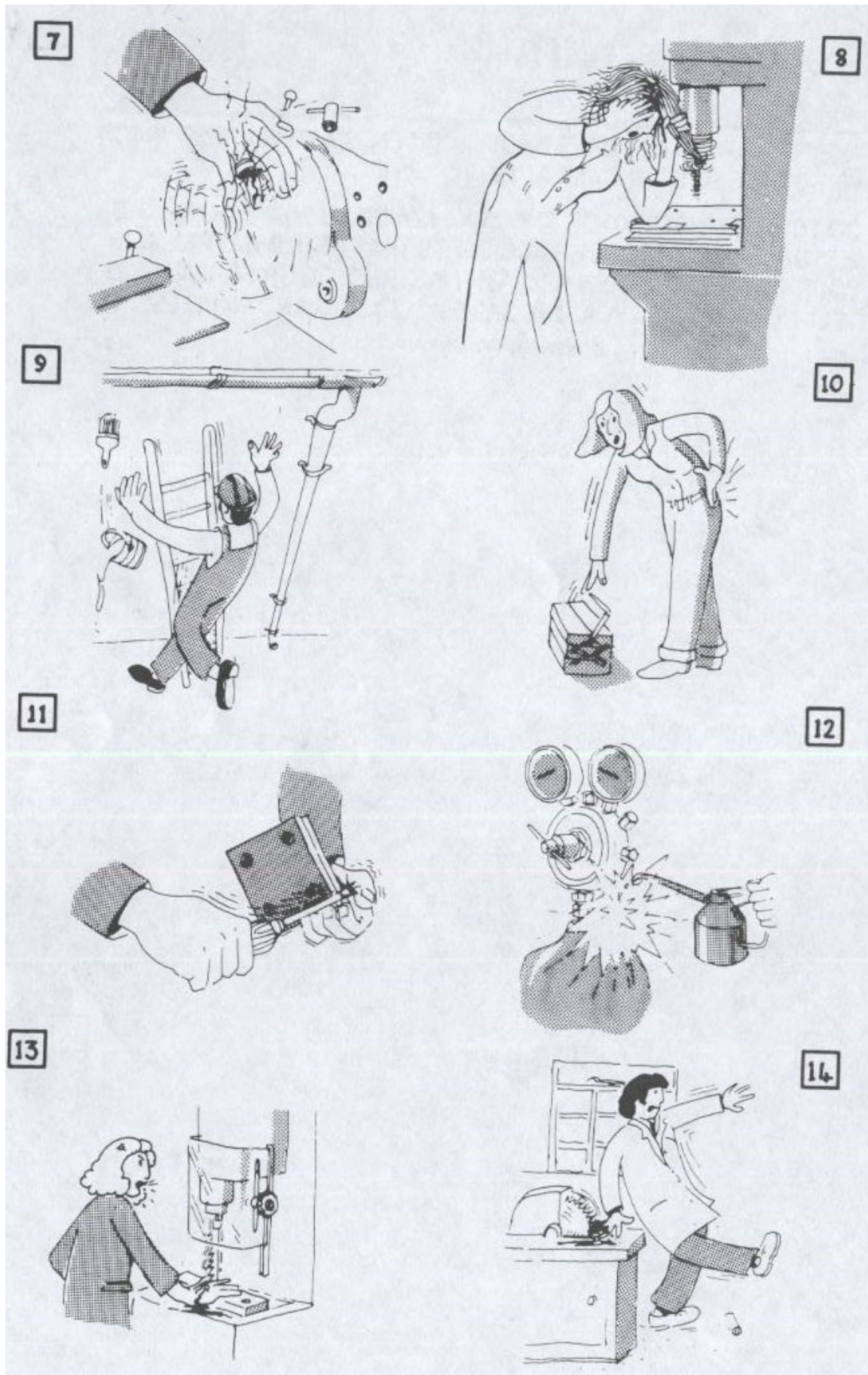


Figure 19. Safety Questions 7 to 14



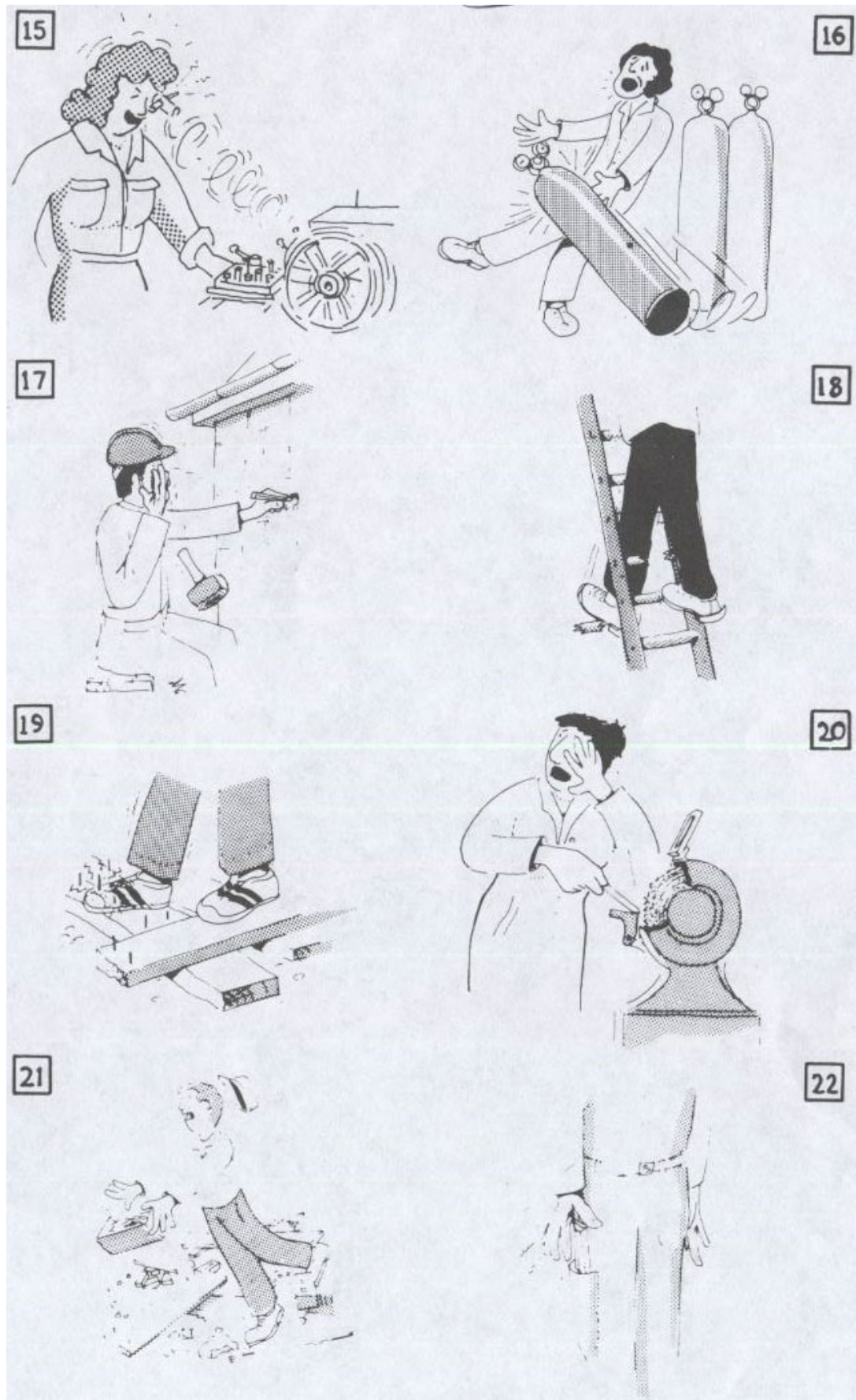


Figure 20. Safety Questions 15 to 22

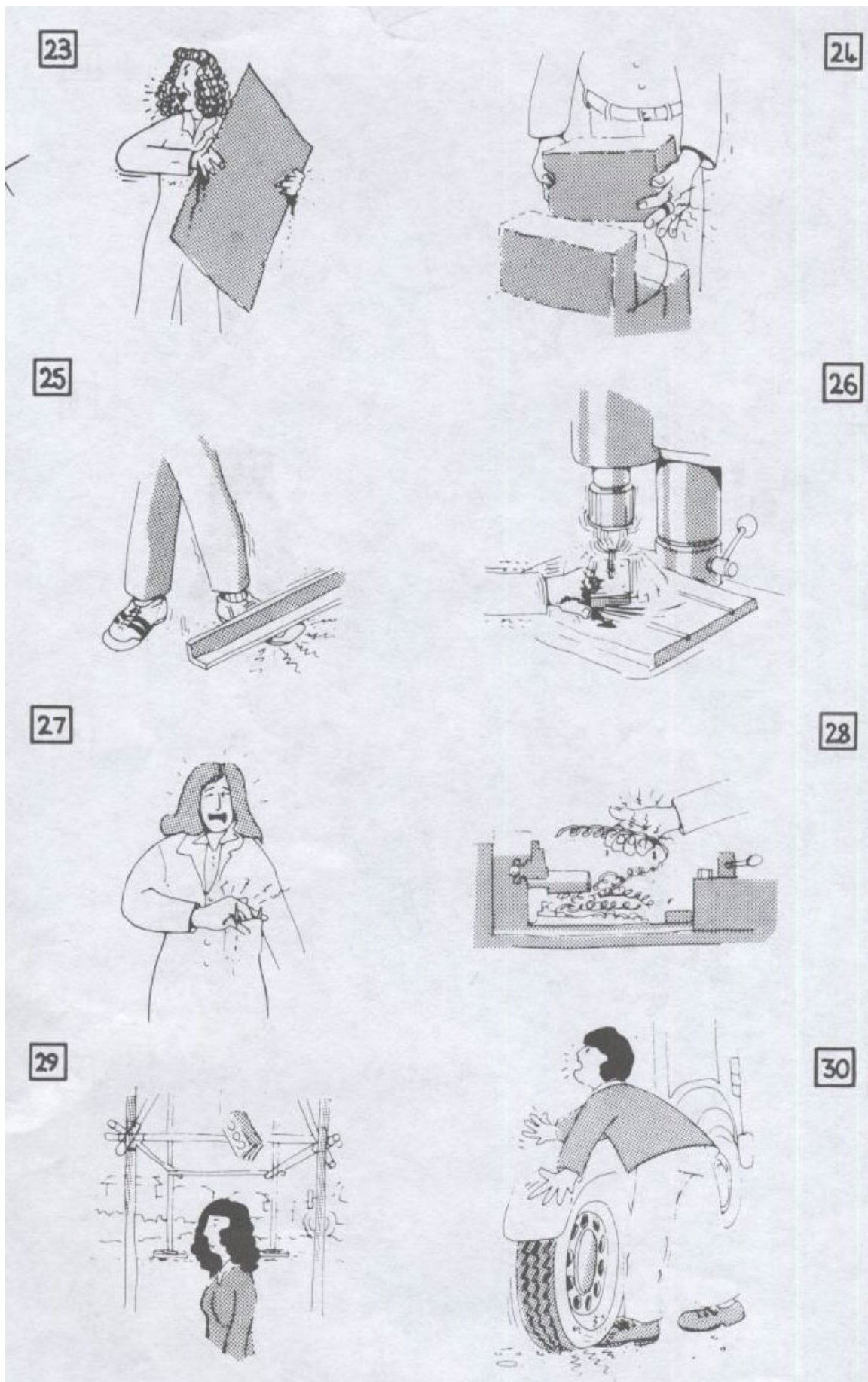


Figure 21. Safety Questions 23 to 30



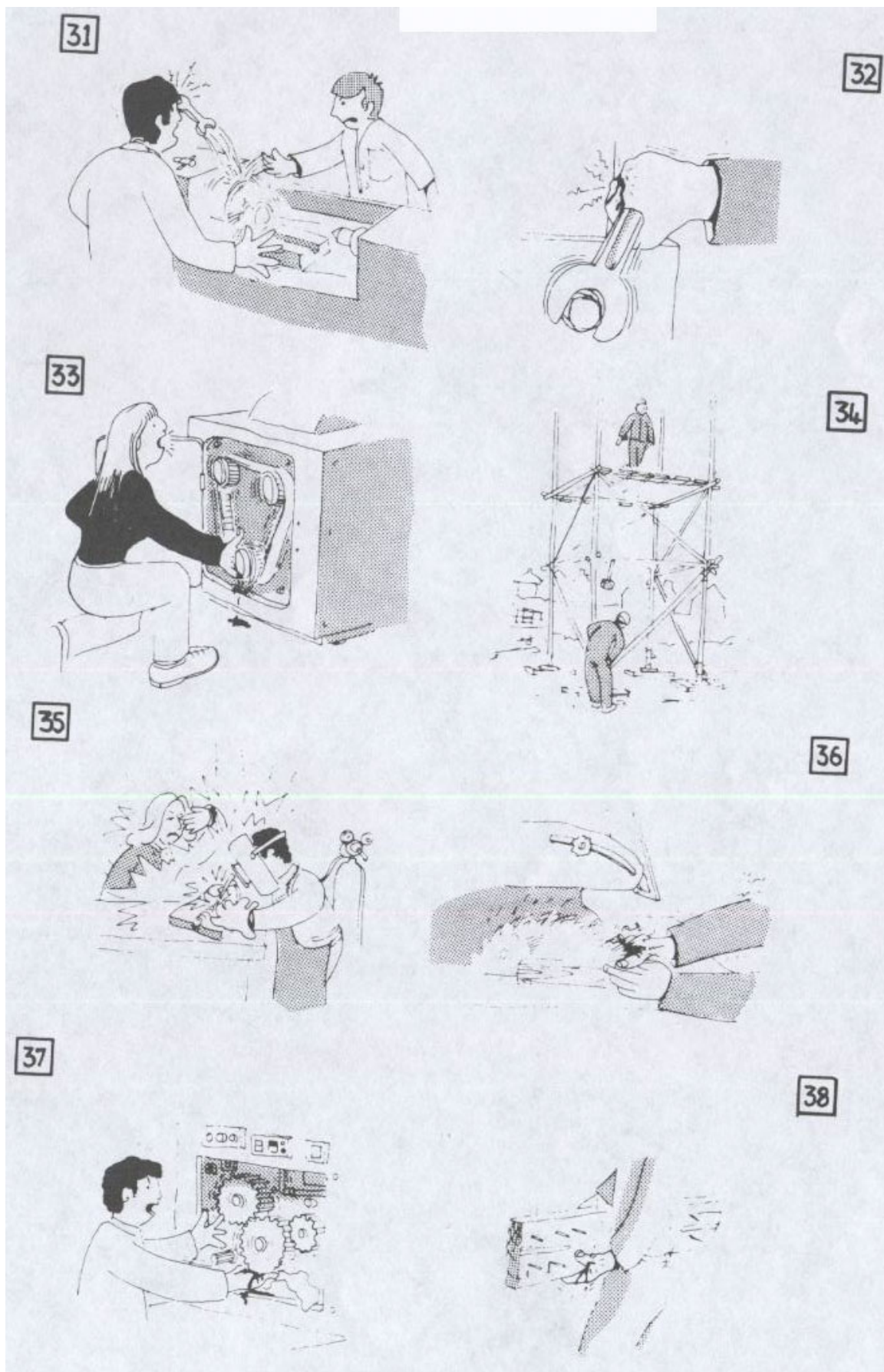


Figure 22. Safety Questions 31 to 38

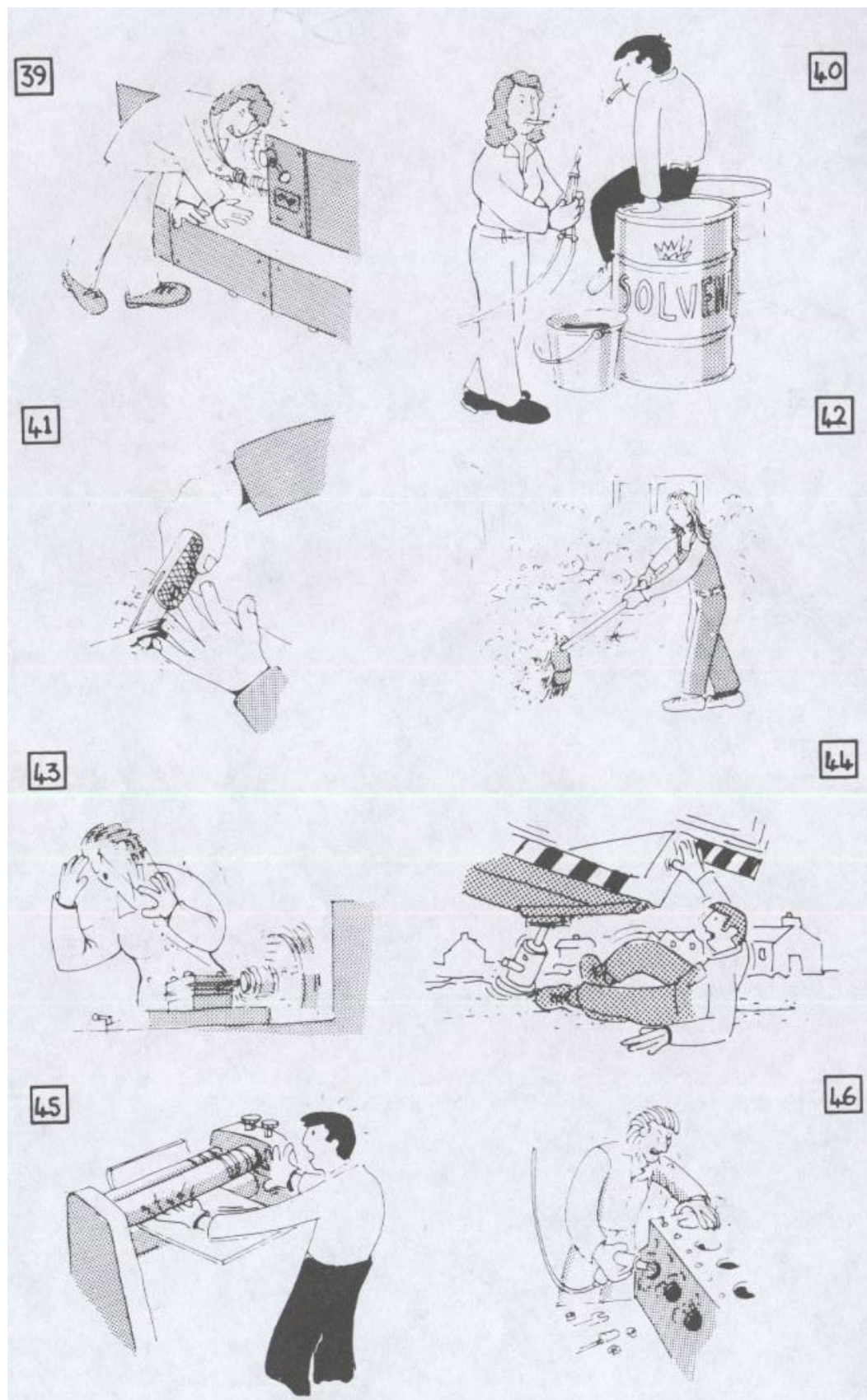
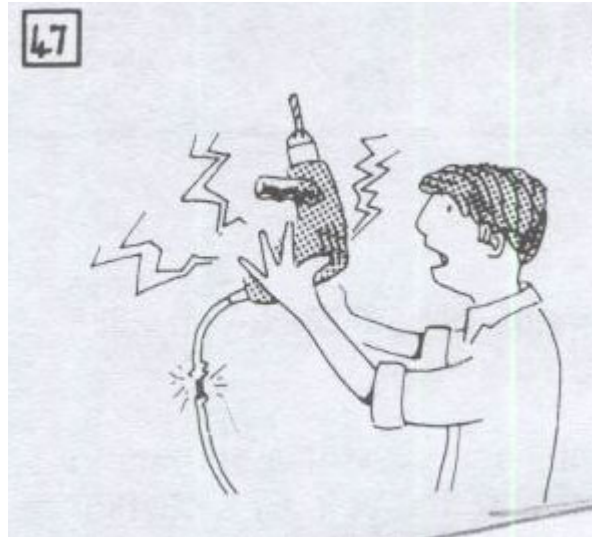


Figure 23. Safety Questions 39 to 46



*Figure 24. Safety Question 47*

## Self Test Questions

Questions	True	False
Place a ✓ in the True or False box for each question.		
1. Safety hair caps are used only to keep dirt off your hair?		
2. Running smooth shafts are not dangerous?		
3. Loose and unbuttoned clothing is alright to wear in the Training Centre?		
4. All empty drums and containers are safe?		
5. Spilt oil on the floor is not your concern?		
6. When passing a place where chips or dust are flying turn your head away?		
7. It is sometimes alright to work a machine without a guard?		
8. If you feel ill or sick, it may go away?		
9. It is not necessary to get first aid for small cuts?		
10. There is no need to worry about your head, it is good and hard and can protect itself?		
11. Sometimes it is necessary to take a chance and make adjustments to a machine or tool without being too clear about it?		
12. If you spot things in an unsafe place it is not your concern?		
13. Always bend your back when lifting?		
14. Most accidents are caused by unsafe acts of people?		
15. Dermatitis is a disease of the scalp?		
16. Whenever you finish your work, wash your hands?		
17. It is alright to wear dirty clothes in the Training Centre?		
18. The bones of the spine have nothing between them?		
19. It is not necessary to wear hearing protection while working an Angle Grinder?		
20. Always wear gloves when working on a drilling machine?		

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