Manual on Maintenance & Minor Repairs on Buildings

"Schools Lasting Longer"

for Schools, Hostels, Offices Farms, Guest Farms, Lodges

including Tips on Environmental Best Practices

A Manual on Maintenance & Minor Repairs on Buildings

for Schools, Hostels, Offices, Farms, Guest Farms, Lodges

incorporating

"Schools Lasting Longer"

including

Tips on Environmental Best Practices

Contents

Acknowledgements

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Please contact either of the stakeholders for copies. Please see the disclaimer on page 174 for printing and / or distribution rights.

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Introduction Cleaner Production

Purpose of this Booklet

The 1st Edition of this booklet was funded and produced by Africa Groups of Sweden. This 2nd Edition has been reprinted with the permission of Africa Groups of Sweden. The Cleaner Production Component initiated at the Ministry of Environment and Tourism's Directorate of Environmental Affairs in January 2005 has supported development of this second edition. The duration of component implementation is three years, to 2007. The difference between the 1st and this 2nd Edition is the addition of a comprehensive and user friendly Environmental Best Practices Section.

The booklet provides a link between good infrastructure maintenance and Cleaner Production (CP) Concepts. The booklet is a complete package on how the CP concept brings together economic interests and environmental concerns, making businesses, schools and households more accountable to their own resources consumption and maintenance, while helping Namibia grow in a sustainable way. It provides a framework to promote the environmental best practices in line with the Government's long-term development plan, Vision 2030. In addition, the booklet serves as a reference for public and private sector institutions, businesses, schools and individual households.

In general the principles of CP are universal in nature. The application of CP though, depends on the local context. Each household, school, workplace, society, locality, town, region or country presents a unique set of challenges and opportunities for the implementation of CP. Therefore, the text in this booklet attempts to provide a universal framework for good environmental management which, in turn, can be used as a basis for local development of the CP concept and other good environmental management tools.

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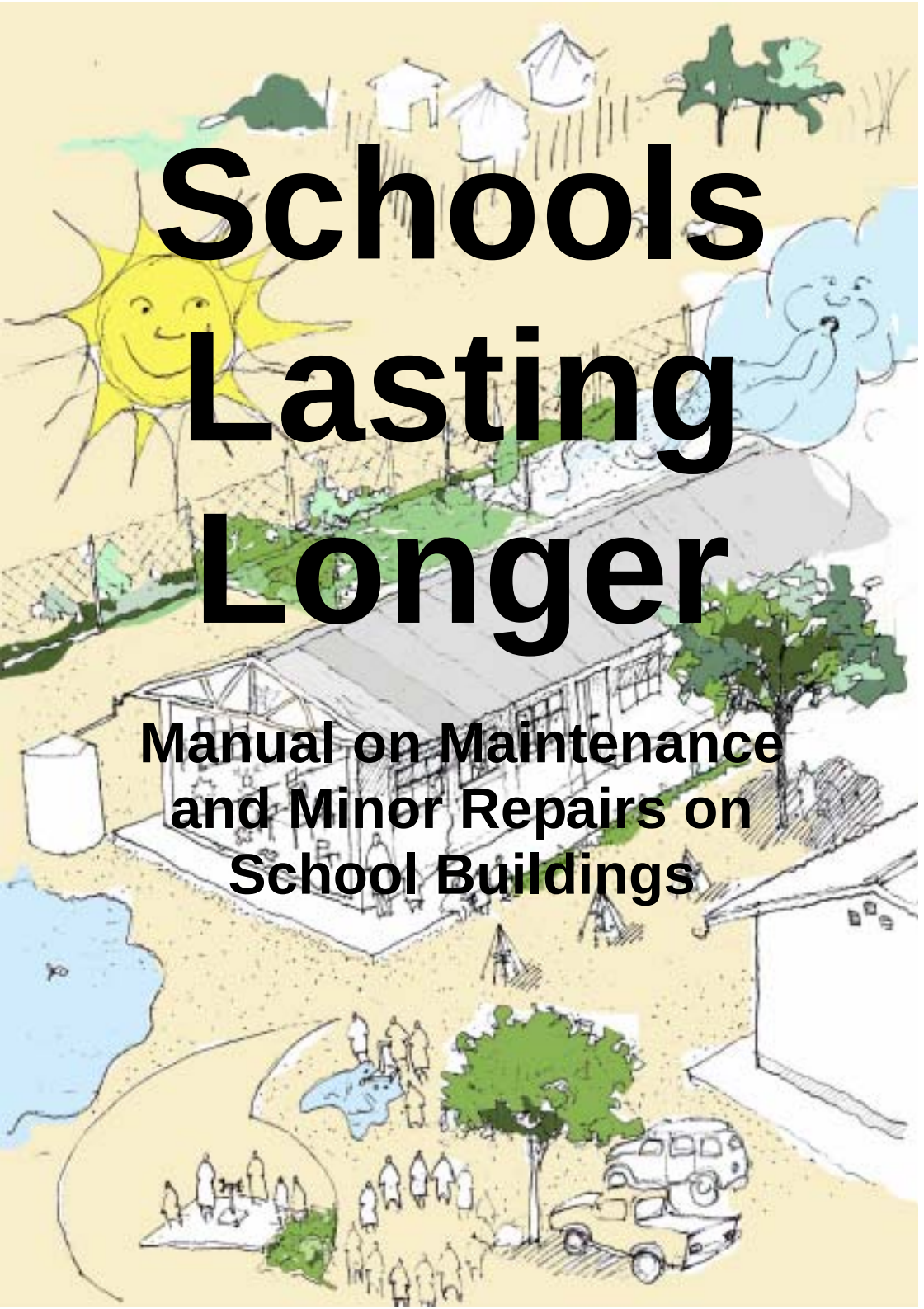
Ministry of
Environment and Tourism

Schools Lasting Longer

Manual on Maintenance and Minor Repairs on School Buildings



Schools Lasting Longer

The manual for maintaining Namibian Schools

Foreword

Since independence the Namibian government, together with it's partners, has worked extensively to eradicate the backlog of educational facilities. Many new classrooms have been constructed and others have been renovated. It is, however, only with good maintenance that these buildings will continue to offer learners and teachers a pleasant and useful working environment. The Education Act of 2001 gives each School Board a larger responsibility for the maintenance of their facilities. To successfully take on this responsibility the schools will need skills and insight in the planning and organisation of maintenance as well as in the practical measures. It is our belief that this manual will be an important tool for the schools. It describes how to plan, implement and follow up maintenance and gives step by step instructions on how to take care of and maintain Namibian schools.

Africa Groups of Sweden has worked with local involvement in rural schools for several years through community-based construction in northern Namibia. Africa Groups of Sweden has now addressed community involvement also regarding maintenance by developing this manual. In the process the two pilot schools involved, Oshakati SPS and Onamutai CS, has provided useful insight to complement the knowledge gained through construction. The EU Socio-economic Integration Project has taken this work one step further by training unemployed people in aspects of maintenance that requires technical skills beyond the scope of school staff and has provided additional material to the manual.

I would like to express my appreciation to Africa Groups of Sweden and the Socio-economic Integration Project funded by the European Commission for assisting the Ministry of Basic Education, Sports and Culture in our process of decentralising school maintenance and for producing the "Schools Lasting Longer" maintenance manual.

John Mutorwa
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1 Introduction

1.1 What is Maintenance?

Maintenance is to take care of the building to keep it in good shape

Everyday preventive maintenance like cleaning, fixing loose parts, oiling hinges, watering and protecting plants, repainting etc. is very important.

Without this basic maintenance things will get old and useless quickly and it will be more complicated and costly to fix them.

Corrective maintenance or minor repairs come after failure. Examples of corrective maintenance are: fixing broken window panes, replacing broken or missing parts, fixing padlocks, repairing broken furniture, fixing leaking taps etc.

When a damage is already there Maintenance is to restore it to a condition so that it can perform its intended functions.

To fix those minor repairs the school will need some tools and material. Often the minor repairs can be done by a handy person at the school or the school community. Try to find out which practically skilled persons are around.

You can always ask the supplier for advice concerning the products you need. Often the supplier has information booklets and personnel that can instruct.

Emergency maintenance is necessary immediately to avoid serious consequences.
Examples of emergency repairs are: electrical repairs, serious blockages, big leakage, big structural cracks etc.

The school will need to take help from an expert to deal with the emergency maintenance.

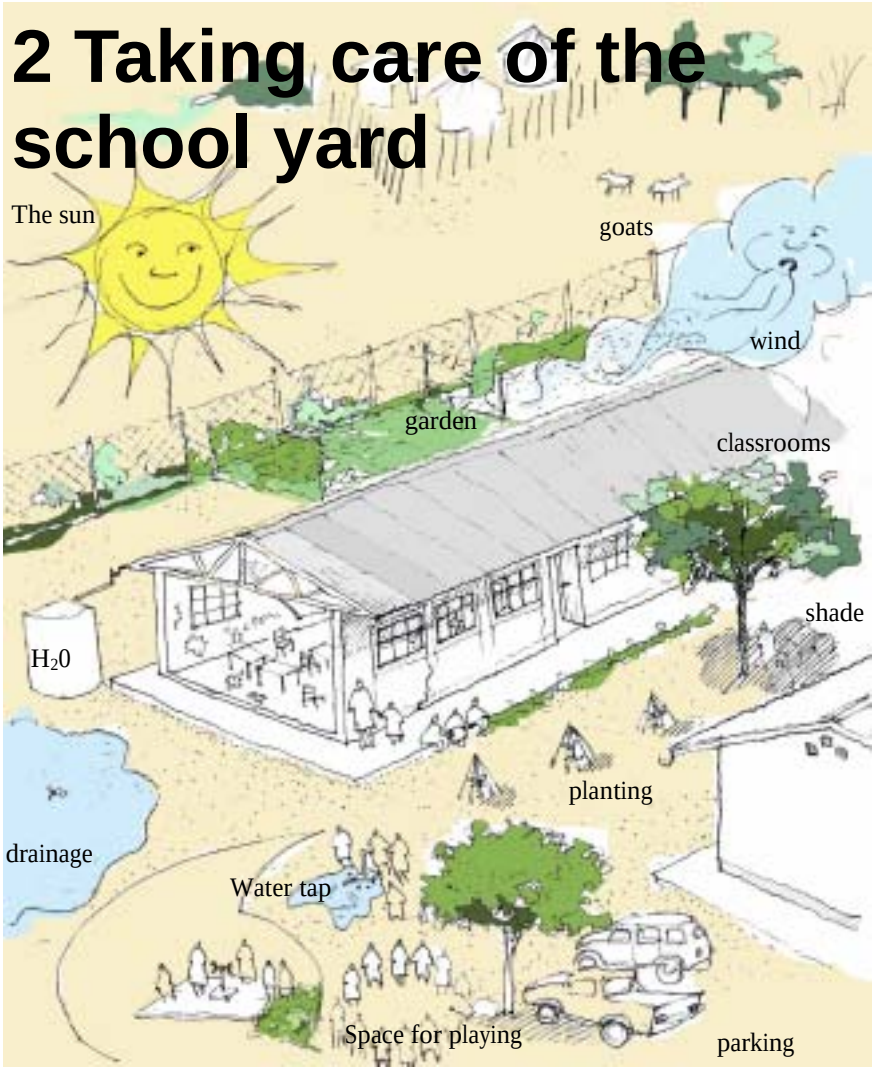
The emergency maintenance needs to get immediate attention and is often too complicated for the school to solve it by itself. The school should contact the Circuit Inspector about the issue.

1.2 Maintenance is Important

The impression created by the school premises is important because it helps to create a homely environment. With maintenance being done on the school buildings they will last longer and be kept in good shape looking neat and representative. The children will feel more at home and parents will be proud to send their children.

If the learning environment is a good one, the kids will learn better, the teachers will teach better and the children will take will take the same caring attitude with them home.

2 Taking care of the school yard



There are many things to attend to on the school premises. Is the fence in good shape? Are there enough places to sit? To play? To be in the shade? Is there a place for parking without passing across where children play? Are the gutters cleaned from leaves? Is the water tank OK? Are parts of the school yard under water during the rainy season? How is the rubbish collected and burned? Does the wind blow strongly sometimes (it's good to have a windscreen on the eastern side). Is the school planting enough? Does the school have a compost heap? Is the school clean? Are the window panes broken? Is the floor in a bad shape? ...

2.1 Planting

Plant many trees in your school yard
Trees break the wind, protect crops and soil, give shade (sometimes fruit) and they add a nice atmosphere to the school.

Dig a wide and kneedeep hole. This will loosen up the hard soil so that the roots can grow freely in the soil.Then you fill the hole with water and let it sink away.

Mix the soil with manure (from goat or cow), six parts soil to one part manure.

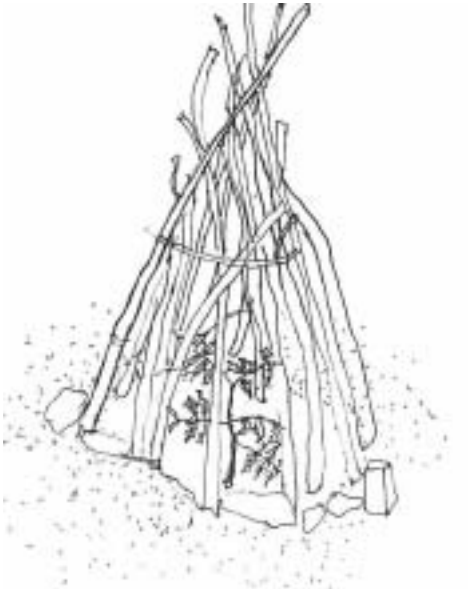
1 Fill the hole with mixed soil. Make a hole big enough for your poly pot.

2 Remove the poly pot carefully. Do not expose the roots to the sun.

3 Quickly place the seedling in the hole, water and cover it well with wet soil

In the beginning you need to water often, sometimes 2-3 times a day. Check the leaves! When they are hanging it is time to water. When the plant is stronger it might be enough to water once a week. This should be maintained for the first year after

4 It´s important to mulch with dead leaves, grass and branches on the ground around the plant. This protects the soil from loosing too much water.



Build a fence around the seedling to protect the plant

Weed around your plant.
If a tree branch is broken make a nice cut with a sharp tool (knife).
Let the children be responsible for the trees. Make sure that someone looks after the plants and waters during school holidays

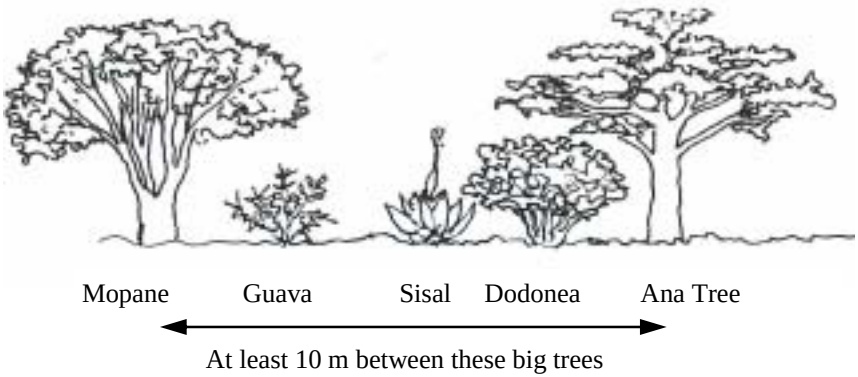
2.1.2 How to transplant (move plants)

Most plants are movable when they are small or medium sized. Water the plant 3-4 days before you move it. This is to make the soil soft. Dig it up carefully, so you do not damage the roots.
Don't take out the sand from the roots.
Plant the same way as you plant a tree seedling in a polypot. The best time to plant is just before or during the rainy season, from September to March.

2.1.3 How to enrich the soil

If you have poor soil, try to enrich it with more organic matter.
A dark soil is usually a sign of fertile soil.
Dead leaves, grass and roots are organic matter and improve the soil. Do not burn them. Add them to the soil!
Clay from the oshanas also enrich the soil.
You can fetch fertile soil under trees in your neighbourhood to enrich your planting areas.

2.1.4 Distance between trees



The distance between trees that will grow big, should be at least 10 metres. You can plant them closer but if they all survive you will have to remove some later. Do not plant trees too close to the buildings or drains, as the roots could cause damage to the foundations or block drains.
Plant bushes (guava, tecoma, pepperbush) next to the trees to fill up the space between them (see more about distance between trees under 'Trees Recommended for Schools in Namibia')
It is nice to plant the evergreen trees together with the ones that loose their leaves in the winter. Then some trees in that area will always be green.

2.1.5 Trees Recommended in Namibia

Name English	Oshiwambo	Latin	Benefits/ Minimum Distance between Plants
		Acacia Mangium	Shade, beauty, quick, evergreen (at least 5 meters between trees)
Silky Oak		Grevillea	Shade, beauty, evergreen (at least 5 meters between trees)
Cotton Palm		Washingtonia Robusta	Shade, beauty, evergreen (at least 5 meters between trees)
Baobab	Omukwa	Adansonia digitata	Shade, beauty, fruit (at least 10 meters between trees)
Sausage tree	Omuhaka	Kigeria Africana	Beauty, best shade, evergreen (at least 10 meters between trees)
Bird Plumb	Omuve	Berchemia discolor	Shade, beauty, fruit (at least 10 meters between trees)
Marula	Omugongo	Sclerocarya birrea	Shade, beauty, fruit (at least 10 meters between trees)
Jackalsbessie	Omwandi	Diospyros mespiliformis	Shade, beauty, fruit (at least 10 meters between trees)
Syringe		Melia azedirach	Shade, beauty (at least 5 meters between trees)
Neem		Azadirachta indica	Insecticide, shade, evergreen (at least 5 meters between trees)
Jacaranda		Jacarande mimosaca	Shade, blue flowers (at least 3-5 meters between trees)
Flamboyant		Delonix regia	Shade, red flowers (at least 5 meters between flowers)
		Tecoma Stans	Beauty, yellow flowers, fencing (at least 2 to 3 meters between plants)
Leucaena		Leucaena leucocephala	Improve soil, fodder, fencing (3 meters between plants)

Name English	Oshiwambo	Latin	Benefits/ Distance between Plants
Ana Tree	Omano		Live fence, good timber, (1-2 m between plants)
Avenue Palm			Beautification, evergreen (5 meters between plants)
Guava	Omukwaava	Psidium guajava	Fruit, easy to grow (3-5m between plants)
Fig Tree	Omukwiyu	Ficus sycamorus	Fruit, shade (5 meters between plants)
Tamarind			Fruit, beauty (5 meters between trees)
Citrus	Omugongo	Citrus species	Fruit tree (5 meters between trees)
Granadilla		Passiflora quadrangularis	Fruit, shade, beautification, evergreen (2 or 3 m between plants) direct the branches to get good shade
Mango		Mangifera indica	Fruit tree, shade (5 meters between trees)

2.1.6 Planting Experiences at Onamutai CS

Site Plan Onamutai

1=Mopani, 2=Sausage, 3=Neem, 4=Jacaranda, 5=Flamboyant, 6=Leucaena, 7=Guava, 8=Eucalyptus, 9=Avenue Palm, 10=Cactus, 11='Ompalala', 12=Acacia Magnum, 13=Dodonaea, 14=Ana Tree, 15=Tecoma, 16=Matalani, 17='family of Casava', 18='Omanoluco', 19 Vegetable Garden, 20=planting area

Planting Area (number 20 on the situation plan)
With sausage trees, wild figs, Ana Trees Camifola, tomato, Aloe, Avenue Palm, Grenadilla, Tekoma Trees, Grenadilla, Cactus, Sun Flowers etc,

Onamutai Combined School participated in a Planting Workshop organized by Onankali Community Trust in spring 2002.

The plants recommended were:
Shade Trees: Melia, Sausage Tree, Neem, Leucaena, Tecoma, Marula, Bird Plum
Beautification Trees: Dodonaea (Windbreak), Ana Tree, Jacaranda, Flamboyant
Fruit Trees: Guava, Aloe, Papaya, Strawberries in the garden, Granadilla

Evaluation of Onamutais Planting done a few months after the workshop by Onankali Community Trust:

The school has managed to mobilize students and teachers in extensive planting work. School children and teachers have worked weekends using their own transport. The community also has been involved as trees have been transplanted from the neighboring area and also manure and fertile soil collected from the surroundings.

The children are responsible to take care of different trees. A winner receives a small prize at the end of the term.

In front of the administration block the school has managed to make a garden that is unique!

The plants have been planted at the right time and are well protected both by the school fence and by sticks around each tree.

Most difficult for the school has been the watering as there is only one water tap in the yard, despite this the plants are well watered.

The school appreciates the water tanks that collect the rainwater from the roofs during the rainy season.

The school sometimes have planted trees a bit too close to each other or to the buildings. In the future they maybe will have to move some of them. Some plants have strong roots that may crack the foundations. The branches might grow over the roof and their leaves contaminate the water that the school wants to harvest from the roof.

The school planted dodoneas on the eastern side of the school which was a good thing as most strong winds blow from that side. They will break the wind in the future.

All shade trees are planted between the buildings. This means there will be enough shade in the future.

Finally, Onankali Community Trust recommends the school to continue planting and also to encourage the community around the school not to cut trees and to plant more.

2.2 Disposal of Garbage

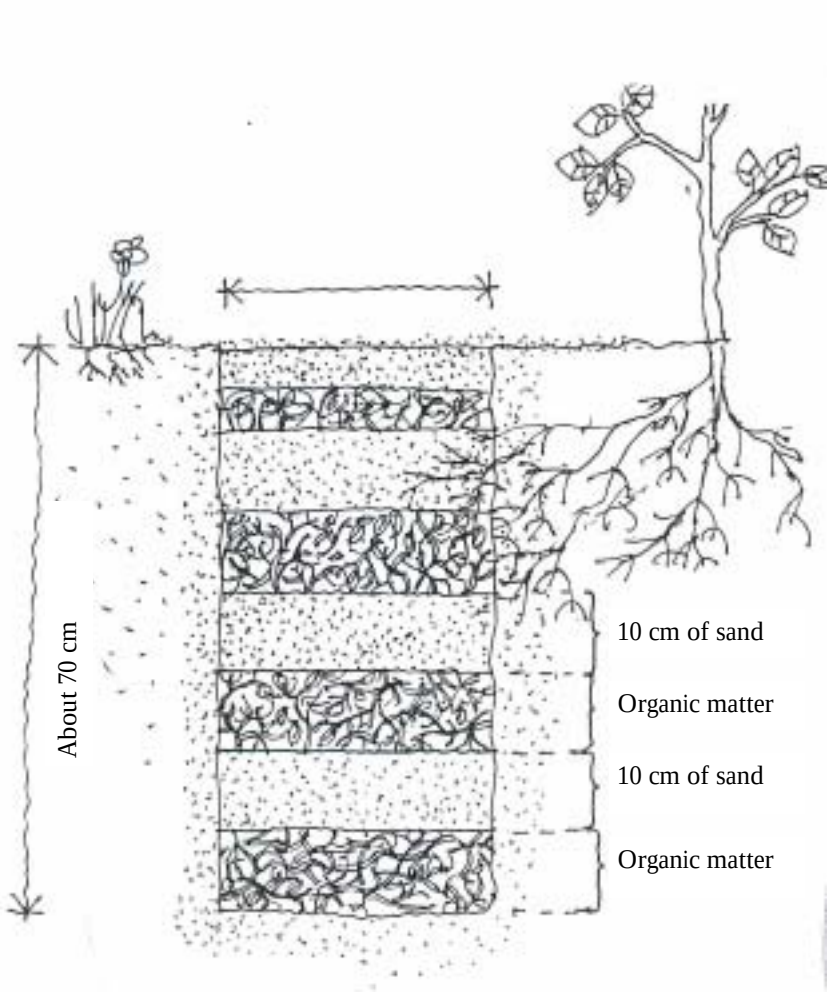
Don't mix garbage, different type of garbage can have different uses.

The recyclable garbage like certain glass bottles, aluminium tins etc. should be delivered back to the manufacturers or suppliers for recycling. Find out where your closest public post of collection is.

Of the non recyclable garbage try to reuse as much as possible. Here an example of how tins, bottles etc. can be used as poly pots.

Some part of the garbage can be burnt like soft plastics, papers and packages. Make sure you burn safely, always have water and shovels available to avoid spreading of fire. Be extra careful in windy weather. Make sure you extinguish the fire properly.
Never burn PVC (hard plastic) which emit gases such as hydrochloric acid.
Old batteries, left over painting material etc. should be removed from the school premises. Old batteries are very bad for the environment

Organic material, left over foods (not meat), leaves and branches can be composted to get good soil for gardening.



The compost hole. It is easy to do. You just need a space to dig and then you keep alternating sand with layers of organic matter. It is good to do the compost hole beside a newly planted tree, this way the tree roots will make use of the good soil. They will find their way automatically.

2.3 Evacuation of Water

During rainy periods water can accumulate in the school yard. This is unhealthy and it reduces the playing space. Try to fill the areas where water accumulates with sand.

If you don't have access to sand (maybe you are an urban school) then you can buy loads of earth (the same as is used for filling out for roads).

2.4 Termites

Termites eat wood. They can come through almost everywhere in their search for food destroying clothes, plastic etc. The Termites only fly during the mating season and usually live under the soil.

Different wood types are more or less resistant to termites but there is no wood that is completely resistant. Wood with cracks or other damage should be avoided.

To avoid termite attacks on the buildings the following should be done:

- Keep the surroundings (the school premises) clean from paper, wood parts and other material that attracts the termites
- Destroy the termite nests that are closer than 50 m from the buildings.
- Keep the school surroundings as dry as possible. Termites look for water as they need water too breakdown the cellulose (the food which they find in the wood).

If you have termites attacking parts of your building (trusses, wooden doors etc.) you better contact an expert before the termites spread more.
If you are living in an area where termites are a big problem you can check if your wooden structures are treated against termites. They can for example be painted with creosote.
Ant poison can be put on the ground. Don't do this yourself. It is very poisonous and you will need to know exactly where to put it

2.5 Conclusion

Remember that:
Planting will give

- Shade for the school children
- Fruit
- Improved atmosphere in the school yard
- Beautiful school yard

Sorting out of garbage is important when you want to recycle.
The school can take measures to avoid termite attacks.

3 Taking Care of the School Building

3.1 Cleaning

3.1.1 Cleaning is Important

If classrooms are clean and neat they are healthy and the users feel proud and caring.

All users of the school should be involved in keeping it clean.
The Children must be involved.

3.1.2 When is Something Clean?

Often schools deal with very difficult dirt. Sometimes the school has not done deep, thorough cleaning regularly and maybe cleaning products have not been available to take away tough dirt, stains and writings. The dirt has then accumulated over the years. In such cases, don't give up if all the dirt doesn't go away the first time you scrub, even if you use strong detergents. All the dirt, stains and writings usually do not disappear the first time. Continue doing thorough cleaning regularly (for example every month). Each time the surfaces become cleaner. Next time the job will be easier and the detergent can be diluted with more water.

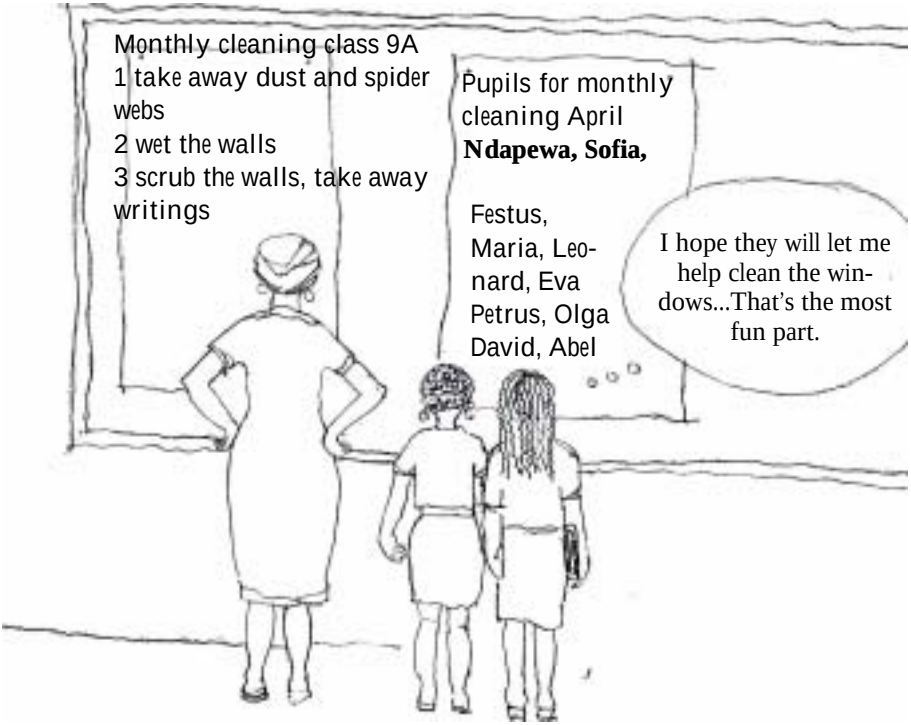
Cleaning workshop at the boys toilets in Oshakati CS where the cleaners, teachers and students participated. Holding the workshop was Kwico Namibia. Multipurpose detergents were used for all surfaces. A special multipurpose detergent was used on the urinals to take away yellow stains. The surfaces were scrubbed using brushes. Other tools used were mops, cloths, steel wool, brooms, spray bottles (for the detergents), feather dusters and a lot of water.

Seen chapter 5 for environmentally friendly materials

3.1.3 Personnel, Tools and Material

Personnel

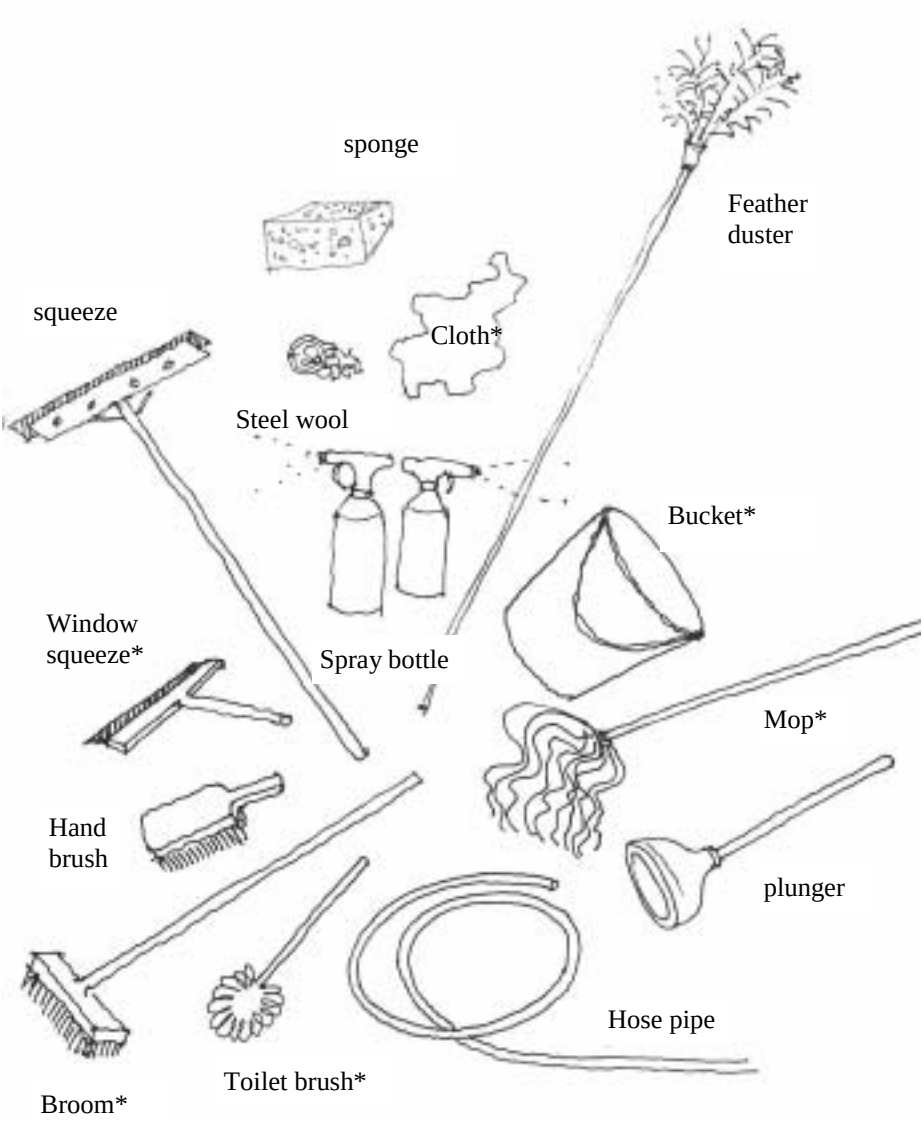
The Principal is responsible for giving good working conditions to the cleaners. Good working conditions = good result.



Give the cleaners clear job descriptions with cleaning lists showing what, how and how often to clean.
It is good if each cleaner has an area where he/she is the main one responsible.
Also, the learners should be held responsible for the cleanliness of their own class and also for clearly defined outside areas.

Tools

The following tools are recommended. The tools marked with * are necessary.



Material

The most important cleaning product is Water! But water doesn't take away all dirt. A multipurpose cleaning product is needed to get away stains, dirt and grease. The same multipurpose product is used for different purposes such as cleaning the windows, doors, walls, furniture, clear glass, mopping the floor etc.

Dilute the product in water, read carefully on the package how much product to mix with how much water. If you have any questions about the product ask your supplier for advice.

If the surface is very dirty you might want to use the product in a more concentrated form. Try to avoid having too much contact with the skin. Open the windows and doors while cleaning.

It is recommended to spray the product with a spray bottle on the surface you want to clean and leave it there for some 10 minutes, allowing it to penetrate before starting the washing and scrubbing.

For toilets it is recommended to have a product to take away the yellow stains on ceramic tiles, urinals and toilet bowls.

It can be good to have a product containing caustic soda for difficult blockages of hand-basins (try first to unblock using a plunger). These products are however very dangerous and there should be no contact with the skin. Keep them away from children at all times and have one person in charge of using them. In the toilets you can use the same multipurpose product as you are using in the classrooms. You can also buy another multipurpose product more specialised for toilets that have a stronger smell.

Don't hesitate to contact the supplier of cleaning materials to ask about different products available.
Check the chapter on environmentally friendly & alternative cleaning materials!

3.1.4 Cleaning of Classrooms and Administration Blocks

Start up and go downwards

Ceilings

Once a week take away dust and spider webs etc. with a feather duster with a long shaft

Ceilings of IBR sheets

don't need much cleaning. Once or twice a year clean with damp cloth and then with a dry cloth to take away the dust. If you have stains spray with some diluted multipurpose product first.

Ceilings of board

are made of fibres that makes them soft. Water can go into the boards and destroy them. If you find a stain you will need to first find out the reason (a leakage? Bats?) Trying to clean the patches will not solve the problem if you don't find the cause first. Don't use much water on the boards.

Walls

Every one or two months it is recommended to do a thorough cleaning of the walls to take away stains and dirt

1 wet the walls with water and sponge

2 spray on your multipurpose product. It's good to have a spray bottle. It will spare the cleaners from having too much contact with the products and it permits the whole surface to have a thin layer of the product (you will use less product!)

Leave the product on the wall for some 10 minutes to let it penetrate for better effect.

3 scrub the walls using for example a broom or brush using water with some diluted multipurpose product in it.

Doors

You will need *= absolutely necessary

Daily cleaning

Take away the dust with a dry cloth twice a week

Monthly Thorough Cleaning

1
wet the door with a cloth or a sponge to take away the dust

2
For very dirty doors spray on your multipurpose product, then leave it on the door for some 10 minutes or more.

3
Scrub the door with, for example, a broom using water with some diluted detergent

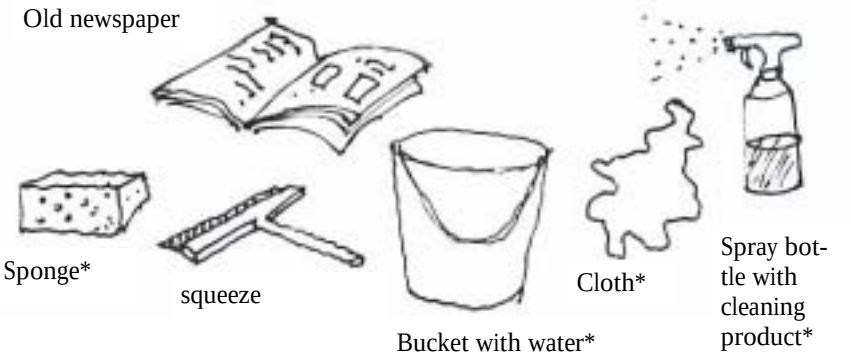
4
For difficult spots, writings etc. you may need to spray some more concentrated product and then scrub intensively.

5
Finish your cleaning by drying with a dry cloth

Remember to wash your tools, like cloths and sponges after finishing and drying them afterwards

Windows

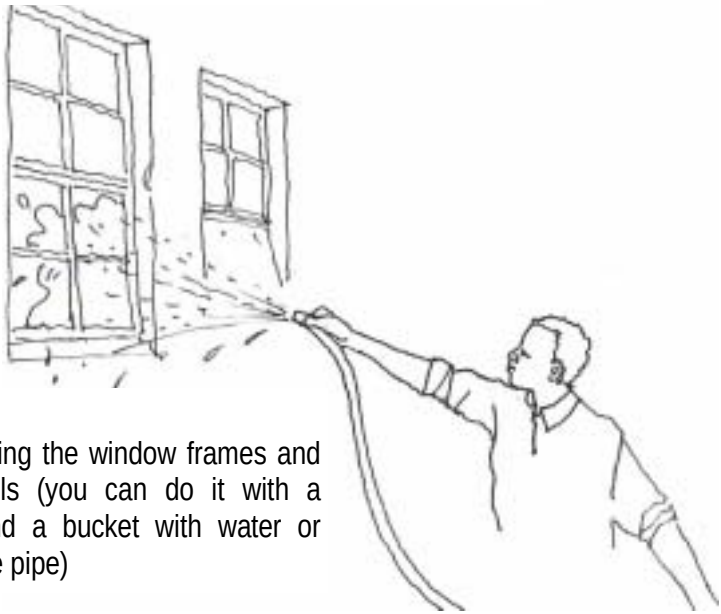
You will need *= absolutely necessary



Daily cleaning

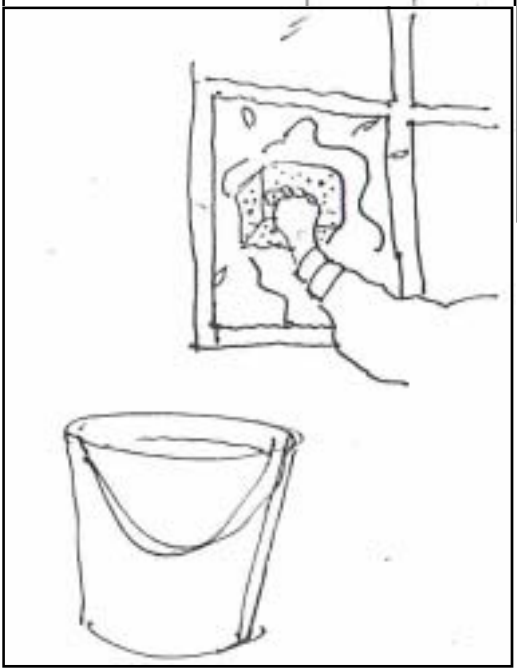
Wipe off the window frames with a dry cloth to take away the dust every week

Monthly thorough Cleaning

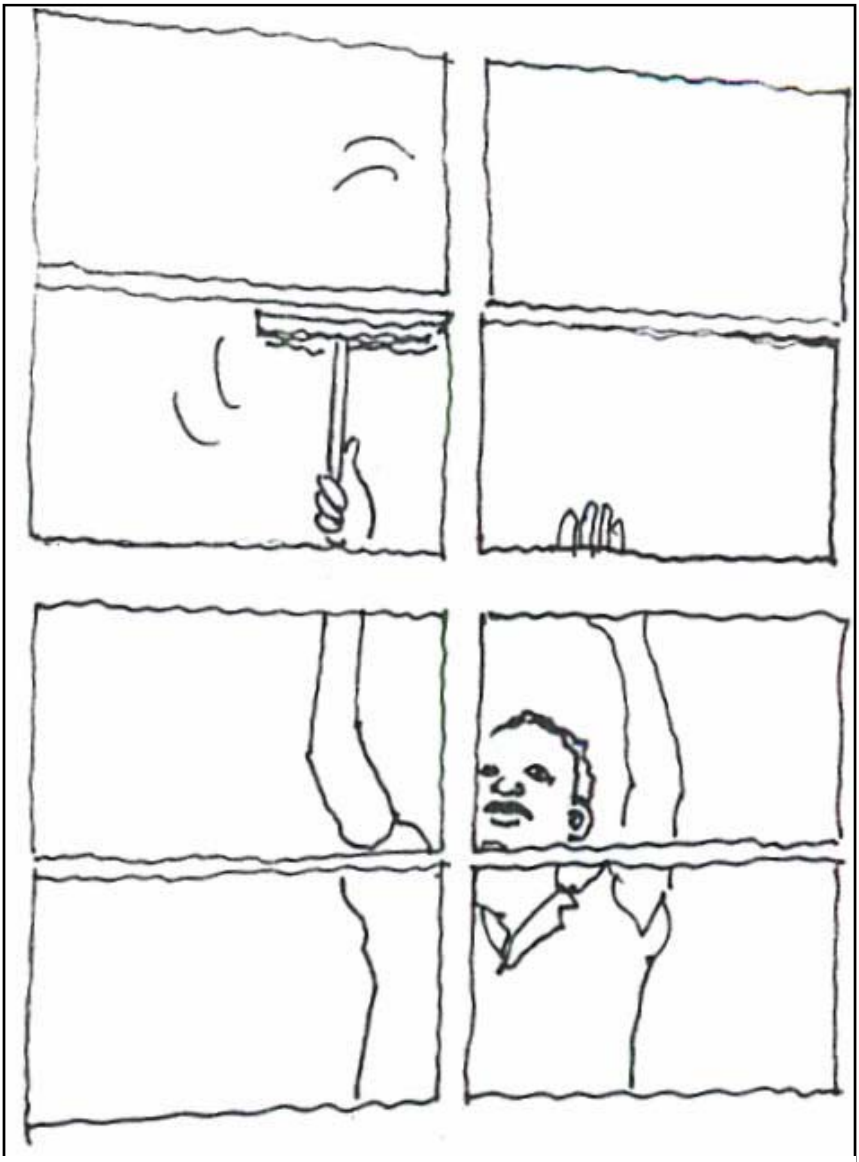


1
Start washing the window frames and window sills (you can do it with a sponge and a bucket with water or with a hose pipe)

2
For very dirty windows it can be necessary to scrub with a broom using water with some cleaning product (multipurpose will do fine) Remember to read the instructions well of how much detergent to dilute in how much water.



3
Spray your multipurpose product on and clean the window pane with clean water and a sponge (if you don't have a spray bottle just dilute some cleaning product in the water).



4

Use your squeeze . Start from the top and go downwards.
When the window glass is dry you can take some old newspaper to take away marks on the glass

Furniture

Every 2 days take away dust with a dry cloth.
Every two weeks clean with a damp cloth then dry with a dry cloth.
To take away writings and difficult stains spray your multipurpose cleaning product, leave for a while and then scrub (you can use a brush)
Finish by cleaning with a wet cloth and then drying with a dry cloth

Cleaning of metal bookshelves at Oshakati CS. The bookshelves had a lot of writing on them. They were first cleaned with a damp cloth and with water to take away the dust. Then the multiproduct Kleentex was sprayed on and left on for some 10 minutes, then the surface was scrubbed. The stains and writing went away!

Floors

Sweep the floors daily with a broom and a bucket

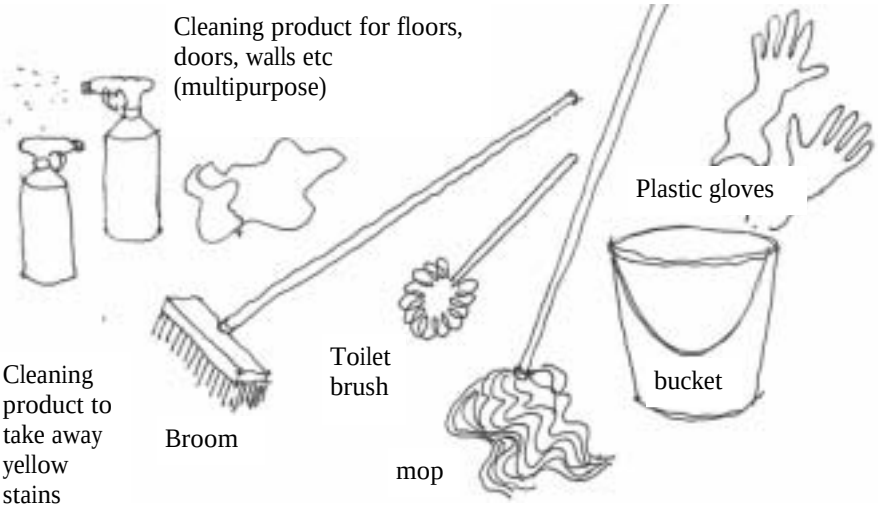
Mop squeeze fitting on the bucket

Mop the floors daily using a mop and a bucket

A mop trolley is very useful to squeeze out the dirty water from the mops.
A cheaper alternative is a plastic moppet squeeze that fits on the top of the bucket (see picture upper right)
It is not quick and not pleasant for the cleaners to need to use their hands.

3.1.5 Cleaning of Toilets

You will need



The floors need to be swept and mopped daily. You can use the same multipurpose product as you have in the classrooms or you can chose another multipurpose product with stronger smell, specially for toilets and bathrooms

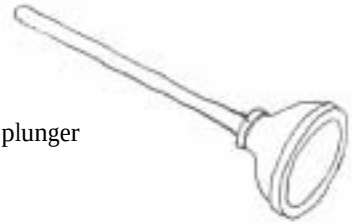
The hand wash basins need to be washed twice a week.
The toilet bowls and urinals need to be cleaned weekly. You will need a toilet brush and plastic gloves.

To take away the yellow stains you will need a product containing bleach (for example bowlite). This product can also be used to take away stains on ceramic tiles.

Only toilet paper should be thrown down the toilet.

If toilet paper is not available it is likely that the children use other kinds of paper and their will be increased risk of blockage.

It is also important that the toilets are flushed after each visit.



plunger

plunger

If you have a blockage in the hand basin use your plunger. Push it up and down (you might need to open the cleaning eye and clean the trap this is explained under blockages in the plumbing chapter)

If you use strong products containing caustic soda to clear drains remember that these products are dangerous an need to be handled very carefully.

If the Toilet is blocked try to pour water with a bucket from as high up as possible.

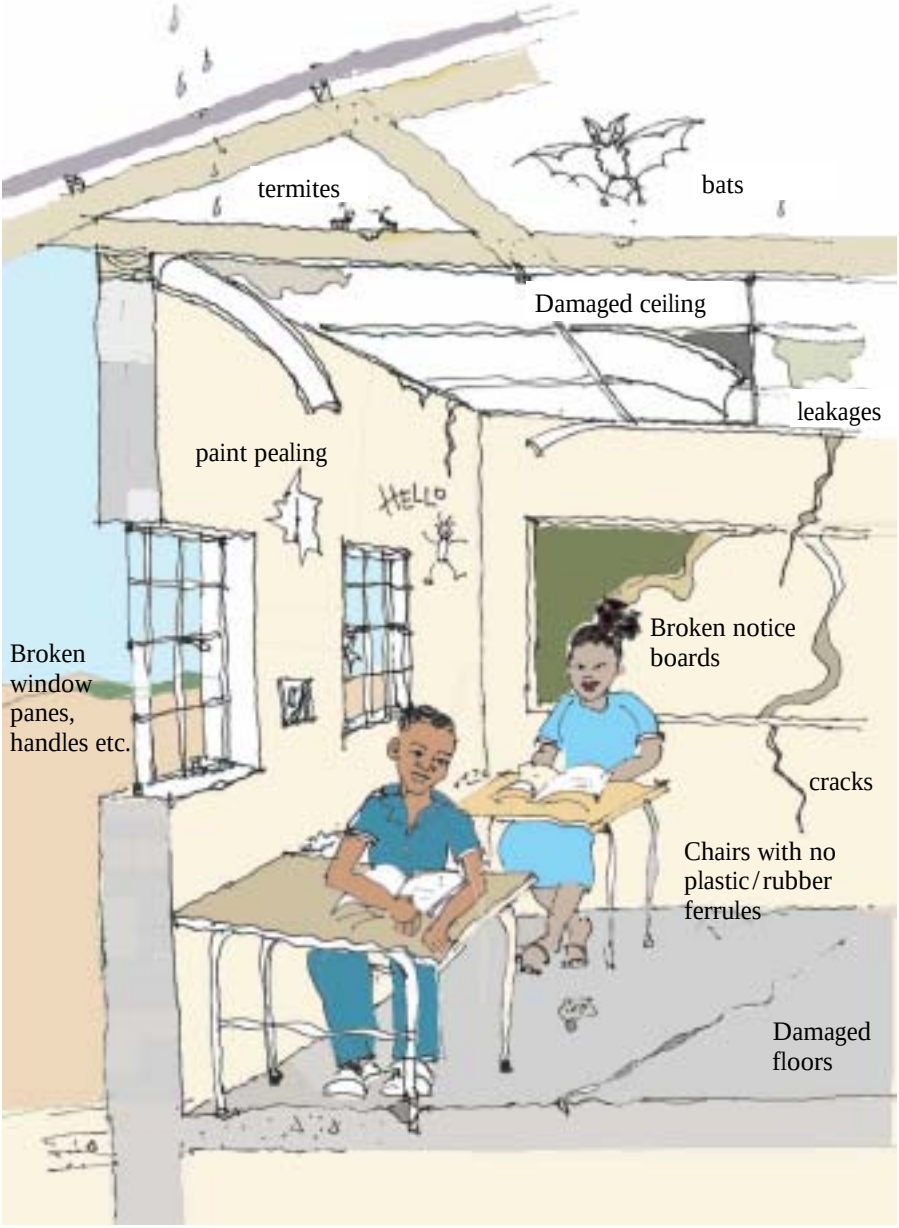
3.1.6 Conclusion

Remember that the cleanliness of the school is very important to create a caring atmosphere

To get a clean school you will need:

- Good involvment of the children
- Good cleaners with knowledge and motivation. Listen to your cleaners! Make sure they have the necessary tools and are well organized with clear cleaning descriptions.
- Designate certain cleaners for specific areas.
- The necessary tools and cleaning products.
- Both daily cleaning and a monthly cleaning plan

3.2 Minor Repairs



3.2.1 The Floor

Fixing Potholes

Potholes are not so difficult to fix. If possible, find someone that has worked with concrete before. It is important use the right ratio of good sand, cement and stones, clean water and to let the concrete mix dry slowly. Otherwise the concrete doesn't get strong enough.

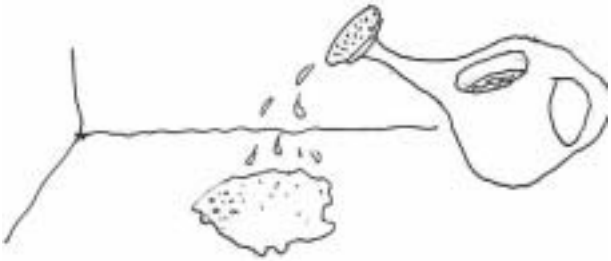
The sand

The sand should be clean. It is good if it is not too dusty and having particles of various sizes (coarse). The biggest particles should not be more than 9mm

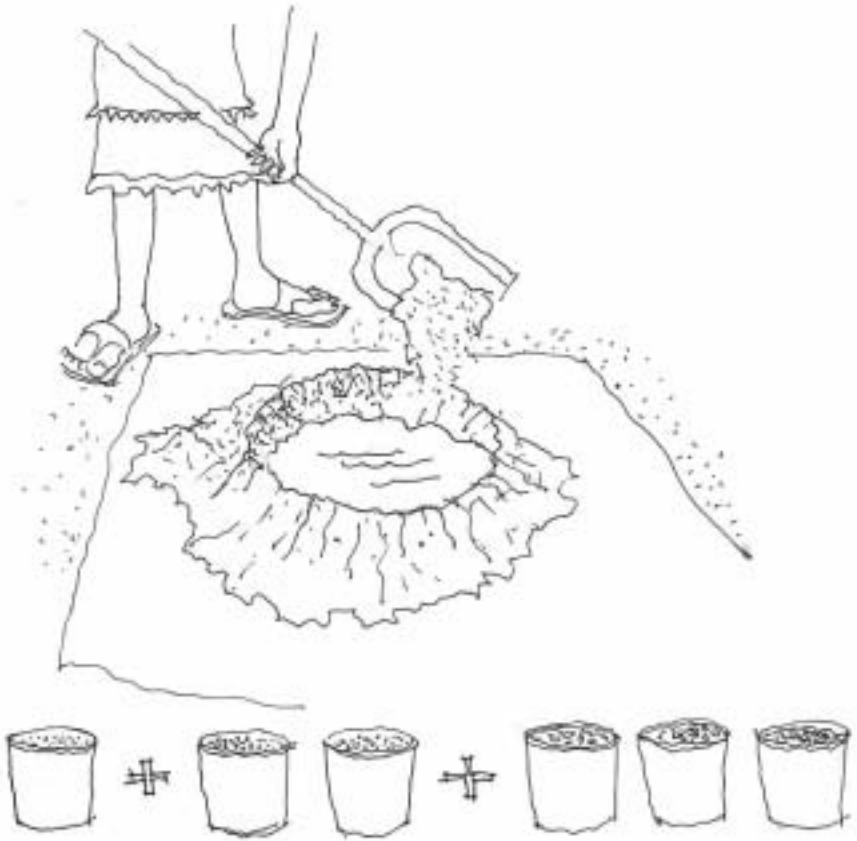
For repairing potholes it is better to buy building sand to make sure to have a strong mix, you will not need much sand.

Clean out the pothole until it's firm using a hard metal object such as a chisel, taking away about 25mm of the concrete until the surface is firm.

The cement usually comes in 25kg/50 kg bags. It needs to be stored in a dry place.



Clean away all the dust. You can use a damp cloth. Wet the surface and cover it with mortar making sure it sticks at the borders



Fill the hole with concrete with the ratio 1:2:3 (1 measure cement, 2 measures sand and 3 measures stones and water).

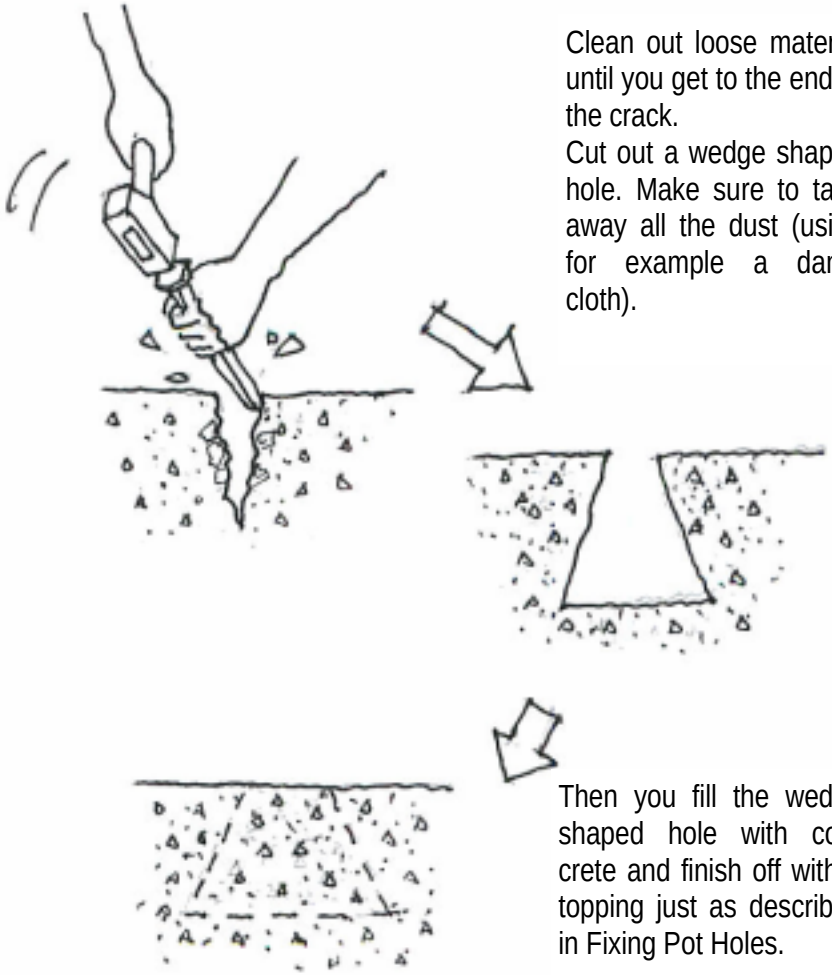
If the small ridges ”mountains” made with the spade stay in that form then the mix is ready and you don’t need to mix in more water

If the area is big you need to make it level with a straight edge.

The finishing layer needs to be floated with a metal float to get a smooth surface.

The floor needs to dry slowly to get strong. Cure the floor (water it and cover it with plastic so it doesn’t dry to quickly). Keep it wet for at least a week.

Fixing Cracks



Clean out loose material until you get to the end of the crack.
Cut out a wedge shaped hole. Make sure to take away all the dust (using for example a damp cloth).

Then you fill the wedge shaped hole with concrete and finish off with a topping just as described in Fixing Pot Holes.

3.2.2 Walls
Fixing of Small Cracks

Smaller cracks can be mended with filler by the maintenance person.
Cut out a little bit in the crack making sure that it is firm. Take away the dust and fill with filler using a trowel

This crack is 2,5 cm. I think we can fix it ourselves at the school. Bigger cracks (more than 4 cm deep) need to be checked by an expert as they might be structural. I heard bigger cracks need to be filled with cement based fillers and often with metal reinforcement.

Fixing of Notice Board

Notice boards easily break with time or they look old and need to be repainted.

If a notice board is in bad shape you will need to replace it with a new one. Take the measurements and buy soft board with the sizes needed at your supplier. You can also buy wooden cover strips to make a frame around the notice board. Paint or varnish the board and the cover strips. On walls of concrete or bricks you will need to screw the softboard into the wall with wood screws 5 x 63mm. Drill holes in the wall first (with 6mm drill bits). It is easier to use an electrical drill machine (a hand drill can also be used but you will need to be precise and patient to use it). Put wall plugs M8 in the drilled holes.

Fixing of Blackboard

Black boards are expensive. Try to keep them in good shape. If a blackboard surface is very old it can be repainted with schoolboard paint (1 litre covers 3-4 m^2).

Often the chalk holder can be missing. Check the screws reguarly and replace when needed. You can buy new chalkholders at your supplier or manufacture them yourself.

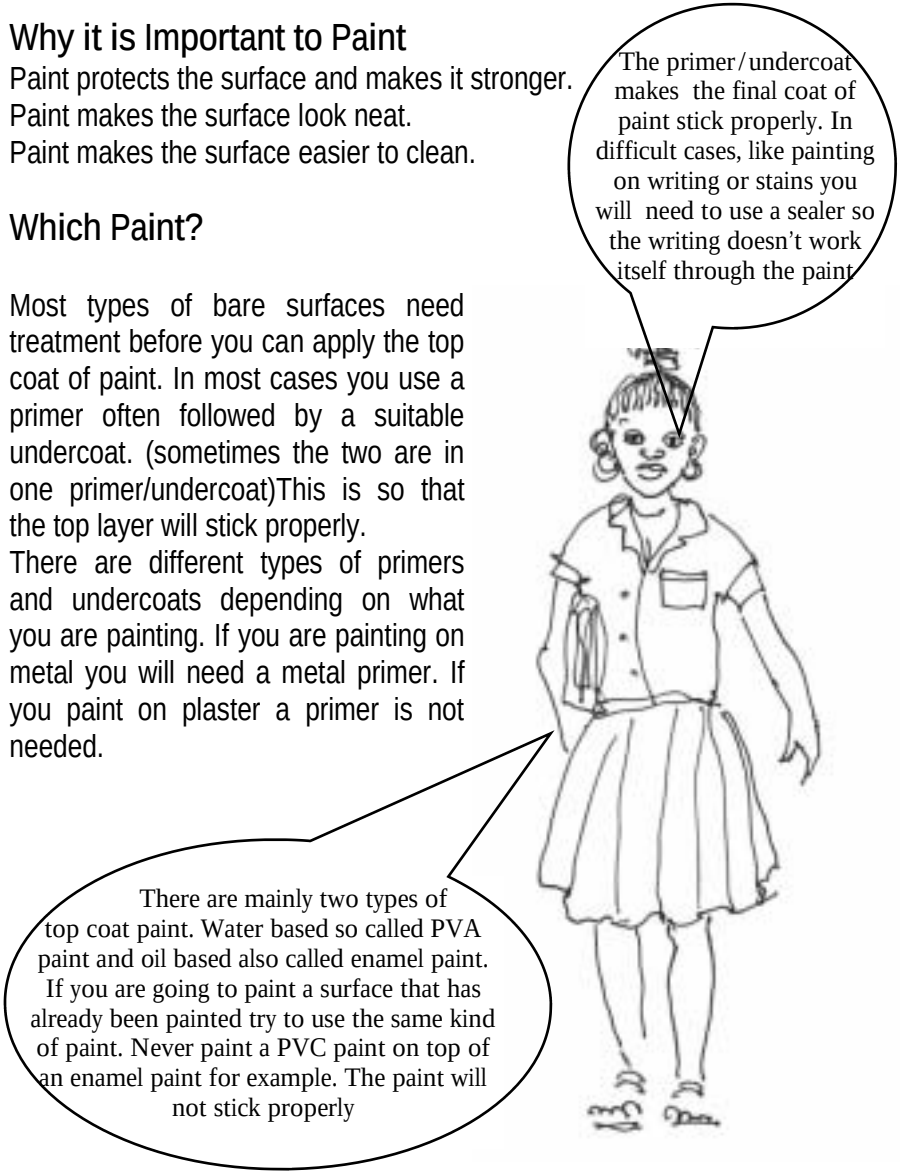
Painting

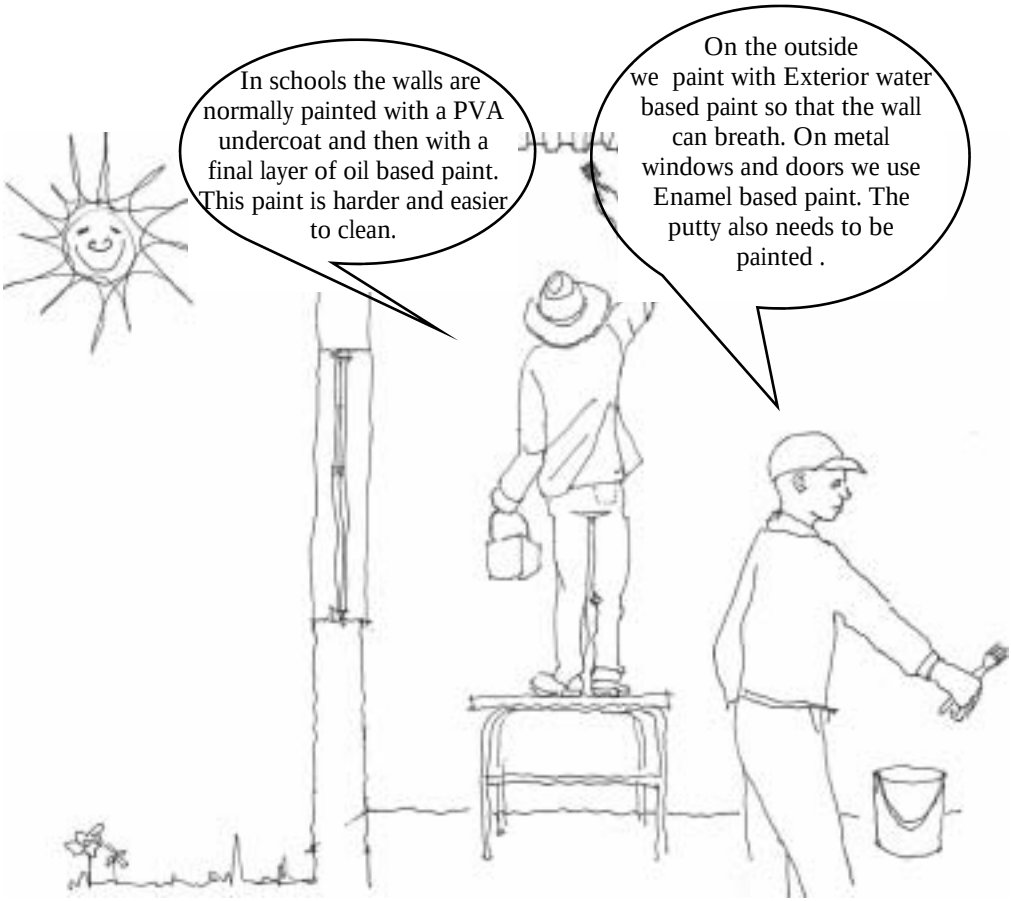
Why it is Important to Paint

Paint protects the surface and makes it stronger.
Paint makes the surface look neat.
Paint makes the surface easier to clean.

Which Paint?

Most types of bare surfaces need treatment before you can apply the top coat of paint. In most cases you use a primer often followed by a suitable undercoat. (sometimes the two are in one primer/undercoat)This is so that the top layer will stick properly.
There are different types of primers and undercoats depending on what you are painting. If you are painting on metal you will need a metal primer. If you paint on plaster a primer is not needed.



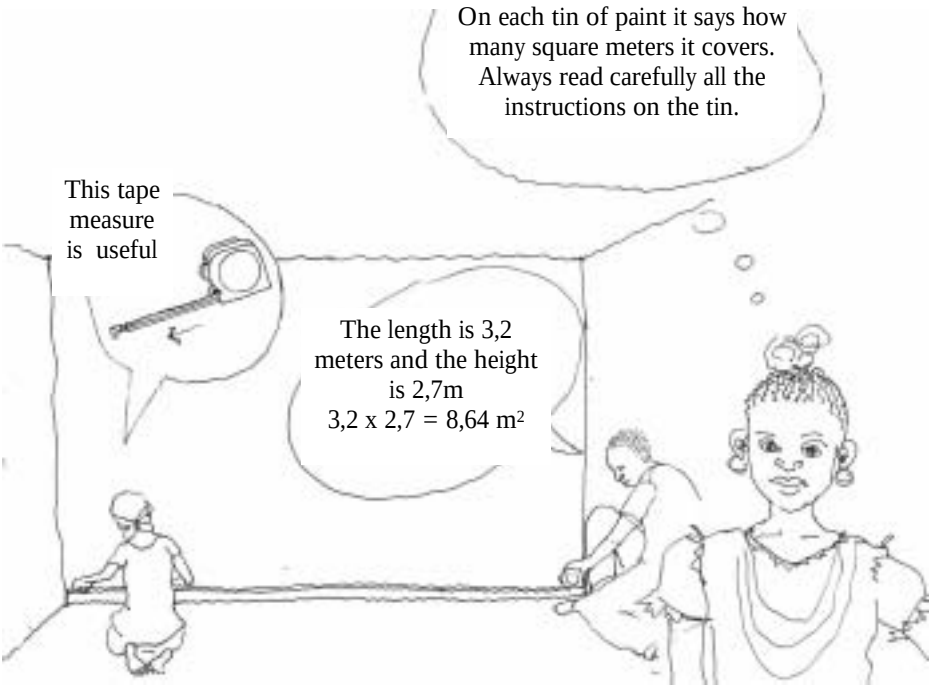


Always try to keep a record of the colour you used so that you are sure to get the same colour once you need to repaint. You will need to know the make of the paint (eg. Neo High gloss Enamel Paint) if the colour is shiny or not (high gloss or neo gloss) and the name of the exact hue (eg. Deep blue 27)

The best thing is to keep one of the old tins!

How much Paint?

To know how much paint to buy it is good to know the size of the surface you want to paint (calculate in square meters)

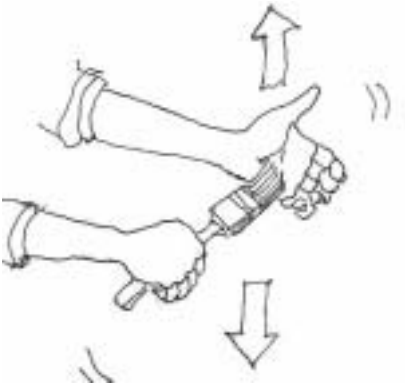


Practical Advice

Often it is practical to pour the paint in a smaller pot.
Always remember to put the lid back properly on the paint tins.

If you fasten a string tight across the smaller paint pot you can use this string to take away excessive paint on the paint brush while painting. This will avoid dripping.

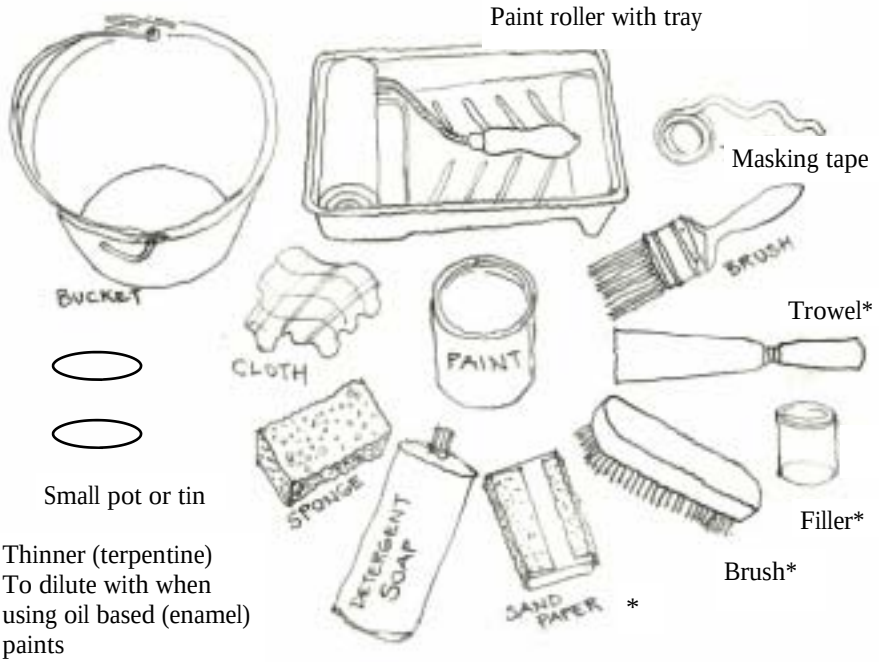
When you want to cover a satin or water mark you need to seal the surface with sealer (water proofing) first.



All new brushes lose some bristles, flick backwards and forwards across your fingers to tease them out.

Painting on Inner Walls of Concrete, Plaster or Already Painted Surface

Tools for painting inner walls. Tools marked with * are mainly needed when the surface is already painted or damaged.



Use the brush to paint filled areas, corners, around windows and doors etc. A brush size of 25mm is recommended for these tasks.
Paint with the paint roller on the large surface areas.
Instead of using the roller you can also paint the larger areas with a brush (100mm is a good size for walls). This will however take more time. But remember that for large areas a roller is usually quicker and less tiring and the paint goes on thinner and more evenly.
If you get paint somewhere undesirable it is always easier to remove it when it's wet.

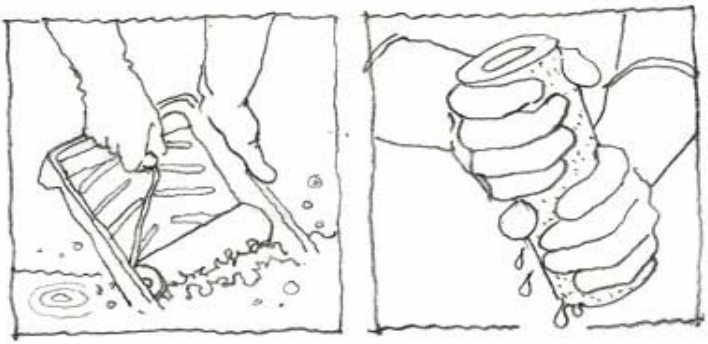
Prepare the inner wall to be painted before starting, so that the new paint will stick properly

1 Clean cracks and remove loose parts until the surface is firm (use for example a trowel or a knife)
2 All holes and smaller cracks (not more than 4 cm deep) need to be filled with filler (you will need the filler and a trowel)
3 Remove screws and nails in the wall to be painted (you can use a hammer and a screwdriver)
4-5 If old paint is loose and coming off, remove the loose paint with a trowel or a knife and fill with filler.
6 If you have problems with fungus you can remove it with a brush using water with a little bit of chlorine/ bleach. Avoid getting chlorine/bleach on the skin. Use plastic gloves.
7 Remove dust and dirt using water and soap (or multipurpose cleaning product).
8 For difficult dirt you might need to scrub with a hard brush .
Rinse the surface with water.
9 If the surface is painted with oil based paint (enamel paint) then you will need to sand down existing old paint using sand paper. Sand thoroughly until the surface is not shiny any more. Then remove the dust from sanding.

Make sure the surface is dry and clean before starting to paint!

Cleaning and Storage of Tools

Clean the brush when you are finished. When you have been painting with oil based paint wash the brush with thinner (terpentine) then dry the brush and wash with water. If you take a break or are going to use the brush (with the same paint) with in 24 hours then wrap the brush up in plastic (as it is with, paint and all). Don't leave a paintbrush like that for more than 24 hours).



Clean the roller and the tray with the thinner (if it's oil based paint) and then with water and soap to get rid of all the paint. If it is water based paint just clean and rinse with water. Then press the roller dry and seal it in a plastic bag. Store roller handles separately.

Hang clean and dry paint brushes on the wall. Protect them with some newspaper fastened with some string or rubberband.

This way you can use them again for the next paint work.

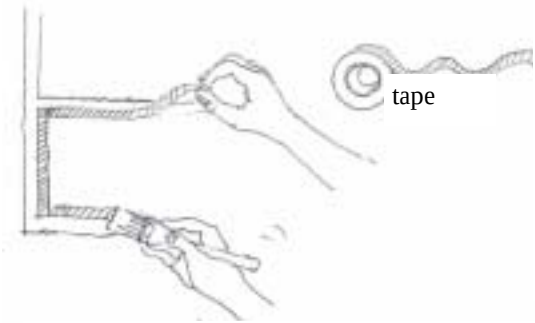
Painting on Metal

The top coat of metal parts is painted with oil based paint (Enamel paints). You will need a thinner (like terpentine) to clean the paint brushes and to dilute the paint when it gets too thick. Don't paint with too thick paint,as this will make painting more difficult . Better paint a thin coat, let it dry and then paint again. Often you will need to paint 2-3 coats before a surface is ready.

Painting Directly on Metal Paint first with a primer (so that the surface will not rust) then an undercoat and lastly with a top coat. Some paints called primer/undercoat can do the two functions in one (then you need to paint only one time with the primer/undercoat before the top coat). Sometimes you will need to paint two coats of the top coat.
If the surface is rusty, remove the rust with a remover or "neutraliser" to prevent corrosion (rusting) continuing under the painted surface.

Painting on allready Painted Surfaces

Sand paper the surface to take the shine off. Clean the surface removing dust and dirt. If the surface has exposed areas then these need to be painted with primer/undercoat.



Before starting painting put masking tape on the glass so that paint does not get on the glass.
Use a paintbrush 25mm.
Don't paint too thick. Better to paint an extra coat letting the paint dry in between.

Don't paint the locks of the door when you paint the door.
Don't paint the handles, hinges or sliding stays.

Painting on Wood

Wood needs to be painted or varnished as protection so that it will last longer

Painting on already painted surface

On wood it is best to use oil based paint.

1 Clean the area to be painted with white spirit or thinner to take away all the grease and dirt

2 Sandpaper all areas to be painted so that they become matt (not shiney)

3 Fill in small holes and cracks with filler. Let the filler dry and then sandpaper it carefully taking away all dust before continuing.

4 Start painting

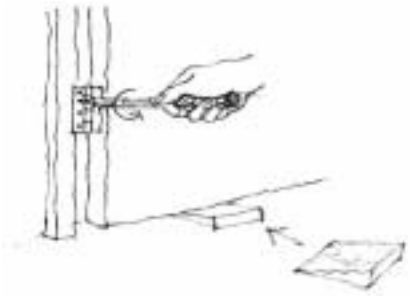
Painting on Putty

Putty must be painted with oil based (enamel) paint two or three days after it has been placed otherwise it will always stay soft!

3.2.3 Door

Doors Not Hanging Properly

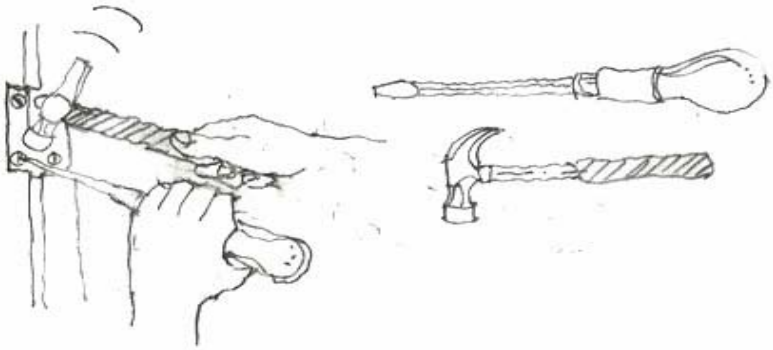
In many cases the hinges can be deformed so that the door swings open crookedly.



Sometimes the hinges may have been fitted wrongly and needs only to be fitted properly so that the door swings horizontally.

Put in a wedge shaped piece of wood to level the door so that it is straight. Then screw the hinges tightly in the right position.

Sometimes the hinges may be deformed because they are too weak for the weight of the door. In this case it is better to buy new hinges and to change the old ones. If it is a wooden door take off the hinges and replace them.
In schools it is better to use the strongest possible hinges so that they will resist if someone plays with the door. (e.g. swing on the door or kick it)



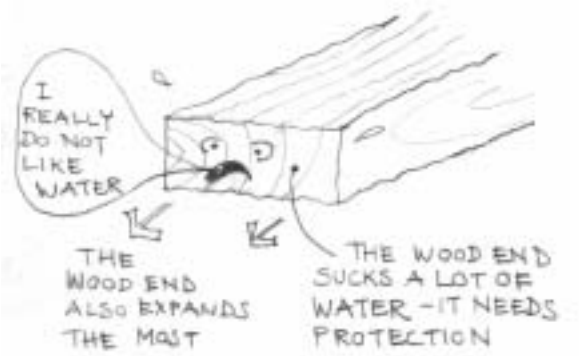
If the head of the screw is covered by paint or rust make a scratch with hammer and screwdriver (or other hard sharp object) so that the screw driver fits properly.
You can also tap carefully with a hammer to loosen the rust. Don't use excessive force or the head can come off the screw!

If the hinges get rusty or make a noise apply a lubricant like for example lubricating oil (you can buy them at hardware shops).
You can spray on and leave over night.

Wooden Doors

Wooden doors are affected by water. During the humid periods they will expand!

Doors will last longer if they are painted (see chapter on painting).



Especially the wood ends (wood is made of long fibre cells and the ends of these are softer) need to be well protected from water. They should never be in direct contact with water.

The left wooden door has the 'wood end' in close contact with the floor, the humidity will go up and the door will slowly rot and get soft The right door where the end wood is protected by a horizontal wood piece is much better.

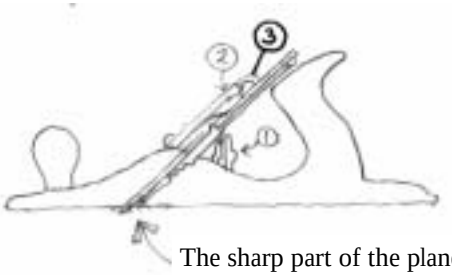
Try always to have a small space between the door and the floor (1 cm or more) so that the moisture of the floor will not affect the wooden door. This is especially important in wet areas like toilets.

What to do if the door is too big

Take off some of the wood with a plane or with a rasping file

plane

rasping File



The sharp part of the plane iron should not stick out too much. (Usually less than 1 mm)

If you need to adjust to the sharp cutting part of the plane iron just turn the adjusting nut (1).

Sometimes you will need to loosen the cam (2). This you do by pulling the part 3.

Maintenance person practising how to use the plane. It's important to have work held securely and a good and comfortable working position.

Handles and Locks

Handles and locks are often a problem in schools. Often they break or don't work smoothly. To better understand how to maintain them it's good to know how they work.

There are three types of locks

(mortise locks) 2 lever, 3 lever and 4 lever. The two lever one is cheaper but it is also easier to open. Three lever locks are the most commonly used in schools. It is possible to buy and install an extra lock on your normal lock if you want it to be more secure. These extra locks are very cheap.

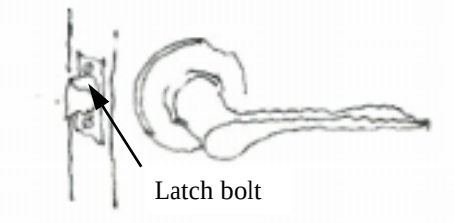
A loose handle

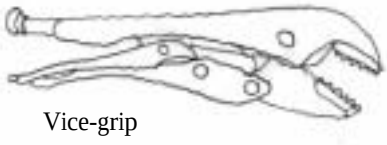
Make sure to have some extra screws so that you can easily fasten parts that are loose. This should be done immediately or parts will easily get lost or get more damaged.

Always keep old handles and locks so that you have extra spare parts in case parts get lost.

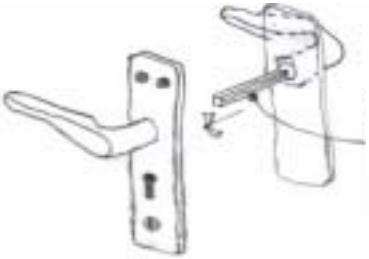
Broken or Deformed Latch Bolt

A frequent problem with doors is that the latch bolt is deformed, maybe because it has supported too much weight.
Try to straighten it out carefully with pliers or with a hammer. If this is not possible you will need to replace the latch bolt.

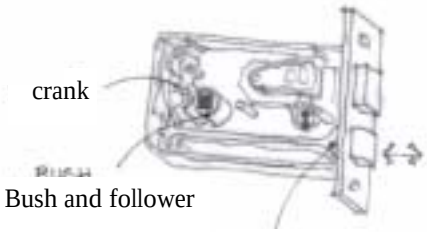



Vice-grip

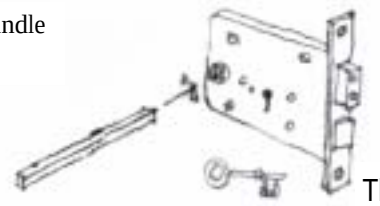
How does the Lock work and which Parts do they have inside


The spindle

Between the door handles there is a spindle that also goes through the lock itself and moves the latch bolt.



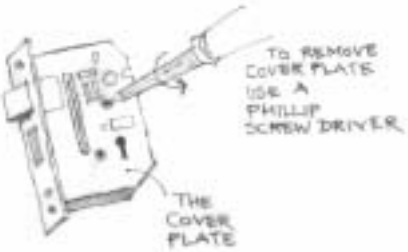
The spindle

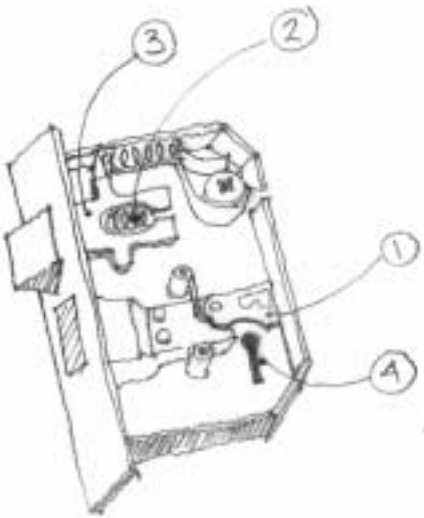

The spindle goes through the lock

The spindle goes through the bush and follower and moves the crank which in turn moves the latch bolt. Sometimes these parts might need some oiling

Inside the Mortise Lock

Open the lock with the cross head screwdriver and remove the cover plate, be careful that the springs do not jump out.

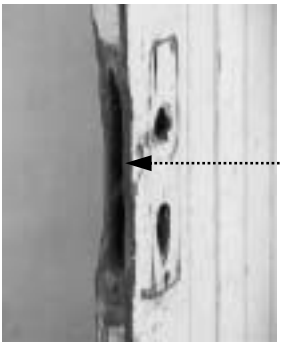




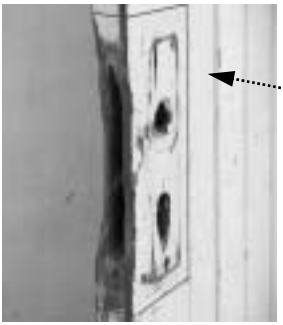
Parts of the lock

1. The levers. You will find 2-4 of them depending on what kind of lock you have. These have to be placed in the correct sequence (the top one on top, the middle one in the middle etc…).
2. The spring. Check that it is functioning. It might be broken or old, or it might be out of place.
3. The latch bolt. Check that it is well oiled so that it moves smoothly. Sometimes it might be slightly deformed, try to gently hammer it straight again. In some cases you might need to turn the latch bolt over
4. The key hole
5. Base plate
6. The face plate

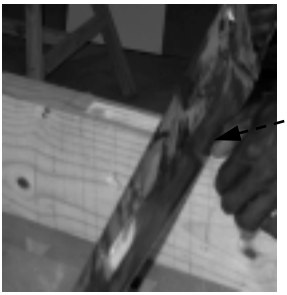
Damage Around the Door Lock



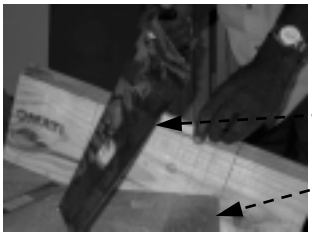
Sometimes the area around the door lock gets damaged and will need repairing.



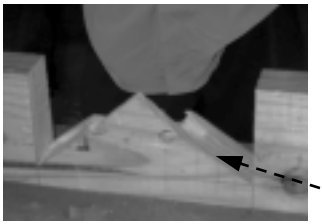
Mark around the area allowing 2 cm into the undamaged area.
Remove the door and secure.



Saw down the mark made on each side of the damaged area

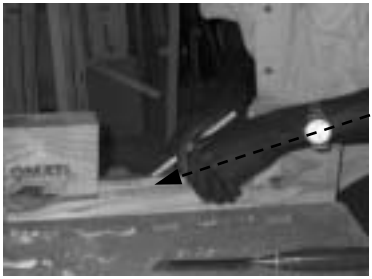


Saw at an angle from the centre of the damaged area to the corner you have already cut.

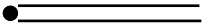


Remove the wood you have sawn so far and a shape like this will be left. This will need to be chiselled out.

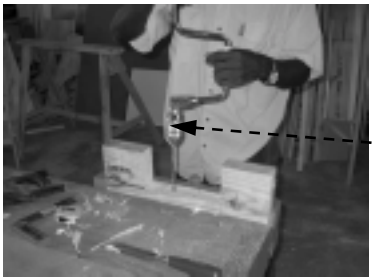
Mark and cut a piece of wood to fit the damaged area that has been removed.



Mark where the holes for the dowels are to be fitted..



A dowel is a cylindrical piece of wood that can be inserted to give strength to a joint



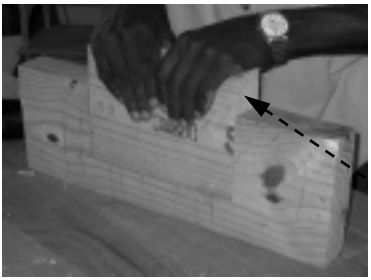
Drill the hole (2cm deep) for the dowel with a bib and brace drill. Make sure to keep the drill upright.

Check that the wood fits in the opening

GLUE

Insert the dowels and glue the surfaces to be fitted together with wood glue.

DOWEL

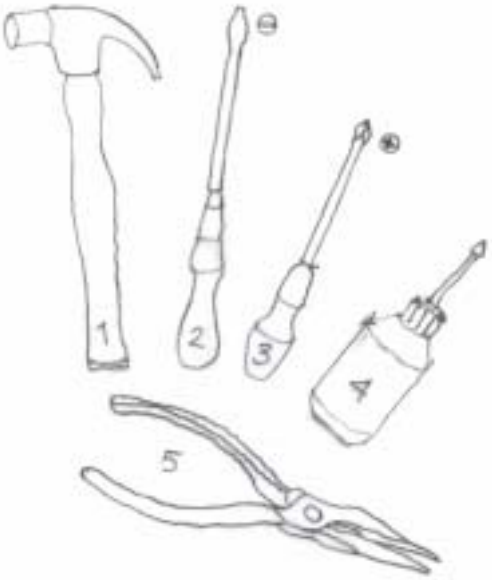


Fit the sawn piece of wood into the cut out area making sure the dowels go into the drilled holes.
When the glue has set, one or two hours in the sun, cut of the excess wood

Drill out the newly fitting wood for the door lock and refit the door.

Fit the new lock.

Tools needed to fix your lock



1 Hammer
2 Flat screwdriver
3 Phillip or cross head screw driver
4 Oil (lubricant). You can buy releasing oil in your nearest hardware store (if you don't have oil, lead from a normal lead pencil can also be applied to make moving parts move smoothly!)
5 Long nose pliers, to remove a stuck key

What to do when the Key is Lost or Broken.

Bring the lock to your supplier to get a new key. If the key is stuck try to get it out with pliers or with steel wire or other sharp object.
Always remember to keep your old locks in case you need to take some spare parts from them

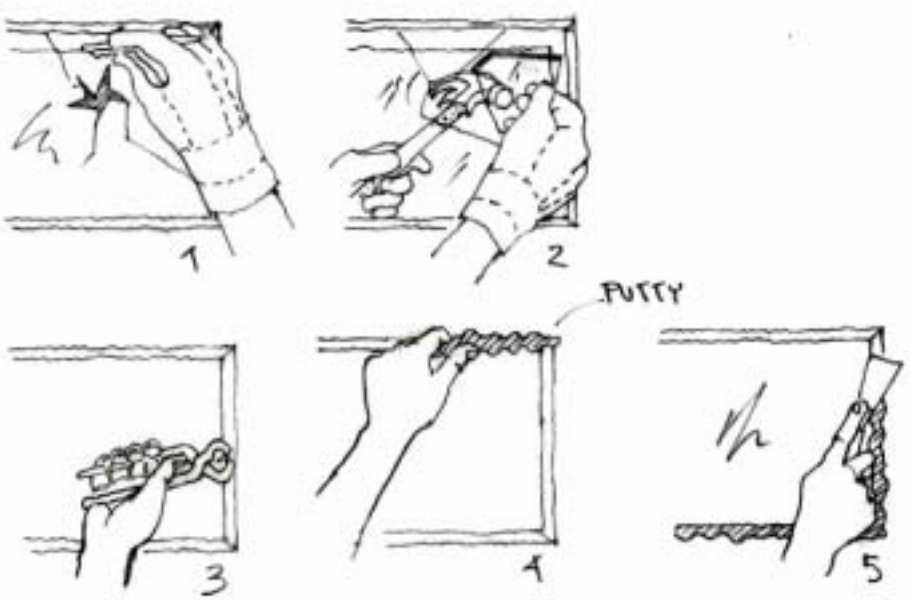
3.2.4 Windows

How to measure the glass panes to be ordered from the supplier.

The glass panes to order are usually 3mm thick and are called clear glass. The width and the height are written in mm. Use a measuring tape and measure the height and the width of each window pane (from frame to frame). Then subtract 2,5mm from each measure) This is to make sure the glass pane will really fit. If it is too big it is always difficult to cut on the site.

The supplier often knows about standard glass pane sizes. When you come with your measure double check with the supplier.

How to change broken Window Panes



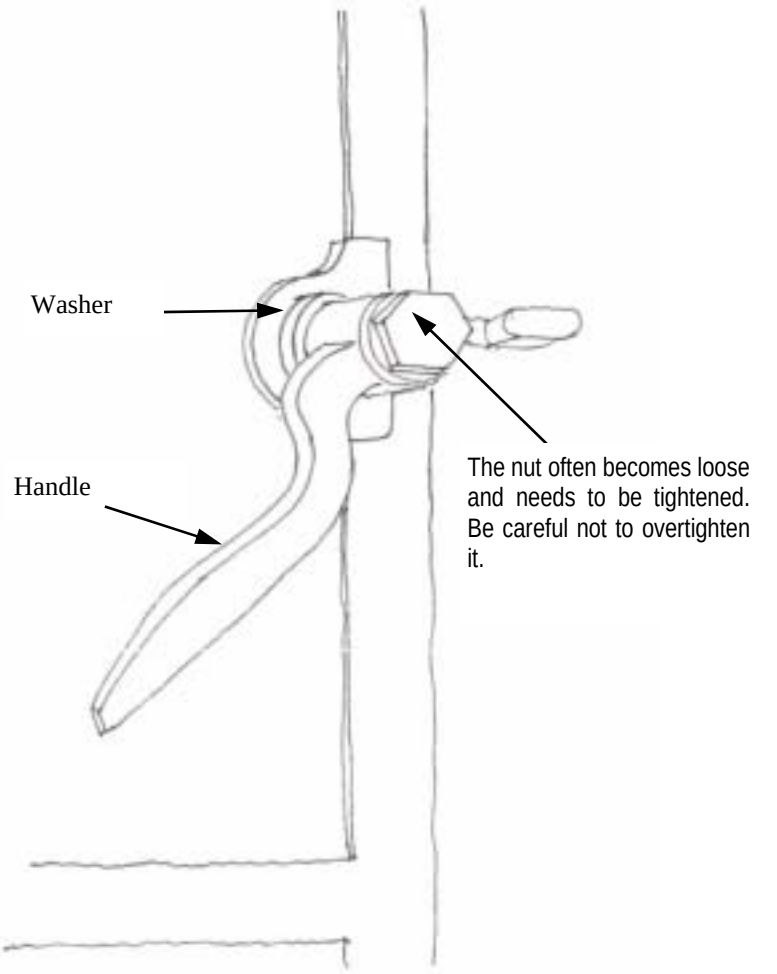
1 With a sharp knife trace a line a bit outside the line of putty. Always wear gloves
2 Take away the glass bits hitting them lightly with a hammer from the outside
3 Take away the rest of the small glass bits with the pincers
4 Keep your hands as cool as possible to stop putty sticking to your hands. Put on the putty with the fingers. The putty is to stop the rain and wind and to hold the glass panes in position. Work the putty nice and soft. This is to work in the oil. Make a 3 mm thick bed around the window frame for the glass to rest against. Put in the glass resting it first on the bottom and push it so that it rests firmly against the putty bed.
5 Apply another strip of putty with a putty knife to the outside of the window, creating an angle of 45°. A1l extra putty should be removed. The putty should dry for 3 days before being painted.

Windows that are not shutting properly

There are different types of shutting systems for windows. The one in the picture (called a casement stay) is commonly used in schools. It easily gets bent and sticks easily. Oil it with lubricant oil (silicon oil for example) so that the moving parts slide easily.
Chalk powder or lead (from for example a normal pencil) also helps these parts to move if you don't have any lubricant oil.

If this detail isn't straight (horizontal) the casement stay will be deformed

Here the casement stay has been broken as a consequence of the problem mentioned in the picture above



The handles often get stuck and does not move properly. On the handles there should be a washer behind the nut. This washer is often missing. Try to put washers on all handles, they are very cheap!
The nuts easily become loose and fall off. Check them every week and tighten the loose nuts. But don't overtighten!
Remember never to paint the handles or casement stays!

3.2.5 Furniture

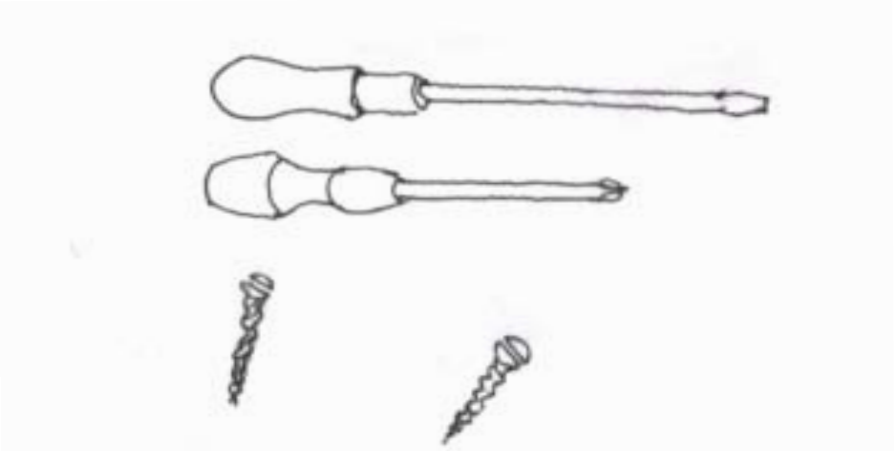
Furniture gets broken all the time when used and needs to be repaired regularly.

Maintenance personnel repairing damaged chairs and marking out wood sheets for repairing chairs or desks.

You can also organize a furniture repair workshop at your school.
Get help from older students. Always when students are involved teachers need to supervise.

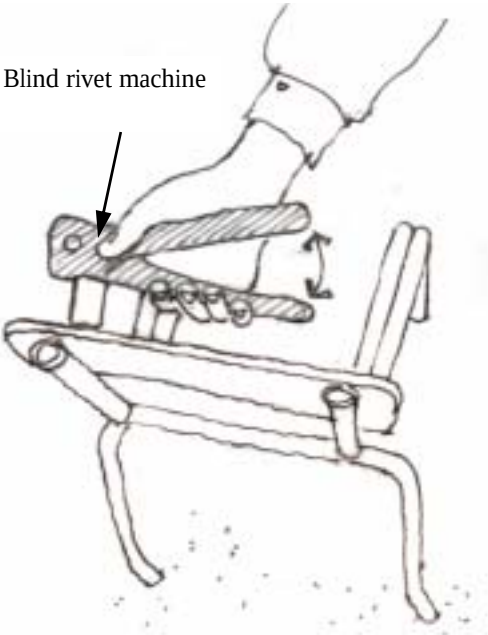
Fastening of Loose Parts

Many desks, seats etc. are loose and need to be fastened.
These are usually fastened with screws or with blind rivets.



Make sure you have the right kind of screws (you can always bring one of the old screws with you to the supplier).

Blind rivet machine

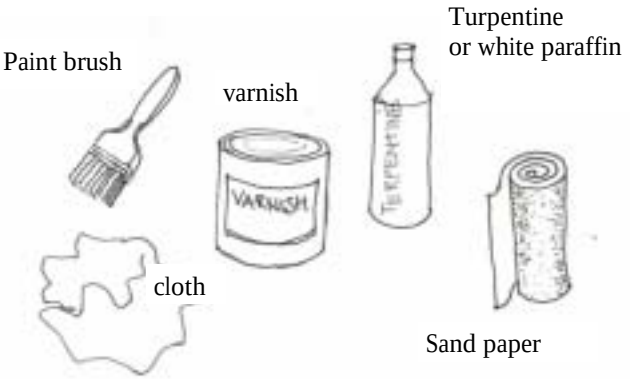


When blind riveting you will need a blind riveting machine and blind rivets. The blind rivets need to be long enough to go through the two pieces to be joined. Remove the old blind rivet with a drill before starting.

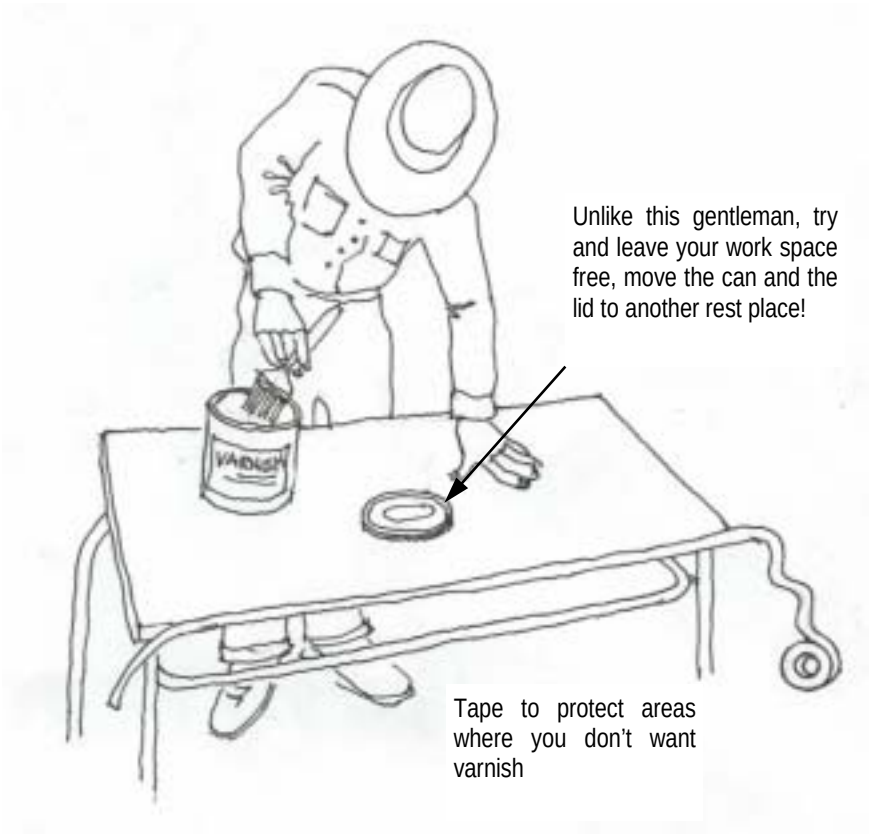
Make sure you hold the blind riveting machine straight so that the blind rivets go straight in (perpendicular to the surface). Push the blind rivet handle up and down various times until the blind rivet snaps.

Making an old Desktop look like New

You will need the following tools:



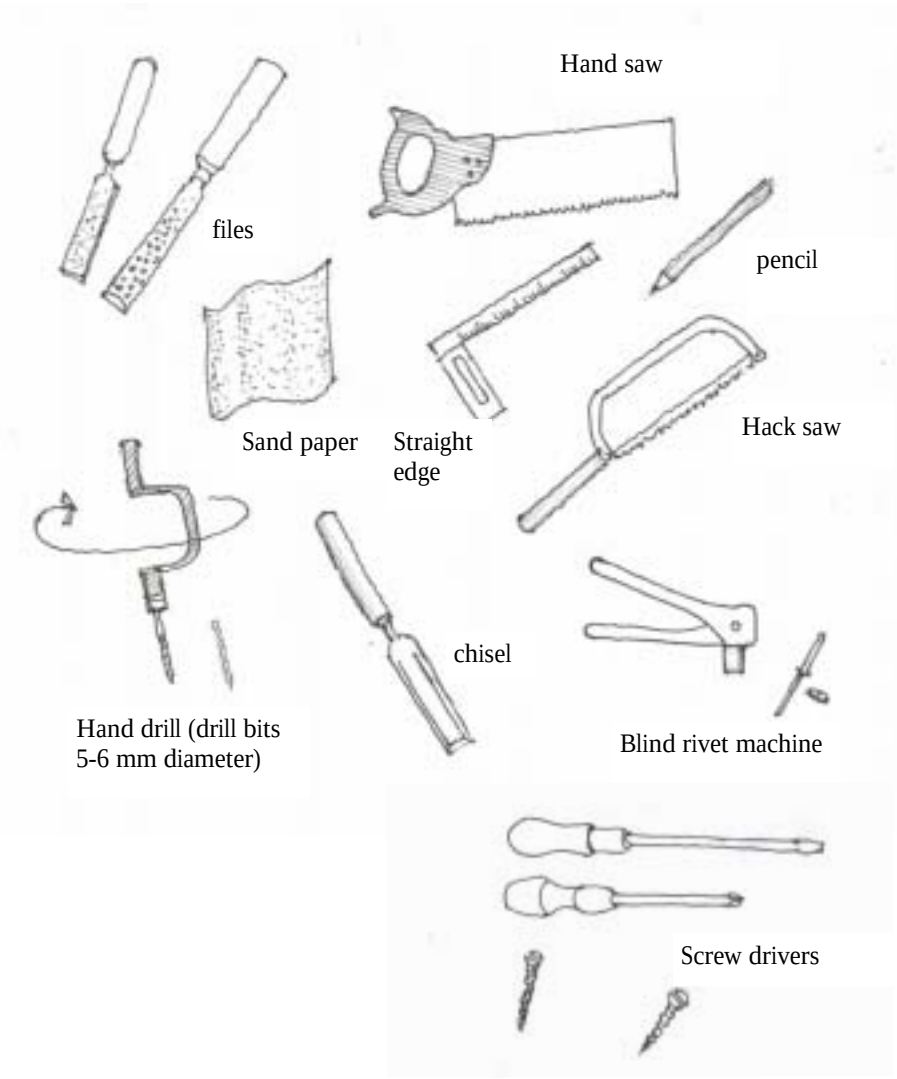
Sandpaper the surface smooth with sandpaper. Clean away the dust with a cloth.



Varnish the clean and sand papered surface. Put some masking tape on the metal parts closest to the desk. This is so that no varnish will come on this part. When you have finished, take off the tape.
For a better result you can varnish twice letting the varnish dry between coats and then sand lightly before applying the next coat.

Putting on New Boards on Desk or Table Frames

These are the tools needed:



You will need hard board. A thinner one is OK for the back support and a thicker one (about 1.5 cm) in for example laminated wood for the seat or the desk top.

1

1. Use an old seat, back support or table top as a model for the new one. Trace around it on top of the board with a pencil. You might want to use your straight edge.
2. Cut out with hand saw or fret saw
3. Use chisel, sand paper or files to do the finishing

2

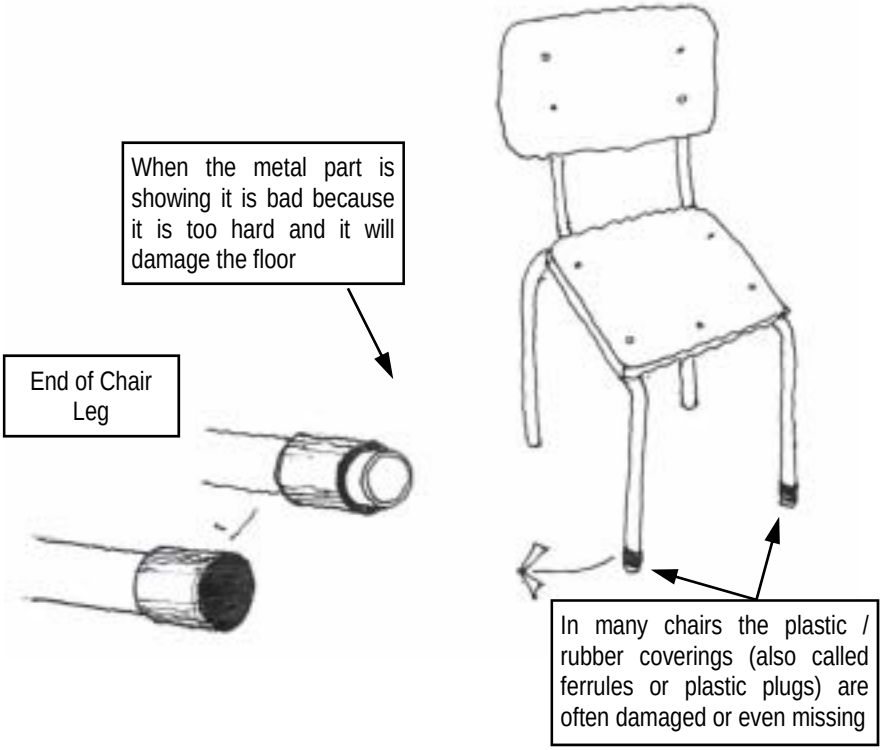
4. Drill holes where needed (make sure you have drill bits for wood)

5. Screw or blind rivet through the existing hole on the metal frames.
6. Varnish the new wood.

3

Rubber/plastic feet on Furniture to Protect the Floor

The Concrete floors of schools often get damaged. The surface is not so strong and also the metal legs of chairs and tables damage the floors. The base of the legs of the furniture should have plastic/rubber coverings to protect the floor and to avoid some of the noise in classrooms.

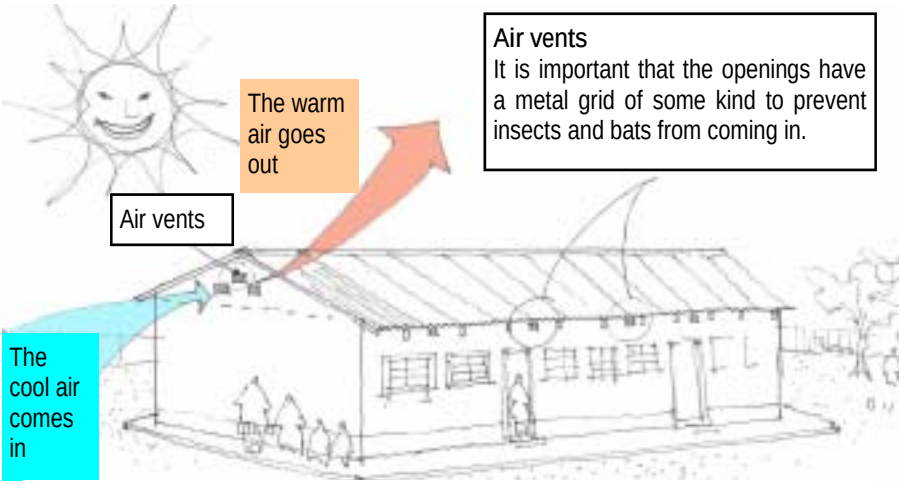


Replace the plastic/rubber coverings with new ones. You can by new plastic ones very cheaply or rubber ones which are more expensive but stronger. If your supplier doesn't have them, tell them to order for you. These plastic protections are cheap and they will protect your floors!

3.2.6 Ceilings

Why is a Ceiling Needed?

The sun shines on the IBR roof which gets really hot and radiates heat (like a stove).You will need to have a ceiling to avoid the internal temperature from getting too hot.



The warm air heated from the hot IBR sheet roof gets warmer than the outside air. By having openings (air vents) in the wall between the roof and the ceiling, this warmer air will flow out to the cooler air. That is why it is important not to forget your air vents, otherwise the hot air will be trapped between the ceiling and the roof.

Ceilings of IBR sheets

Ceilings of IBR sheets fastened on wooden trusses use self tapping screws 10x30mm. Always tighten loose screws and make sure none are missing.
Where roof trusses are steel then IBR sheets are fastened with rivets or self tapping screws.

If the IBR sheets that are to be replaced are not painted, then paint the new sheet before putting it up. You will have a far more comfortable working position.

Ceilings of board

These are usually nailed to the wooden trusses with plaster board nails. These have a bigger flatter head than ordinary nails.
Ceilings of board are often sensitive to water and moisture. If you see stains it is important to remember that you need to fix the leak in the roof first. The stains can also come from bats (see section on bats).

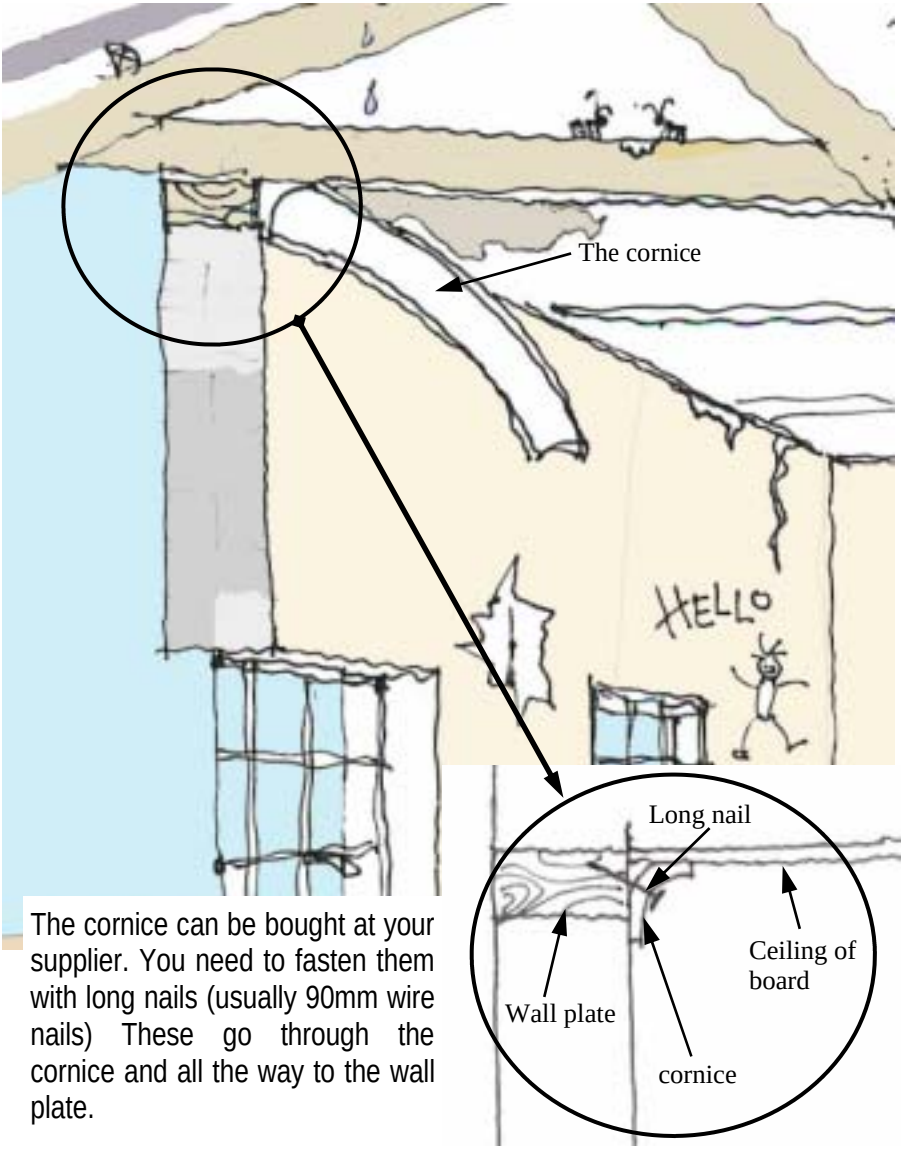
Keep boards to be used at a later time in a dry place.

Bats

Bats can cause big problems in the roof space as their droppings can damage the ceiling boards.
If the problem goes unchecked then the droppings can build up and create a big health risk, as bat droppings carry a disease which can cause serious breathing problems in humans.

Always check around the school at the points where the roof meets the walls, there should be no large holes and the air vents should have wire mesh over them or at least very small holes to stop bats entering the building.

The Cornice falling Down



The cornice can be bought at your supplier. You need to fasten them with long nails (usually 90mm wire nails) These go through the cornice and all the way to the wall plate.

Always fasten cornice that start to hang down early before they get destroyed.

3.2.7 Roofs

Small holes (the size of a 5 cent or smaller) can be mended by metal filler. Use your hands and push the metal filler in the hole.

If the hole is bigger than a 5 cent you can seal it with a 'flash band' patch. This is a metal plate that is blind riveted over the hole.
Many times there are leakages through the holes where the nails are. Pull out the nail and fit new rubbers washers.

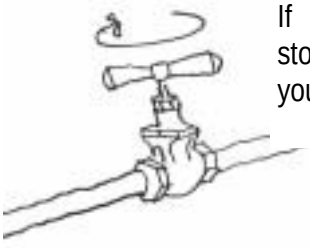
Get up on the building roof regularly to check the roof bolts and other roof fittings, preventing leaks in the first place will save a lot of work later.

Crooked bolts such as these can easily let in water which will damage the ceilings, furniture, electrical components and other parts of the school.
A bolt like this may have been ok once, but after some years the rubber will have perished and will start letting in water.
Paint some roof sealant over all suspect roof bolts

3.3 Basic Plumbing

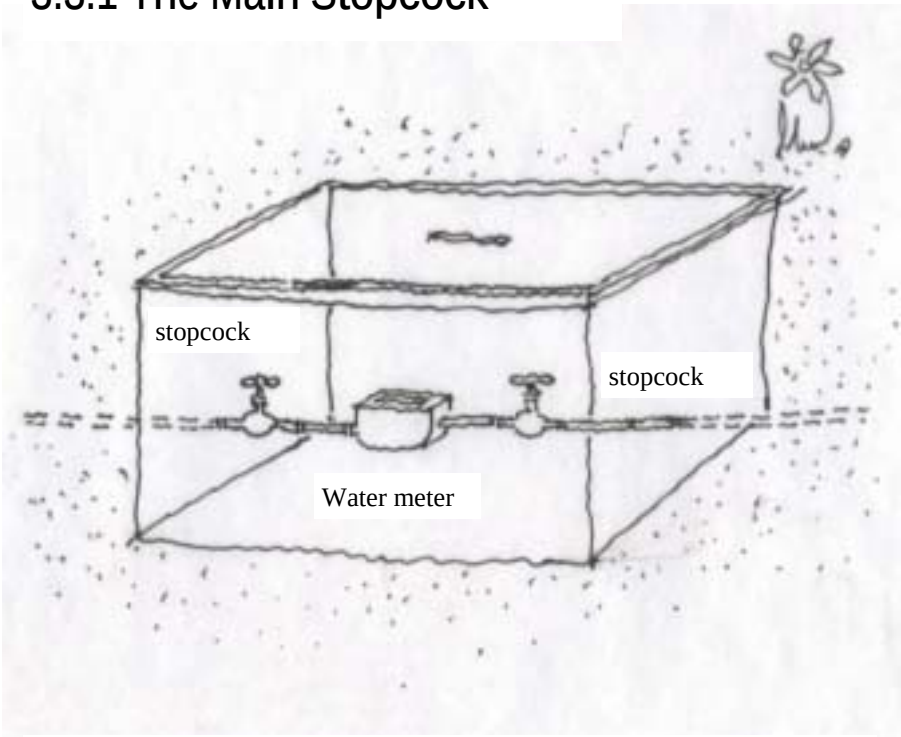
Try to avoid big emergencies

Know where your stopcocks are and which pipes they control



If you turn the stopcock clockwise you close the water

3.3.1 The Main Stopcock

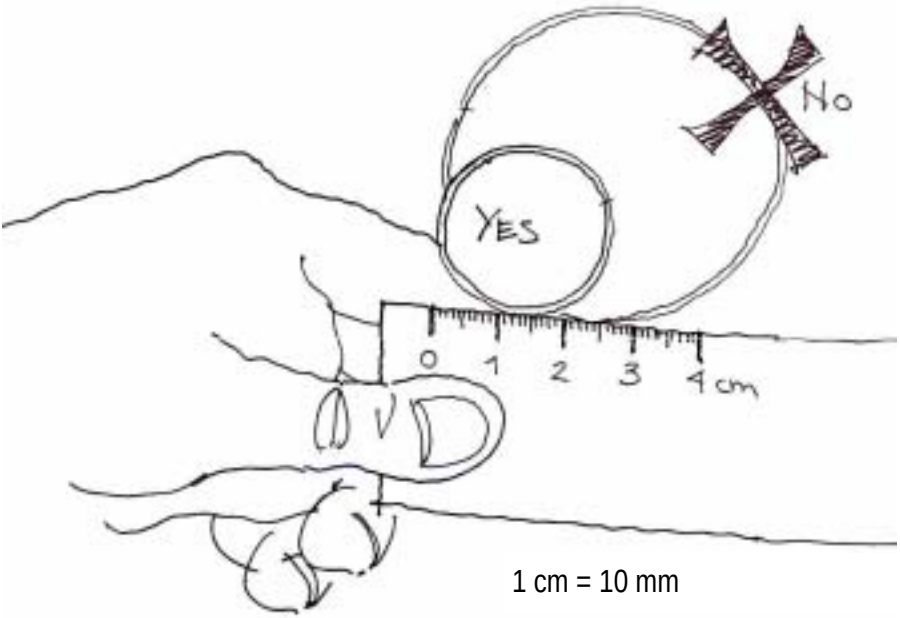


The main stopcock shuts of the whole water supply. You will find it next to the water meter.

Remember to use the stopcocks to turn of the water before you start working!

3.3.2 Mending Small Bursts on Plastic Pipes

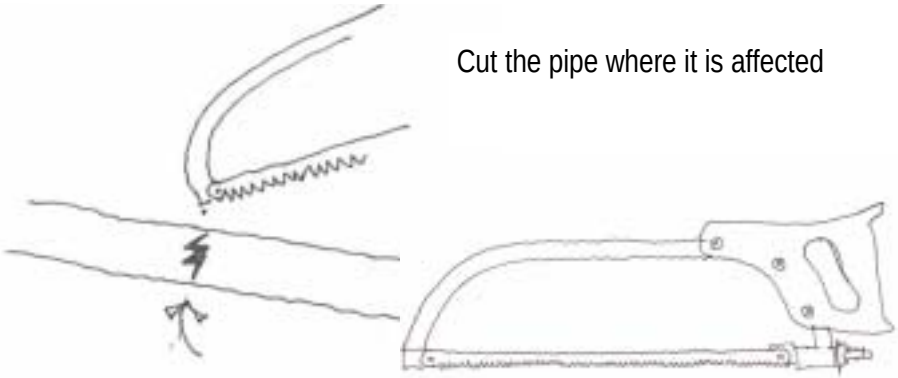
You can mend bursts on small plastic pipes (15 mm to 35 mm in diameter)



1 cm = 10 mm

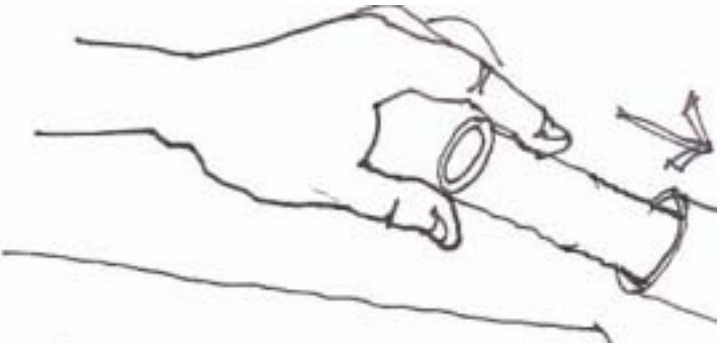
Consult an expert if the pipe is bigger than 35 mm.

When the plastic pipe is soft (class 4 -6, you can read the number on the pipe itself), use an adapter, a coupling socket and a clamp to mend the burst.

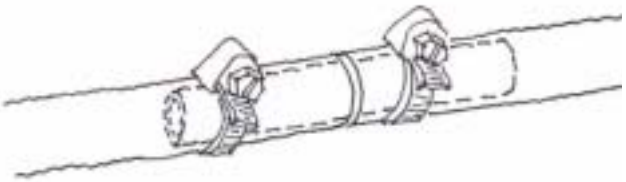


Cut the pipe where it is affected

Use a hacksaw



Fit the adapter inside the pipe

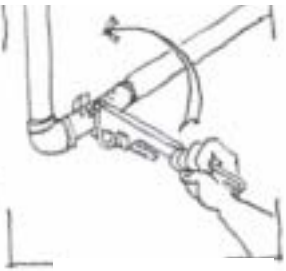


Put clamps on both sides of the cut (you will need a screwdriver)

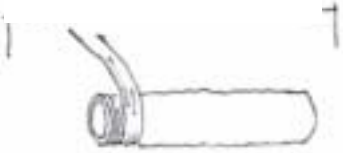
When the plastic pipe is hard (class 7 – 10 you can read the number on the pipe itself), use a compression fitting.

The diameter of the fitting should be a bit bigger than the pipe (eg. pipe 20 mm, fitting 25 mm)

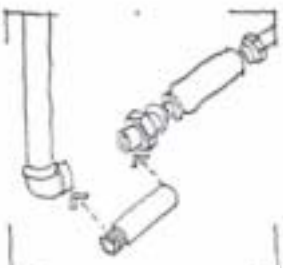
1 Cut with a hacksaw beside the damage



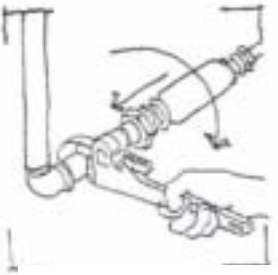
2 Take away the damaged pipe with water pump pliers or a wrench



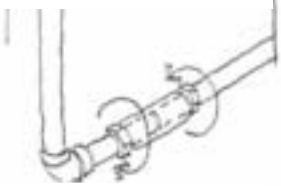
3 Put on sealing thread



4 Put on the new pipe and the fitting



5 Tighten the pipe and move the fitting so that it covers the breakage



6 Screw on the fitting

3.3.3 Taps

There are different types of taps. The most suitable ones for schools are the bib tap for outside or for sinks and the pillar tap for hand wash basins.

There are different sizes of Taps
15 mm,
20 mm
50 mm.
The most common is the 15 mm one.

The taps are in two parts, the head and the bottom. Often it is the head that breaks first.

The only part of a tap that can be replaced is the washer.

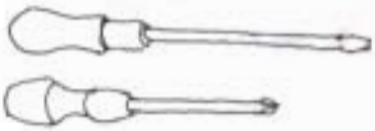
To fix a leaking tap you will need:

A shifting spanner to tighten and retighten nuts as required.

Water pump pliers/ wrench to tighten, re-tighten and hold pipes and nuts of different

Instead of water pump pliers you can also use a Stillson wrench, these are more expensive but are easy to use and they get a good grip on pipe fittings.

Flat head



Cross head

Screw drivers.

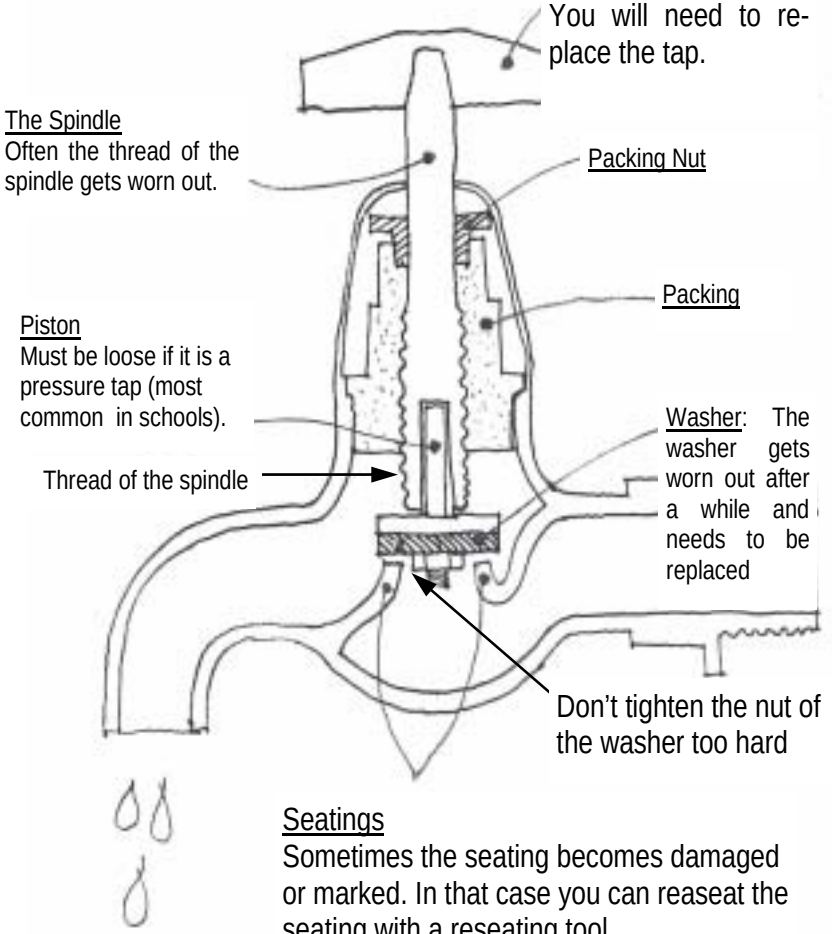
Tap reseating

This tool is used for grinding the seating on a tap smooth, this enables the washer to seal the tap and stop the water flowing

What to do if Taps Break

The Bib Tap

Tap Head: if you feel that the tap head is loose and can move up and down, then the thread of the spindle is probably worn out. You will need to re-place the tap.

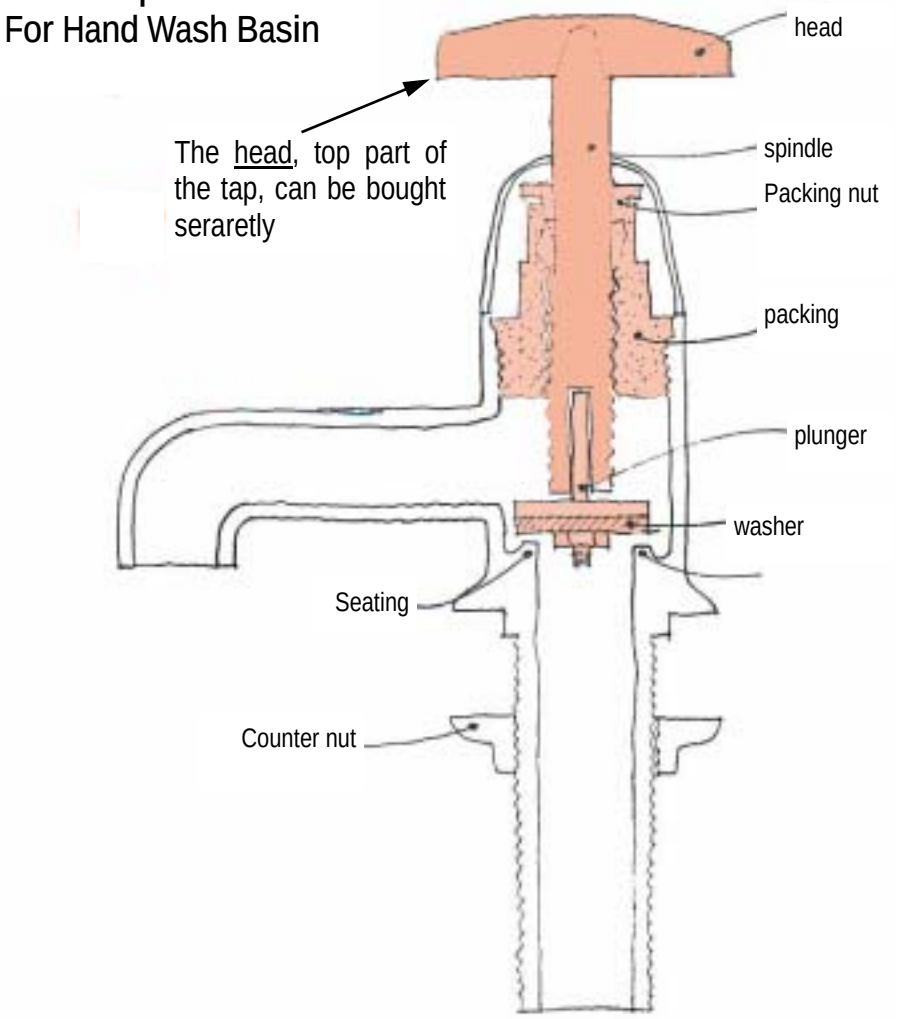


Seatings

Sometimes the seating becomes damaged or marked. In that case you can reaseat the seating with a reseating tool.

Pillar Tap

For Hand Wash Basin



The Pillar Tap is similar to the bib tap except that it is for handwash basins. The dark part of the drawing shows the ”head”, this part is removable and can be bought separatly from the bottom part.

Before starting remember to shut of the water supply (see stopcocks)

How to change the Washer

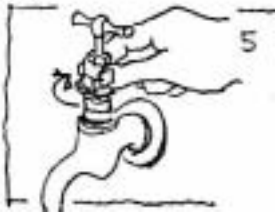
Often in the schools there are many children opening and closing the taps. Sometimes they are closing the tap too tightly. After a while the rubber washer wears out and doesn't function properly.

Separate the top and the bottom using the shifting spanner.

If necessary remove retaining nut and take of the old jumper rubber (washer)

Put on a new washer

Loosen the handle to avoid damage on the washer later when the piston moves

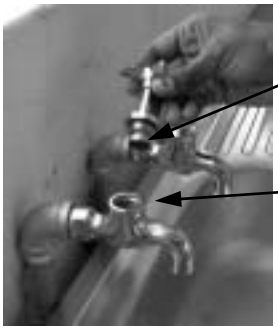


Screw on the head again (clockwise). At the end you will need to use the shifting spanner

Tap Reseating

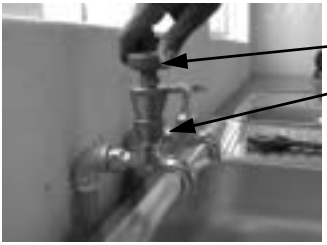
A Tap Reseating Tool and a wrench are the tools needed for reseating a damaged seating on a tap (see picture on page 94).

Make sure you have closed the water supply to the tap. Check this by opening the tap and leaving it open. This will also help in the undoing of the upper part of the tap.
Undo the upper part of the tap.



Remove the upper part of the tap and check the washer, replace this now if it is damaged.
Insert your finger in the bottom part of the tap and feel to see if it is smooth.

Take the Reseating tool and insert into the tap.



Screw in to make secure and turn handle clock-wise until the seating is smooth.

Replace tap top

Tighten with the wrench.
Leaving the tap open turn on the water and flush away any brass filings.
It is important to do this as they will stick on the washer and damage the seating .

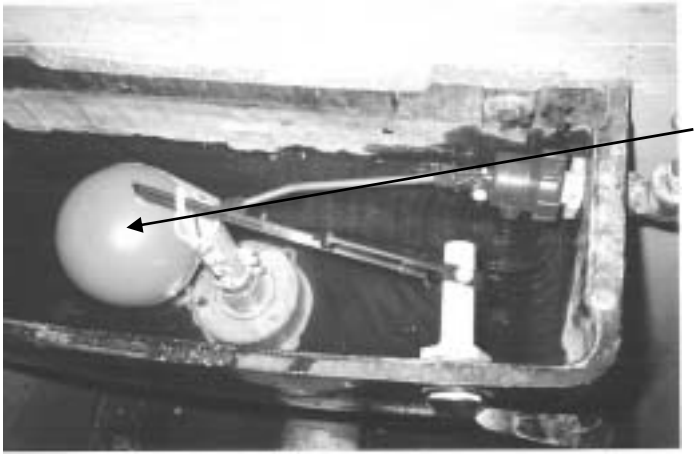
3.3.4 The Flush Toilet

Only use toilet paper in the toilet system.
The sanitary services are a health risk if they are not clean.

Before working remember to shut off the water

Leakages of the flush toilet are often a matter of rubbers/washers. These are cheap and easy to replace.

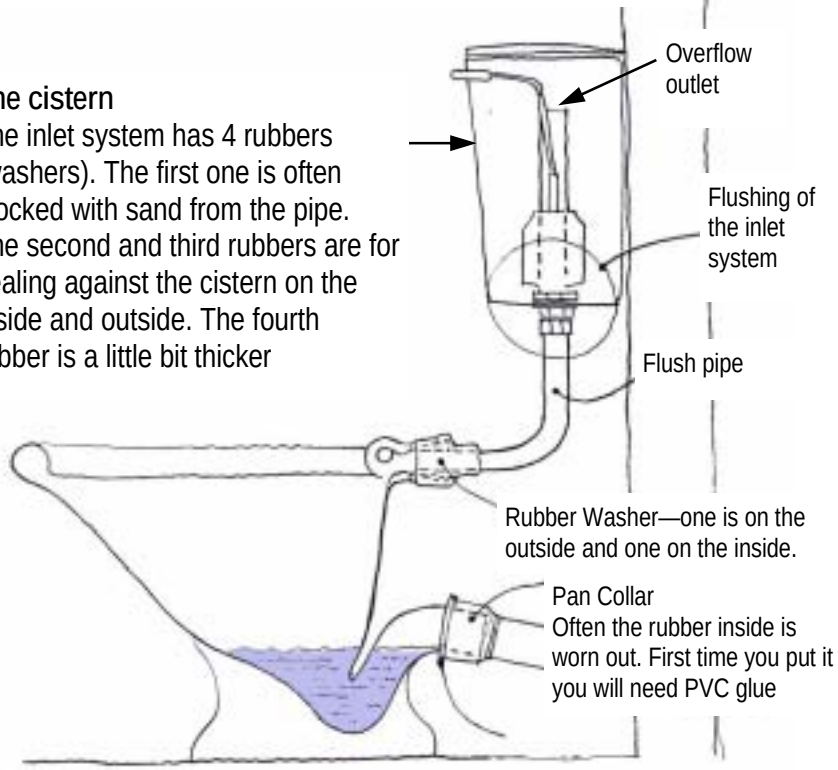
Picture showing the direct lift valve. The red rubber is the first one, it is often blocked by sand from the pipes.



Cistern seen from above showing the ball valve. When the ball valve is worn out the water keeps on running from the overflow. The ball valve will need to replaced

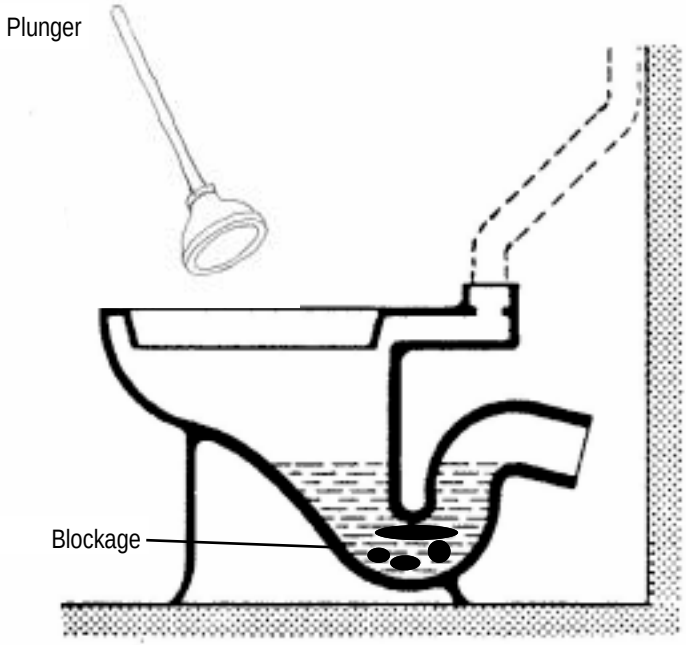
The cistern

The inlet system has 4 rubbers (washers). The first one is often blocked with sand from the pipe. The second and third rubbers are for sealing against the cistern on the inside and outside. The fourth rubber is a little bit thicker



Clearing Blocked Toilet

To avoid blocked toilets remember to use only toilet paper and that the toilet needs to be flushed after each time it has been used



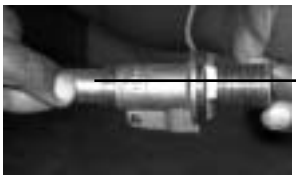
If the toilet is blocked use a plunger to force the blockage away. Sometimes it may be necessay to use your hand, if this is necessary make sure you wear a long rubber glove.

Replacing Washer on a Brass Ball Valve

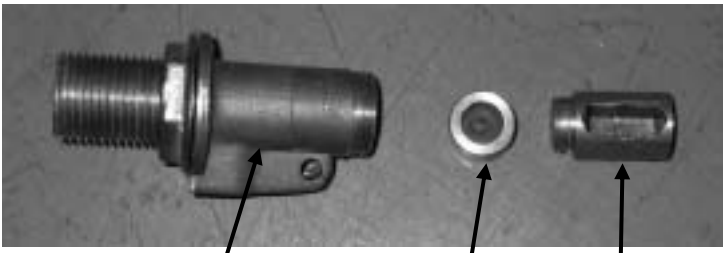
A typical brass ball valve

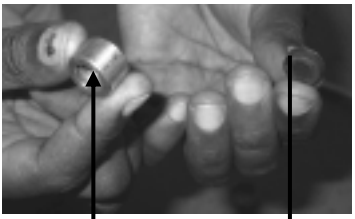
After removing the ball valve from the cistern or tank take off the end cap as shown in the picture.

Remove the split pin, you can try removing it with your hand but you will probably need to use a pair of pliers.



Then remove the sliding piston

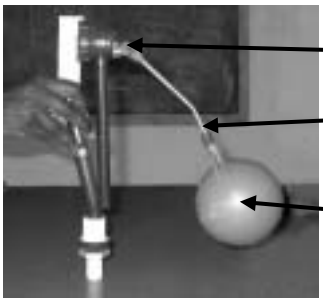




Remove washer and replace as necessary

Reassemble the ball valve and refit to cistern or tank.

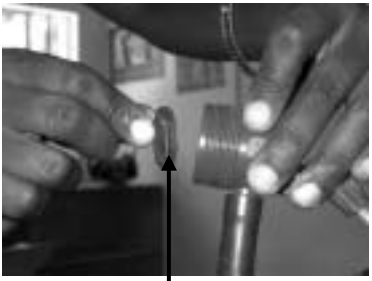
Replacing a Washer on a Plastic Ball Valve



Undo nut on valve body. This should only be hand tight but if necessary use water pump pliers.

Piston

Remove the piston from the valve body

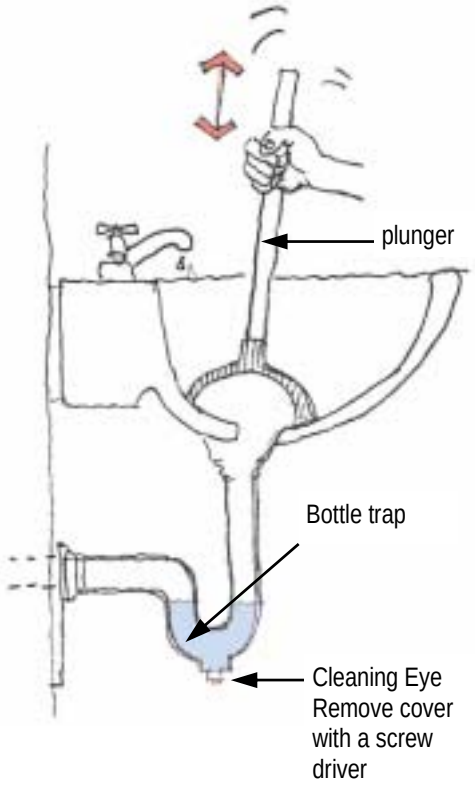


Diaphragm washer

Remove washer from inside the valve body.

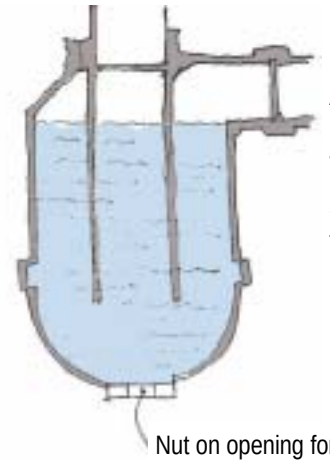
Reassemble the ball valve and refit to the cistern or tank

Clearing blocked Handwash Basin, Urinals, Bidet



Remove the blockage with a plunger moving it up and down. The same can also be done in the urinals.

If this doesn't work open the cleaning eye with a screw driver or small spanner. You can clean with wire and/or throwing water in.



A different kind of bottle trap (this one is often be found in urinals).
To open it you turn the nut. Use a shifting spanner or water pump pliers to unfasten if the nut is hard to move.

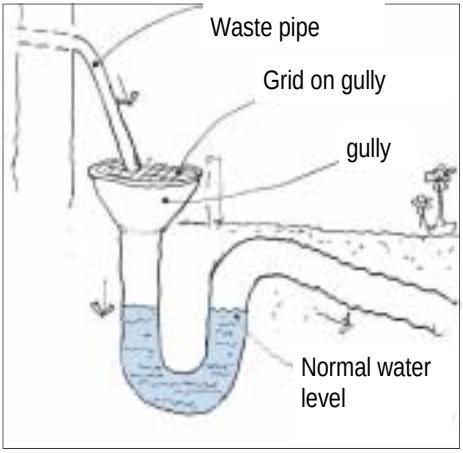
3.3.5 Drainage

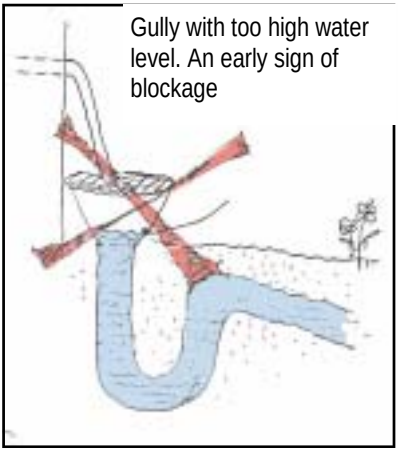
Keep storm water systems and open canals free from blockages

Make sure manhole covers and grids on gutters are not removed or damaged (If so buy a new one at your supplier and replace it).

Drains which are totally blocked and overflowing are unpleasant.
Try to act before they get that way

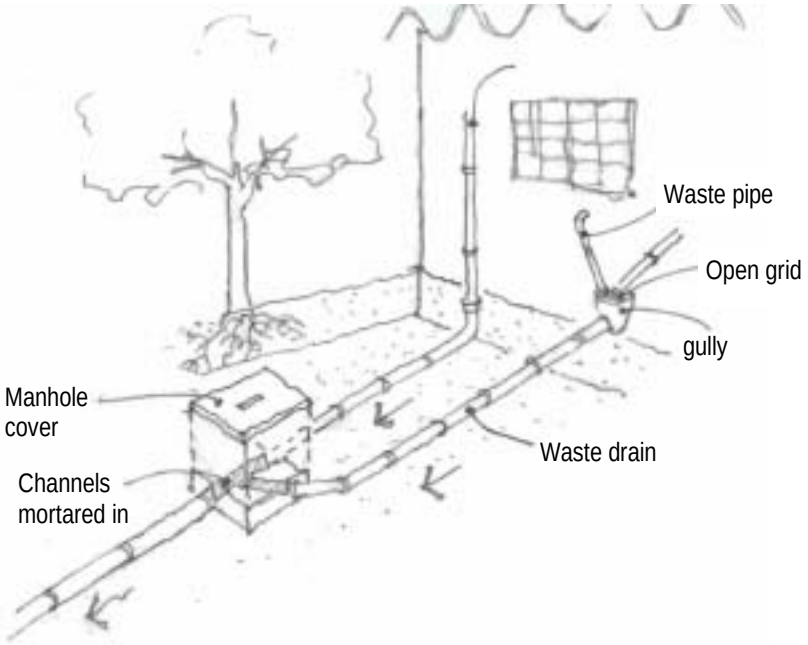
Clearing Blocked Drains





Signs that pipes are starting to have blockage are:

⇒ Overflowing gullies outside
⇒ Abnormal Gurgling sounds (in hand wash basin, sink and modern urinals)
⇒ Drain smell
⇒ Raised water levels in the WC



If the manhole is full the blockage is downstream (from the manhole and then away from the building)

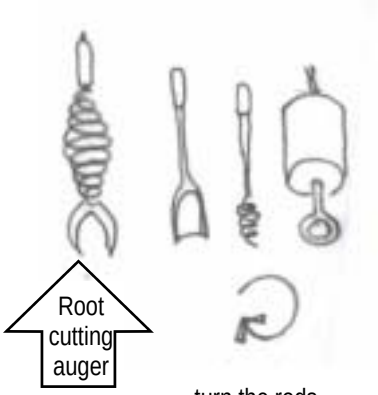
If the manhole is empty you know the blockage is upstream.

Try various taps and appliances round the building while you watch the manhole to see which pipes are blocked.

You can then rod the affected pipe. (you can sometimes borrow the cleaning rods from the Works Department).

Rod the affected pipe

(you can borrow rods from the Department of Works or the Municipality).

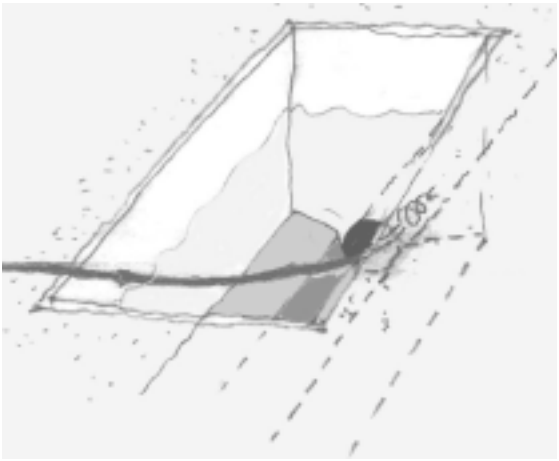


Rods

There are different types of heads. The most common is the rubber and the spiral one, If you have roots growing into the channels you will need to use the root auger.

Screw the rods together to get the necessary length. You might need a shifting spanner.

Turn the rods clockwise. Keep turning them as you push down into the drain, When you meet resistance push and turn at the same time.



Rodding of a full Manhole

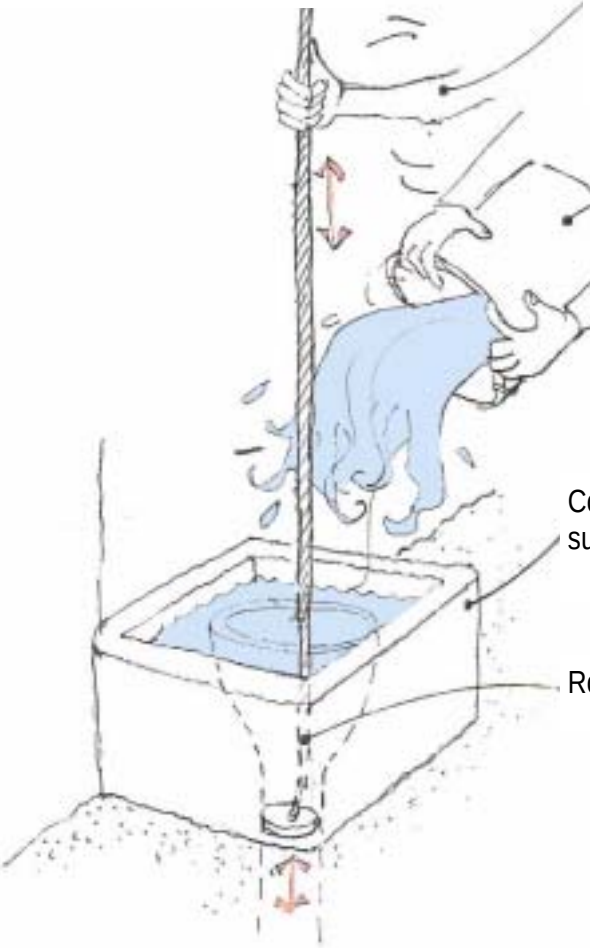
If the manhole is full insert the rods “blind” and push towards the downstream end. The channels mortared into the base will guide the rods towards the outlet hole.

You don’t need to empty a full manhole before rodding.

Rodding of a gully

The gullies should have a grid to protect them and to avoid to get blocked by garbage, sand and other unwanted materials. Before rodding remove blocking material. Always use gloves and be careful because there might be sharp things like broken glass. Once the gully is clean then rod, turning clockwise and pushing. When finished pour some buckets of water and check the manhole downstream. Once water is running there is no blockage.

Rodding the Gully



3.4 Tools and Equipment Required for Maintaining Schools

Introduction

The following pages will act as a reminder of how to use basic tools and to encourage you to start building a more extensive toolkit which will allow you to perform many tasks, meaning that you will be able to earn more money!

Many tools have more than one use and so this section will show the variety of different applications for which a tool can be used.

This section will also help you to re-order parts or spare parts for your tools.

You may need to tell the Principle of the school what you need to do a certain job, so use this manual to help describe the things you need.

The picture on the left shows a well stocked tool box.
Buy the tools whenever you can as having a good range of tools will help you to get more work and more money!

Tools are not an expense they are an Investment!

Caring For Your Tools And Equipment

Why should you care?

Your tools are your road to earning money, without tools, performing even the most basic tasks will be impossible and customers will not ask you to work for them.

All tools are not only valuable because of their price, but also in terms of what they can earn for you, therefore, always care for your tools in the knowledge that they are your defence against poverty.

Tool Care

Always work in a clean environment, in Namibia, it is difficult to avoid sand getting onto tools, but sand can clog up tools and make them difficult to use, so be careful not to drop your tools in the sand.
Work on an old sheet or some plastic if possible, because small tools can easily become buried in the sand and get lost.

If you are doing plumbing work or working with water, make sure that your tools are clean and dry when you are putting your tools away, wipe your tools with some oil to stop them going rusty.

Unfortunately, some people do not use tools properly and can often break the tools by using too much force, using the tool for the wrong purpose or they just lose the tools.
For this reason it is important to never lend your tools to anyone.
It will be difficult to refuse some people, so offer to help them personally with your tools and do the job for them.
If you start lending tools to people, you will have no control over those tools and you will very quickly find that your toolset gets smaller and the tools that you still have will be broken.

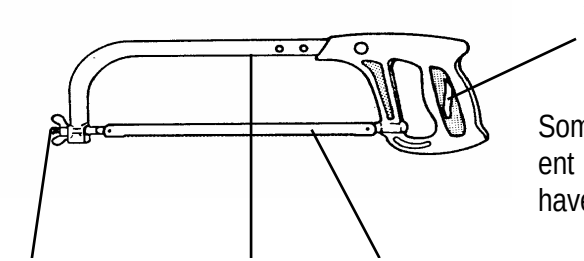
Lending out tools will make you poor, so don't do it!

Basic Metalwork Equipment & Techniques.

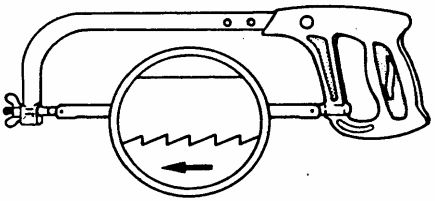
When maintaining a school it will become necessary to cut and shape metal or other materials, for this we can use a hacksaw.

The Hacksaw

A hacksaw is a hand tool which is designed to cut thin or small sections of material, usually metal.
Cutting metal greater than 3 cm thick will be hard work, but it is possible, as long as the correct blade is fitted and the correct method is used.
The Hacksaw consists of four main parts, the frame, the handle, the blade holder, and the blade.

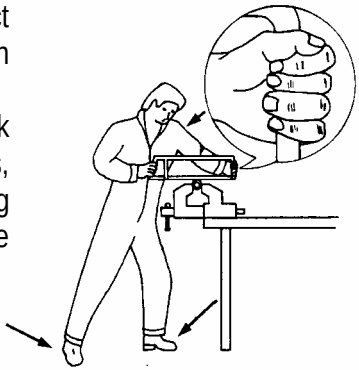


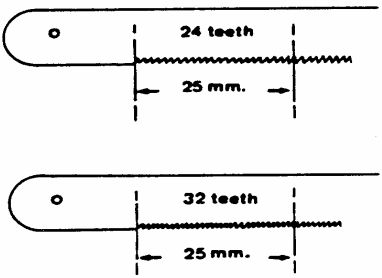
Some hacksaws are a different shape but they usually have the same basic parts



The picture on the left shows the blade magnified, it is very important to fit the blade properly , with the teeth of the blade facing forward.
Set the tension of the blade by turning the wing nut until the blade does not move on the holding pins, then turn the wing nut for another one complete turn. Do not over tension the blade or it will break easily.

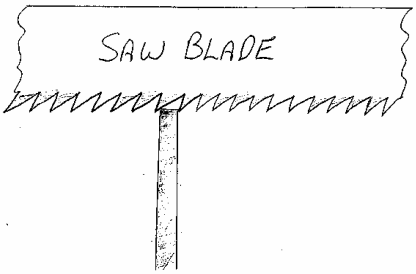
The picture on the right shows the correct grip and standing position to be used when cutting metal.
Notice that the man is leaning into the work so giving his weight to the cutting process, this is why the blade teeth have to be facing forward. Grip the frame tightly and keep the frame straight up, to produce a straight cut.

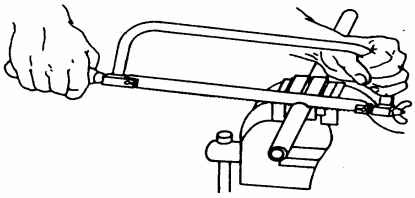




The picture on the left shows two blades which you might use. A general rule is that two blade teeth should be touching the work at all times.
So, if the material you are cutting is only 2mm thick then you should use a 32 tpi teeth blade. (tpi=teeth per inch)

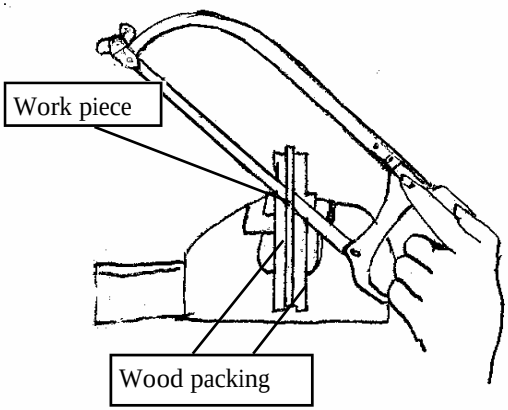
The picture on the right shows the danger of cutting thin material with a coarse blade, during the forward cutting stroke the teeth of the blade will easily break off so making the blade useless.





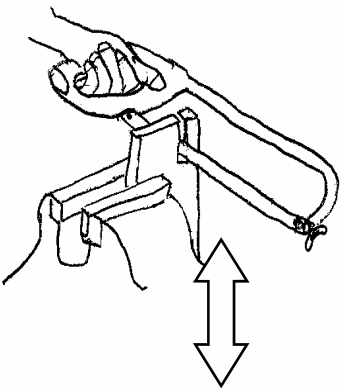
A good example of cutting thin material is when cutting pipe for plumbing, a thin pipe will easily strip the blade if it is not the correct teeth number.

Using the Hacksaw for Cutting Thin Material



Support thin material with some wood packing, either in a vice or clamped together when working on site. The wood will provide a guide as well as reduce the vibration of the material.

The frame of the hacksaw will be wider than the blade width, so cuts longer than the distance between the blade and the frame will be impossible as the frame will hit the material.
For this reason most hacksaws are designed to be able to turn the hacksaw through 90°, allowing the frame to be turned over, to provide the freedom to cut longer lengths of cut.



Points to Remember with the Hacksaw

- Choose the correct blade 'teeth per inch' (25mm) for the thickness of material to be cut.
- The teeth of the blade must face forward.
- The blade must be tensioned properly.
- Use eye protection when using the saw and stand correctly.

Files and Filing

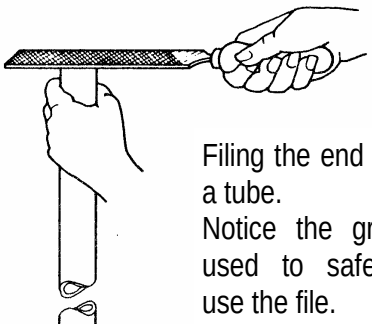
Files are used for removing and shaping small amounts of metal from a work piece.

File construction

Files are made of very hard steel which have small teeth machined into them. Files are very hard, but it is important to remember that they are also very brittle which means that they can snap or shatter easily if they are bent or dropped.

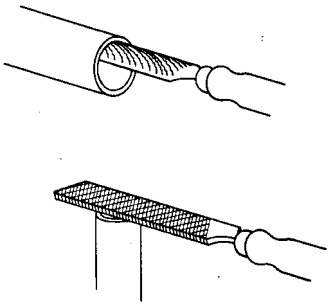
File types

A file can be a smooth cut, medium cut or rough cut and are also made in different shapes for different jobs, they can be flat, round, triangular, half round, and square.
They only cut on the forward stroke so it is important to have the correct style of filing, gently lifting the file on the back stroke.



Filing the end of a tube.
Notice the grip used to safely use the file.

Files come in two parts, the main file body and the handle. The handle is connected to the file by sliding the thin angled end of the file, called the tang, into a hole in the handle.
The handle can become loose and come off of the file during filing, so it is important to remember to grip the file in the correct way to avoid the file jamming into your hand! Never use a file without a handle.



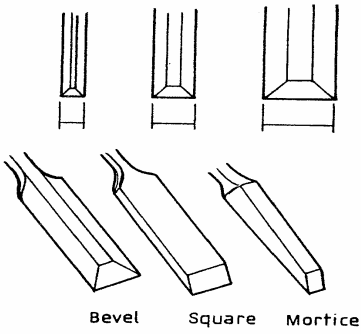
The picture on the left shows a half round file de-burring a pipe and a flat file squaring a pipe.
Remove steel particles from the file with a wire brush and rub chalk over the file to prevent clogging.

Wood Chisels

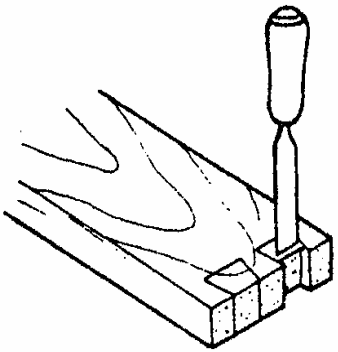
Wood Chisels are used to remove small amounts of wood when fitting locks and hinges, or when wood requires shaping, such as when repairing tables and chairs.

Chisels are especially designed for wood and must **never** be used to cut other materials like metal or cement.
Chisels are made from hard steel, fitted to a wooden handle, never use a metal hammer to hit the end of the handle, if you don't have a wooden mallet, use a heavy piece of wood to hit the chisel.

Chisels come in different widths to suit different jobs, the picture on the right shows some of the shapes.



Chisels can re-sharpened using an oil stone, take care to keep the same angles that exist on the Chisel, never stone an angle on the flat side of the Chisel.



The picture on the left shows the Chisel being used to cut a dovetail joint.
It is important to sharpen the chisel every time you use it to keep it cutting efficiently and safely.

The Correct Selection and Use of Screw Drivers

A set of good quality screwdrivers will last you many years, if they are well looked after.
Screwdriver sets come with a selection of different sized tips to fit a variety of different screw heads.

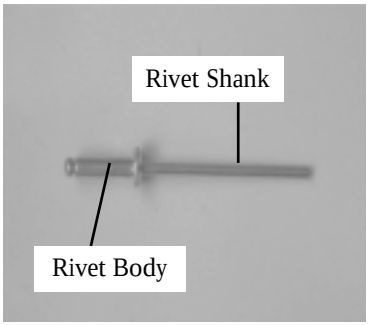
It is important to match the size and shape of screwdriver tip to the screw that you want to turn.
A bad fit will result in losing effort and the screwdriver may slip and possibly damage the screw, so making it more difficult to remove.
With a poor fitting tip you may also damage the wood around the screw, which will upset the customer and lose you work!

From the picture on the left you can see that the tips of the screwdrivers are accurately made for the correct screws, the crosshead screwdrivers are sometimes called ‘star’ screwdrivers or ‘Phillips’ screw drivers.

Never use a flat screwdriver to turn a crosshead screw, you will damage screwdriver and the screw, the screwdrivers edges may break off, so making it useless even for flat screws

The Blind Rivet Gun

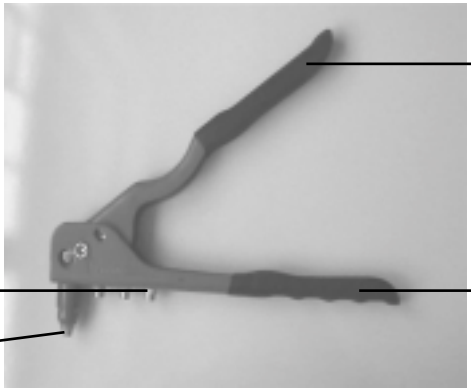
Blind rivets are used for many jobs to join pieces of material quickly. Blind rivets are often used instead of nuts and bolts or screws, as blind rivets give a neat and tidy finish in areas where there is not much room to move with your hands or fingers.



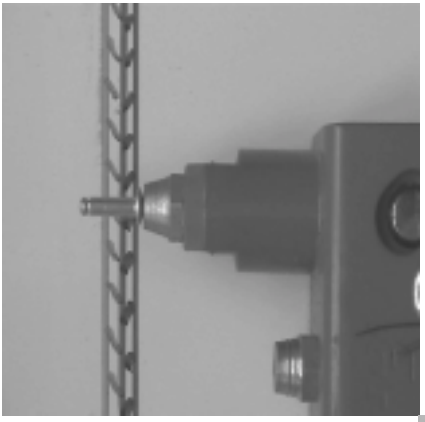
Blind rivets can be made of Steel or Aluminium, and can come in many different length's and diameters to fit the work pieces to be joined.
The rivet on the left is a 10mm long x 3.2mm diameter and will require a 3.3mm drilled hole to fit through.

It is important to understand that blind rivets are not as strong or as safe as a nut and bolt, therefore, do not use rivets in situations that could be dangerous if the riveted joints become over loaded. For example, don't try and blind rivet a book shelf, as this could become overloaded and fall onto somebody.
If the joint to be repaired is going to have heavy loads then it is better not to use a blind rivet.

The Blind Rivet Gun



The rivets used in the blind rivet gun have a pin through the middle called a shank, which the blind rivet gun grips and pulls the smaller end of the rivet into a wider shape, so blocking the hole and creating a tight join in the
material.
When using blind rivets, always keep the box that the rivets were bought in, as this gives information about the rivet, including the size of drill to use.

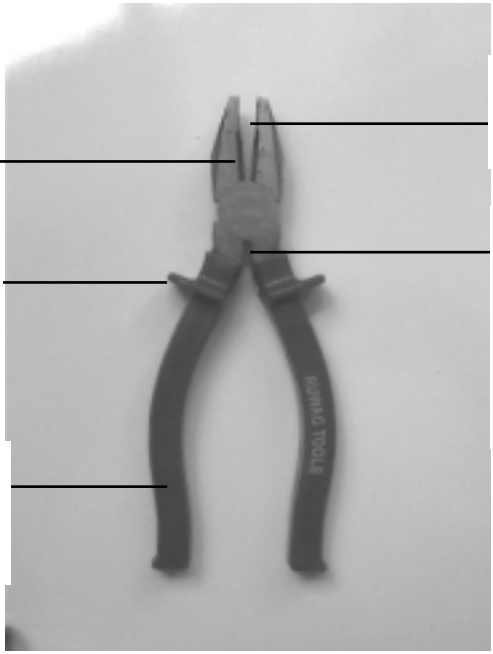


In the picture on the left, the two pieces to be joined are represented by the sketch.
After drilling the correct size hole insert the rivet shank into the rivet gun head as far as it will go.
To do this make sure the 'pumping' handle is open.

Start to squeeze the handles together until the rivet deforms, eventually it will suddenly snap and the rivet gun will come away from the rivet, open the handle and shake out the shank of the rivet.
Make sure that the rivet gun head is always against the rivet head when squeezing the handles

The Combination Pliers

A pair of pliers will stay with a maintenance person for the whole day and will be used often, however, the trainee in maintenance may need to be reminded of how versatile the tool is.
Pliers come in many shapes and sizes but combination pliers usually have the same features, below is a picture of a typical pair of pliers.



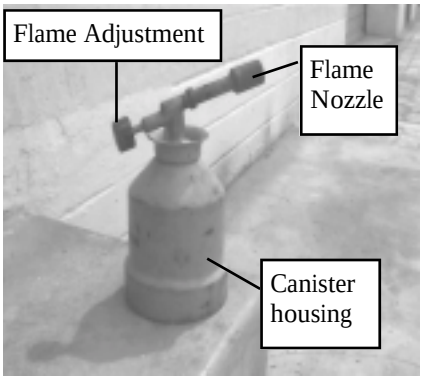
Pliers are versatile and useful, but never use them when the correct tool is available, for example, don't use them to loosen nuts when you have the correct spanners, pliers may round off the nut and make it difficult to remove.
Do not use the cutters for anything other than soft wire.

The Blow Torch

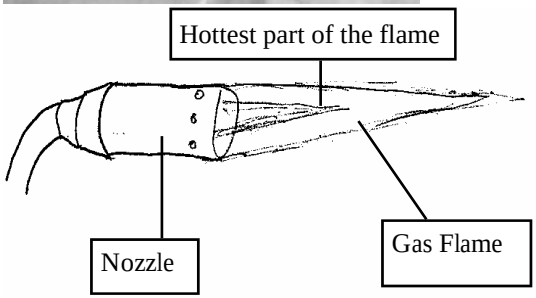
The blow torch is a compact piece of equipment used to heat metal, usually for soldering copper joints when doing plumbing work.
The blow torch uses liquid gas contained in a metal can that screws onto a gas inlet on the torch.

The cans of gas can be bought at most hardware stores, camping stores and some supermarkets.

Extreme care must be taken when using the blowtorch, the flame is very hot and can set fire to your surroundings very quickly. When using a blowtorch keep a bucket of water nearby, in case of fire.



To operate the blow torch, open the control valve and light the gas released from the nozzle, then adjust the valve until the flame roars and is bright blue.



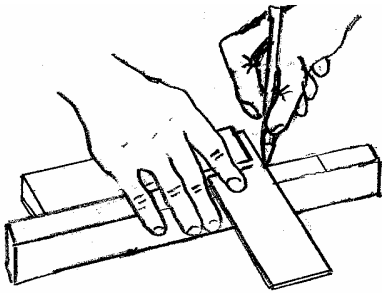
The ideal flame burns yellow/blue with a light blue 'cone' this is the hottest part of the flame and the part that you should use to heat the copper pipe.

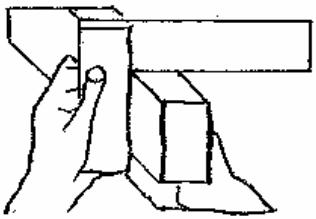
Marking and Measuring

When repairing furniture or buildings you may need to replace some old material with new, this will involve measuring, marking out and cutting.

Use a tape measure to measure and mark off the amount of material that you require. A steel tape is best, but it can get broken if you let it run back into the tape body too fast.
Never pull it further than its full length or the spring will break and the tape will not rewind.

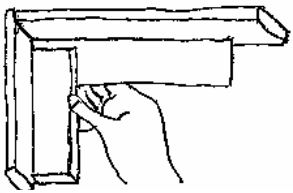
Use a try square to draw accurate lines on wood or metal before cutting, the try square is also used for checking that your work is square before joining the work.





Above: Checking a square corner

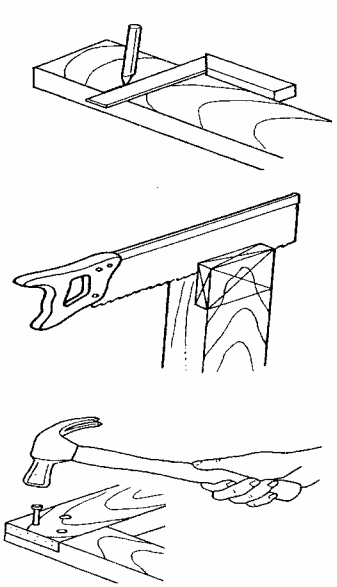
The square is very useful, but also needs great care to stop it becoming damaged and inaccurate.



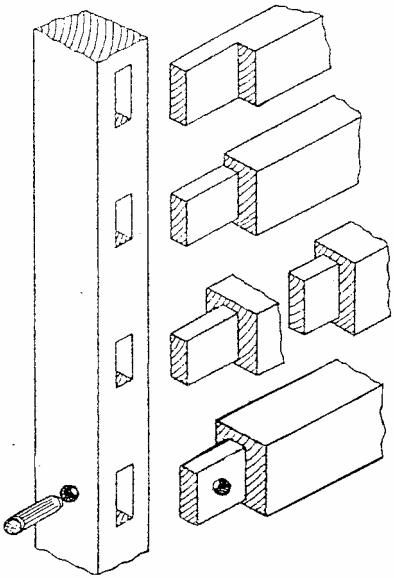
Above: Checking an inside angle

Marking and Cutting Simple Joints

When you have become good at marking out, then you can move on to cutting some simple joints such as the one on the right.

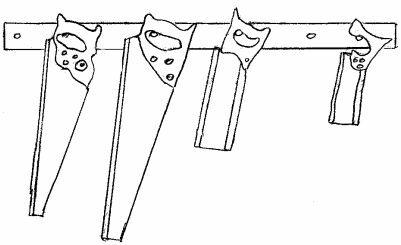


You will soon realise why making sure a joint is square, is so important, especially when you work with longer pieces of material, a small error in the 'squareness' of your joint may create a huge error at the other end of the work piece.



When you get more advanced you could attempt some of the joints on the left!

Don't forget to store your tools nicely so that they stay in a good condition (below)

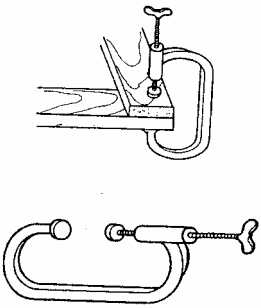


The Use of Glues and Epoxy Resins

Glues and epoxy resins are becoming more and more important in construction and maintenance.
Below is a description of different glues that you may need to buy when maintaining schools.

Wood glue

Wood glue is a polyvinyl glue, giving the name PVA glue.
Wood glue for interior use is water based and can be cleaned with water.
All wood glues will need clamping together to stick properly.
For outdoor work use an exterior PVA glue.



Floor covering glue

Vinyl floor coverings should be glued with a rubber resin or a synthetic latex, the hardware store will be able to advise you on the best glue for the work, both types of glue can be cleaned with normal water.

Bathroom Wall Tiles

Contractors in Namibia usually use plain cement to fix tiles to showers, sinks and bathrooms, which is why they always fall off!
It is better to use a PVA tile adhesive for tiling, they can be
water resistant and EPOXY based grout for tiling also resists mould and germs.

Ceramic Floor Tiles

Clay or ceramic floor tiles can be laid with cement based tile glue, and can often be laid with just sand and cement.
Make sure that you don't spend money on WALL tile glue when fixing FLOOR tiles.

Metals

Epoxy resins come in two parts which have to be mixed together, one part is a hardener and makes the glue go hard very quickly, so it has to be used quickly.
Clean with mentholated spirits (purple spirit).

Super Glue

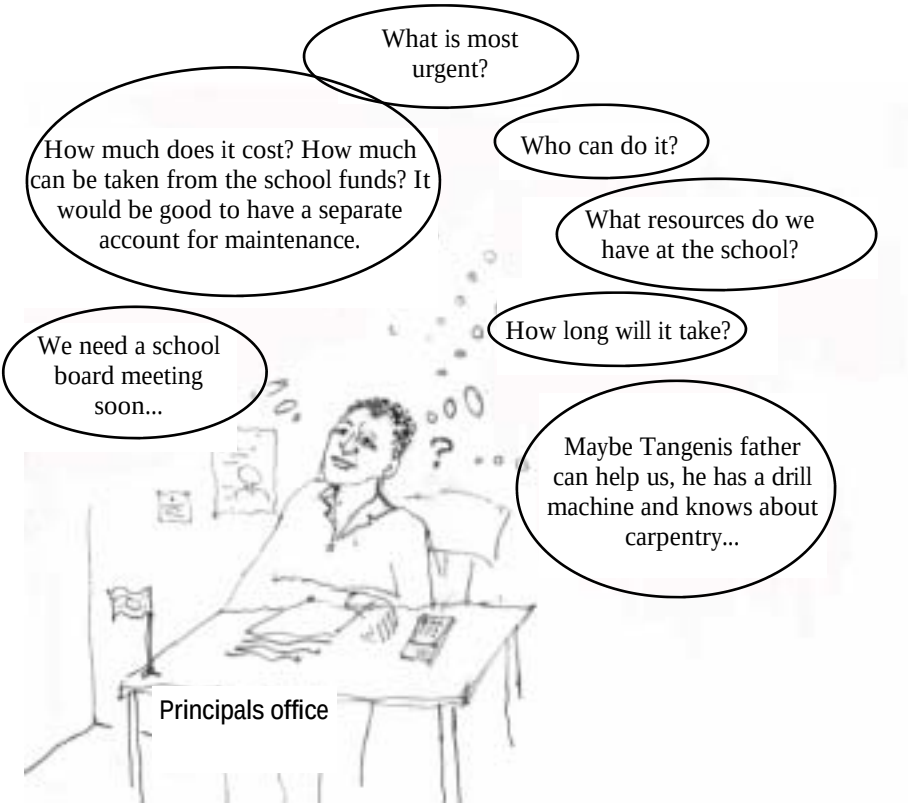
Super glues or Cyanoacrylates stick nearly anything to anything, including human skin, so they must be used with extreme care.
Super glue is supplied in small tubes and is expensive so use it only when nothing else will do.

4 Maintenance Planning

The principal is the main responsible for the basic maintenance and the minor repairs at the school. A Maintenance plan should be integrated to the school plan. Liase with the Circuit Inspector when planning the maintenance.

4.1 How can the School Organize and Plan for Maintenance and Minor Repairs?

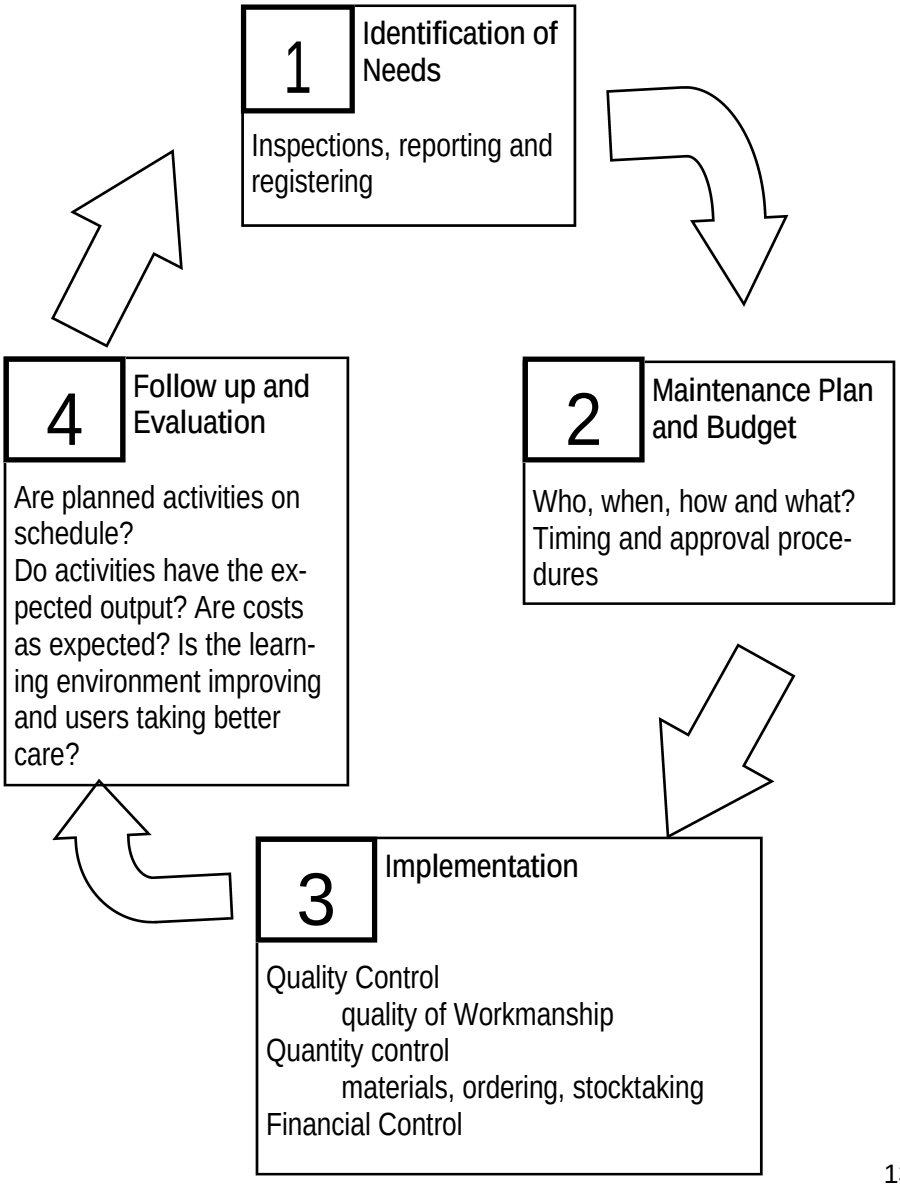
There are many factors to consider



The principal needs to organize the school in order to know **the needs of maintenance and minor repairs** . Once the school agrees on what is to be done then it needs to organize **how** to do it (**who** can do it? **which tools and material** are needed?) **How much will it cost**? When shall each activity take place? etc.

4.1.1 The Maintenance Cycle

clarifies the different steps in the maintenance planning



4.2 Maintenance Planning at Oshakati CS

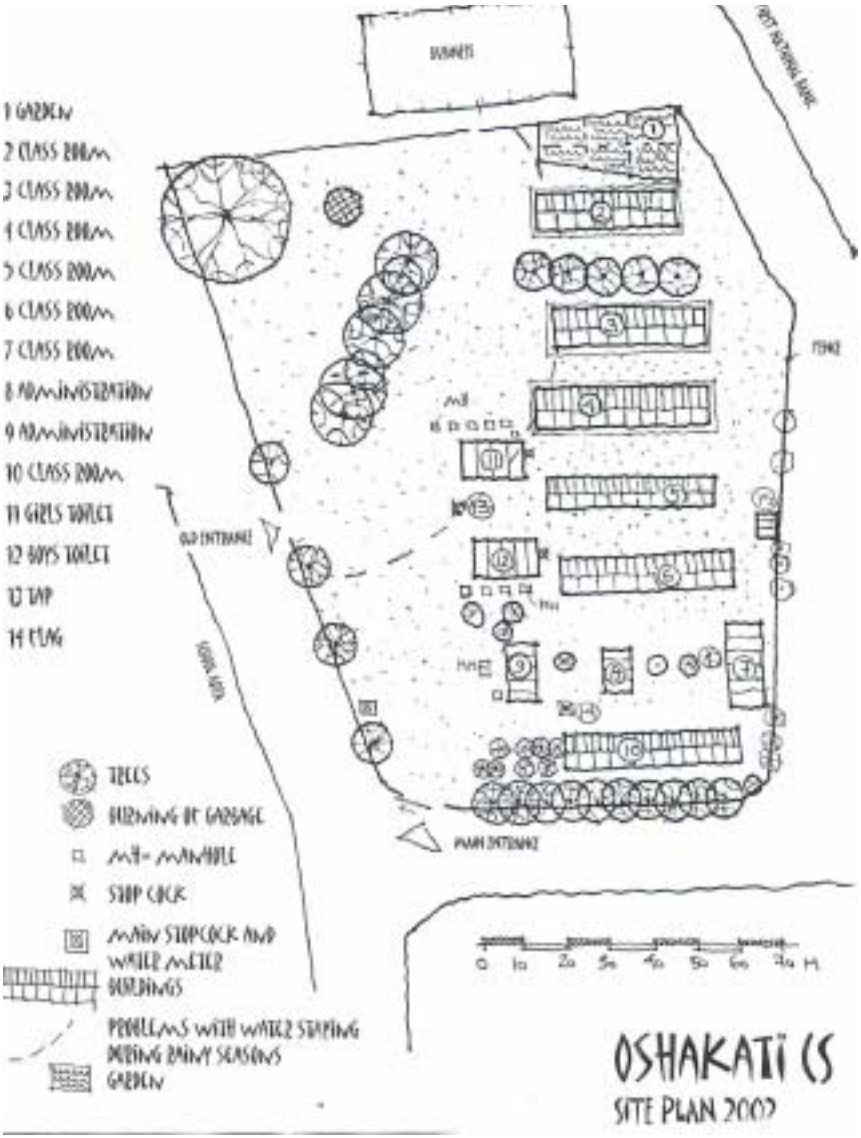
Oshakati CS and Onamutai CS are Pilot schools concerning maintenance. Both schools have improved their environment considerably. This chapter shows how Oshakati CS organized their maintenance. (Onamutai CS is mentioned in the chapter "The school Yard" presenting their planting experience).

Oshakati CS selected a Maintenance Committee consisting of the principal, 2 teachers, 2 parents, 2 handy persons, 2 cleaners and 2 student representatives.

It is important to check what parents can help with. Maybe there are persons knowing about carpentry, plumbing, painting, welding etc. among the school parents.

The reason for selecting the maintenance committee is to get the most interested and practically skilled people involved.

A site plan of the school and its suroundings helped to visualize the overall situation at the school and to precisely show the different problems and solutions.



The maintenance Committee **identifies the maintenance and minor repairs needs.**

Each classroom was checked for the minor repair and maintenance needs. Also exterior spaces like the garden, the playgrounds, toilets, taps, water tanks, fence etc. were checked

The maintenance in schools requires increased practical knowledge
The handy persons, cleaners, teachers and student representatives participated in practical workshops on minor maintenance, cleaning, basic plumbing and mending of furniture.
Increasingly many minor repairs were implemented as the practical knowledge increased in the school maintenance committee. Today furniture has been fixed, thorough cleaning effectuated, some blackboards fixed, broken window panes mended, flush toilets and leaking taps fixed and drainage and gullies unblocked, etc.

The school has a toolbox with the basic tools (hammer, screw drivers, pliers, saw, chisels, raspers, files, paint brushes, planer, cloth, meassuring tape, straight edge, trowel, shifting spanner etc). The school also is in the need of completing the toolsbox with for example a hand drill and a pop rivet machine.

OSHAKATI CS MAINTENANCE PLAN 2002-2003

specification of needs/ problem identification	specification of activity	person-nel needed
To protect the vegetable garden	*To fix the enclosure around the vegetable garden*	*handy person*
To make the soil in the vegetable garden more fertile	*to mix the soil in the vegetable garden with cow dung*	*learners/ teachers*
Protection of trees	*to put protection of branches around the trees*	*handy person*
To collect garbage in the class rooms	*7 garbage bins (for the classrooms) Flip Flap mini Leo*	*secre-tary*
To collect the garbage in the yard	*3 refuse bins rubber 55 liter*	*secre-tary*
12 window sliding stays missing	*to replace the 12 window holders with new ones*	*handy person*
broken window panes	*to replace the broken window panes with new ones using putty and repainting the putty*	*handy person*
Window handles broken or not working properly	*to replace broken window closers with new ones*	*handy person*
broken fluorescent tubes	*replace broken fluorescent tubes*	*handy person*
broken softboards	*replacing of broken soft boards using wood screws and plugs. Painting?*	*handy person*
chalk holders broken or missing	*replacement of defect or missing chalk holders*	*handy person*
electrical layout dangerous, lids missing, cables visible etc	*to see over the electrical layout of the school*	*experts*
broken door locks	*repairing of broken door locks*	*handy person*
openings between the asbestos roof and the walls in the secretary office	*to get rid of the openings, meantime cloth to cover*	*expert*
blockage of toilets	*unblocking of the toilets*	*handy person*
gully cover missing	*buying new gully cover and placing it on the gully*	*handy person*
2 manhole covers missing/broken	*putting on new manhole covers*	*handy person*
hand wash basin old/broken	*replacement of old hand wash basins*	*experts/ handy person*
Toilets not flushing properly	*replacing of flush system*	*experts*
		vat
		total

tools and material needed		budget	when is the activity to be done	comments
40 mesh wire(available in school box)+ school toolbox (available)		*0.00*	*2/3/18*	
Cow dung		*0.00*	*11/2/15*	
tree branches		*0.00*	*10/2/17*	
no		*118.72*	Mar-03	transport needed
no		*399.13*	*May-03*	*transport needed*
12 sliding stays (tools needed are available in the school toolbox)		*234.78*	*25-26/10/02*	*transport needed*
16 window glasses (9x 239x464 mm and 7x 276x35 mm), putty, 1 liter turpentine, High gloss		*361.32*	*Apr-03*	*transport needed*
3 window handles		*23.48*	*25-26/10/02*	
17 fluorescent tubes 1,20m (TLD 36), ladder		*2319.10*	*6/2/05*	*transport needed*
6 ceiling boards 1220x2440 mm), 1 box of wood screws and 100 fisher plugs M8		*576.82*	*10/2/22*	
5 chalk holders (2 chalk rails 2.10m and 3 chalk rails 3.3m), screws, plugs, tools in school toolbox to be used		*627.84*	*2/3/07*	
to be provided by an expert, Department of work will be approached			*2/3/21*	
5 lock set 4 level!? 460/313 solid, tools available in the school toolbox		*578.25*		
to be provided by an expert,			*in 5 year plan for renovations*	
tools available at the school. (Force pump, zoom)		*0.00*	*09/2002*	
3 gully cover		*24.78*	*05/2003*	
2 manhole covers (to be provided by Works?)		*434.00*	*1/3/19*	
hand wash basin, expert with his own tools			*in 5 year plan for renovations*	*training needed*
renovation of 4 blocks			*in 5 year plan for renovations*	
		542.47		

4158.90

4.3 Conclusion

Remember that:

- Without good planning it is not possible to have good maintenance at the school. The Principal has the ultimate responsibility for the Maintenance.
- Good planning needs to mobilize the human and material resources at the school. The human resources need mainly to improve their knowledge and practical skills. For this they need tools and material (material resources)
- A maintenance Committee is a way to mobilize both parents, teachers students, cleaners and handy persons.
- With Improved knowledge the caring attitude becomes better at the school
- When possible involve the school children in the maintenance

Glossary of Terms

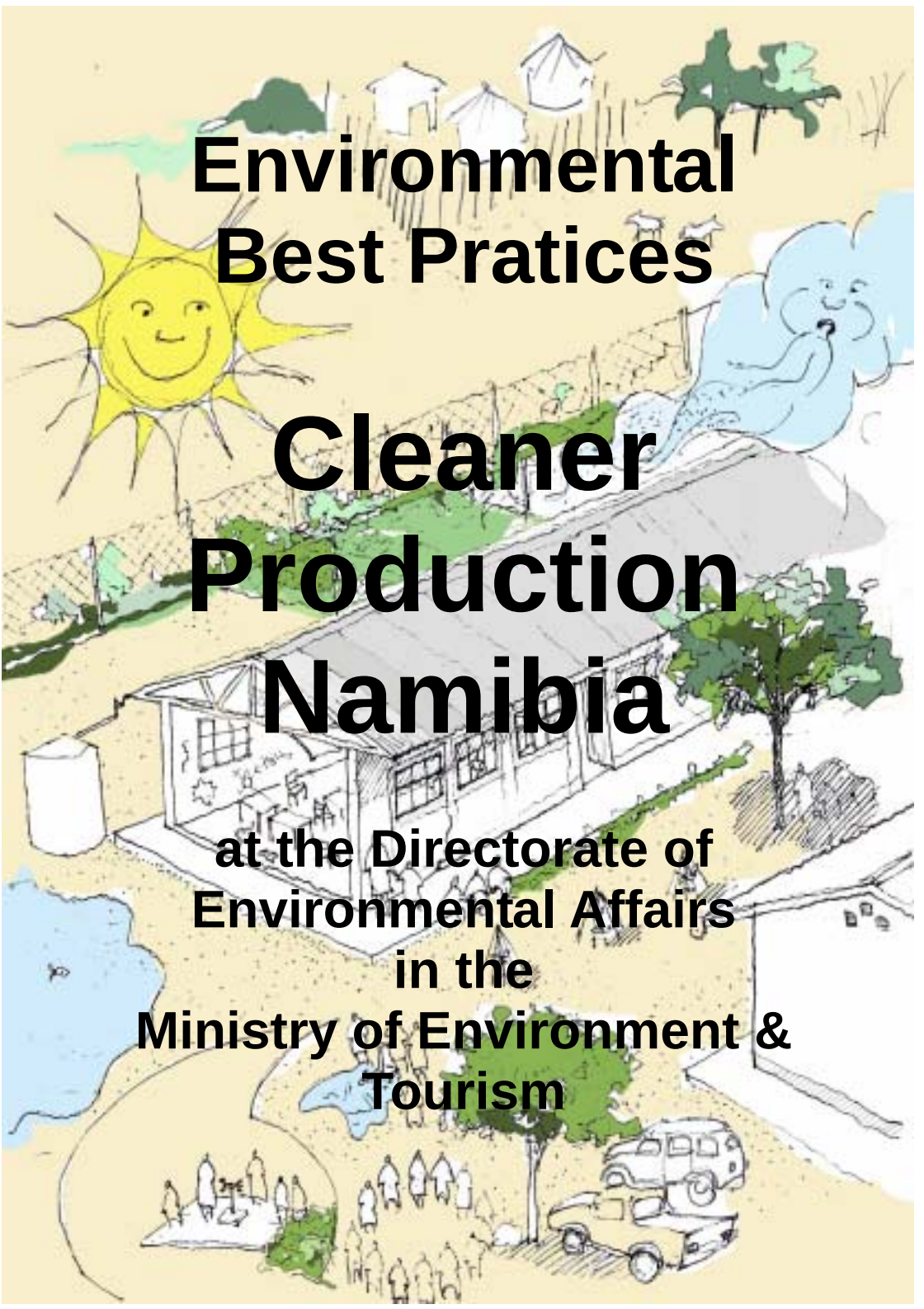
Word	Meaning
Accumulate	Become more and more, grow in number.
Anti-clockwise	In the opposite direction to the hands of a clock.
Asbestos	Grey fibre substance used for roofing.
Batteries	Power cells containing corrosive substances.
Blind Rivet	Method of joining two materials with a collapsable pin.
Brittle	Easily broken with sudden impact like glass or a clay pot.
Caustic Soda	White powder used for cleaning drains, very corrosive and dangerous
Ceiling	Structure which separates the roof from the room.
Cement	Fine grey powder used to make concrete.
Cheap	Costing not much money.
Cistern	A tank holding water with a filling device.
Clamp	A device used to hold items together tightly.
Clockwise	In the same direction to the hands of a clock.
Coarse	Rough, not smooth or fine.
Compost	Rotted vegetable matter used for growing plants.
Compression Fitting	A short pipe with bolts at both ends which
make	a watertight seal when tightened.
Concrete	Mixture of sand cement stone and water to create a very hard rock like material.
Copper	Brown metal used in plumbing and wiring,
very	soft and easily worked.
Corrective	To put something right or to fix something.
Cure	With regard to glues or concrete; meaning to go hard and (for glue) properly stick the items to be joined.
Detergents	Chemicals used for cleaning.
Diaphragm	Usually a round rubber item with no holes
Drill bit	A round metal bar especially shaped to remove material to create a hole.
Enrich	To add value, in terms of soil, to add food for plants to grow.

Ferrules	Round items shaped to fit into or on the end a chair leg to stop damage to a floor
Filler	Powder or chemical substance used for filling cracks or holes. Hardens in short time
Garbage	Rubbish. Unwanted items which are thrown away.
Gully	A built floor structure which directs water towards a drain and protects the drain
Gutter	A channel at the edges of roof sheets which channels water towards a gully or collection tank
Hacksaw	A tool used for cutting a variety of metals
Hinge	A mechanism of two parts, one being fixed and the other revolving around it. Used for doors etc.
Hue	A modified shade of colour
IBR Zinc Sheet	Roof sheeting most commonly used in Namibia
Maintenance	The practice of lengthening an items useful working life by effecting minor repairs
Masking Tape	A sticky type of paper used to protect items while painting for instance. Can be written on
Mortise Lock	A flat type of lock that fits into the edge of a door as with a mortise and tenon joint
Oil Stone	A manufactured flat stone for the sharpening of blades, chisels and planes
Organic	Usually plant life, not man made, animal or mineral
Perpendicular	Straight up from a surface, at ninety degrees to
Plasterboard	A soft powdery substance stuck together with paper to form an economical ceiling material
Plumbing	The practice of creating networks to supply water to buildings and facilities
Plunger	A rubber cup which sucks and forces air back and for ward to clear a blockage
Polypot	A cheap plastic pot used to grow small plants
Pothole	A hole or dip in a road or cement platform
Preventive	Stopping something from happening
Primer	A substance which stops rust and allows paint to stick better to a surface
Priority	Something urgent which must be done first
Putty	A sticky oily substance used to fix windows in the frames
Radiate	To give of heat or to send out heat, a fire radiates heat
Recycling	The practice of re using rubbish to create a new and useful thing

Reseating tool	A tool used for smoothing a tap seat so the rubber washer seals against it firmly
Roof Truss	The structure used to hold up the roof from the walls of the building
Rubber Washer	A rubber disc with a hole in the middle
Rusty	Brown powder or scale that develops on wet steel, making the steel weak
Sand paper	Paper which has sand or glass particles glued to it to make it rough for rubbing down old paint
Seating	In taps, the round metal area which the rubber washer sits against so stopping the water flowing
Seedling	A young plant
Shatter	To break into many pieces like glass
Sills	The ledges outside windows
Soldering	Using a soft metal to join two other pieces of metal like copper pipes, uses heat from a blowtorch
Spindle	A round item that revolves around inside a hole, like a tap handle shaft
Squareness	When two items are exactly at ninety degrees to each other
Steel wool	Fine wire twisted together to make an abrasive material
Stopcock	A main tap which turn off the water supply
Tang	The tapered end of a steel file which the handle fits onto
Tension	When something is tight like a rope or a hacksaw blade it is under tension
Termites	Insects that eat wood
Thinner	A chemical which reduces the thickness of paint
Transplant	To move a growing thing from one place to another, like a small tree
Valve	A mechanism which controls the flow of a liquid
Varnish	A sort of clear paint which dries to give a hard smooth surface on wood
Wall plug	A plastic or fibre plug which, when fitted into a hole in a wall, allows a screw to be screwed in.
Wood Plane	A tool for removing thin pieces of wood so reducing the wood in size accurately

Environmental Best Pratices

Cleaner Production Namibia



at the Directorate of Environmental Affairs in the Ministry of Environment & Tourism

Cleaner Production Namibia

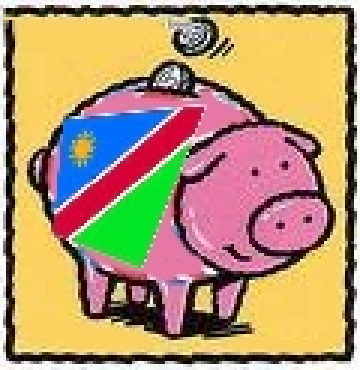
Cleaner Production Component (CPC), housed within the Namibian Ministry of Environment and Tourism's Directorate of Environmental Affairs, has been tasked with the promotion of Cleaner Production as a practical and achievable methodology to achieve improved environmental practice in Namibian industry.

The purpose of this Section is to assist entities of Namibian private and public sectors in identifying technologies of differing sophistication that can be easily implemented, thereby resulting in improved environmental and economic performance.

5. Environmental Best Practices

Making use of the Tips on Environmental Best Practices reduces the amount of input resources, such as water and energy, which is required in the running of everay entity existing in Namibia. It also reduces the amount of waste created that would ultimately be deposited at landfill sites.

Providing such services (water, energy and waste deposits) is getting more & more expensive in Namibia and the anticipated trend is for consistent price increases over time.



Thus implementing Best Practices at your premises will eventually help you saving money!

5.1 Tips on How to Save Energy

Replace all incandescent bulbs with energy saving lamps (CFL)

DID YOU KNOW: *replacing 50 incandescent 60W bulbs with 50 CFL bulbs of the equivalent 9W, with each light burning 6hrs a day and 240 days per annum will save you N$2220.00 in the first and N$ 2909.00 in every following year!*

Switch off lights during the day

DID YOU KNOW: *A cut of just 6 hours of individual bulb lighting every day will save you enough energy for six-months worth of evening TV viewing!)*

DID YOU KNOW: *i.e. switching off the coffee machine after the coffee has been filtered – and use a thermos can for storing will save you ~N$950.00 a year, each PC left on standby overnight and at weekends wastes ~N$900.00 per year in electricity*

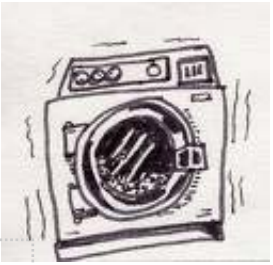
Switch off all electricity consumers not needed, including computers, screens, TV's and chargers for cell phones, laptops & cameras

DID YOU KNOW: *If we can all get into the habit of turning off or unplugging our chargers after use, we could cut 55,000 tonnes of CO2 from the atmosphere!*

Keeping your fridge or freezer as full as possible reduces the amount of energy it uses. Do not place warm or hot food in it, close its doors quickly, defrost it regularly and ensure that it is not exposed to sun in its location

DID YOU KNOW: *A half-empty fridge can use 20% more energy than a full one.*

Most modern detergents work just as well in cooler water. Why not try washing your clothes at 30°C to save energy and help to reduce CO2 emissions.
Save dirty clothes until a full load has accumulated

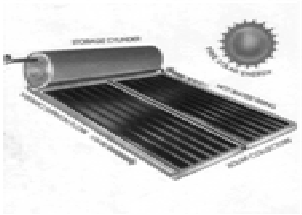


DID YOU KNOW: *Front loaders use less power than top loaders & Lowering the temperature of your wash could save you up to 40% on the running costs of your washing machine.*

Solar Energy

The biggest savings can sthough be achieved by moving away from electrical ovens, stoves and geysers to SOLAR powered devices.

Visit the HABITAT Centre in Claudius Kandovazu Street, Windhoek to see the variety of solar appliances available in Namibia.



DID YOU KNOW: *electrical geysers are responsible for approximately 60% of a standard household s electricity bill!*

! Keep track of your electricity consumption by monitoring your electrictiy meter regularly
! Be energy wise—switch off & save!

! Electric lighting adds heat to a space that must be removed in the summer by air conditioning. Turn lights off when not in use.

! Use the economizer cycle on the dishwasher and let the dishes drip dry instead of using electric heat to dry them.

! When the weather is nice outside leave the AC off and open the windows.

! Shop around for energy efficient computers, monitors and accessories.

! Be sure to open the windows now and again to air out the house or business. Fresh air is vital to human activity. Inadequate ventilation in an office or home can result in the "sick building" syndrome and possible illness to people within. Problems can range from dizziness or headaches to allergies or worse.

! Plant shrubs and trees around the air conditioning condenser to improve its operating efficiency. The shade makes it work less to cool the refrigerant circulating from the inside air handler. Plants help to purify air in the home. They extract carbon dioxide and create oxygen.

! Install an insulating blanket on the water heater so that it will operate more efficiently and cost you less each month.

! Install a timer on the hot water heater and turn it on only for a couple of hours each day when all the domestic chores are done.

! Drying clothes on a line instead of in a dryer uses less energy and is easier on the fabric too.

! The coils at the back of the refrigerator are heat exchange surfaces. Keep them clean and the unit will operate at peak efficiency.

! Standing with the refrigerator door open lets humid air in. This makes it harder to cool and it will condense in the freezer into ice.

! Modify the office dress code so people can dress more casually and be comfortable with the thermostat set a few degrees higher.

! If air is moving well, such as from a ceiling fan, it can be a little warmer and still give the sensation of being comfortably cool.

! Sweep and rake by hand instead of using a power blower.

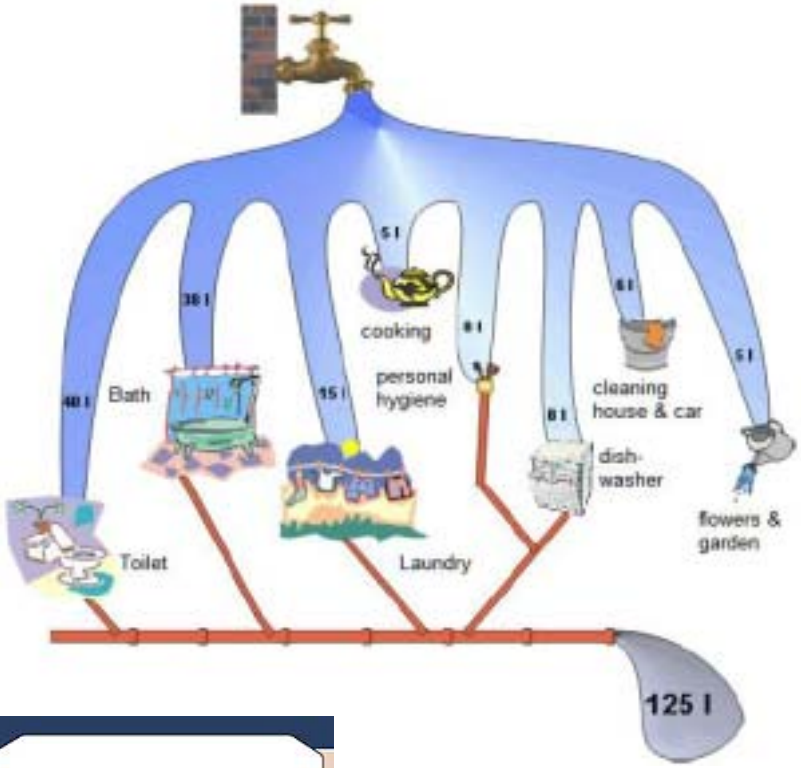
! Drive the speed limit and save diesel or gasoline.

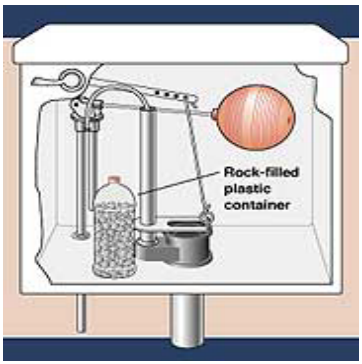
! When purchasing replacement appliances buy the energy efficient types.

! Building operators can save money by operating only one elevator on weekends and at night.

! Donate old appliances, tools and electronics to charitable groups so they can repair them for the less fortunate.

5.2 Tips on How to Save Water





Looking at the picture above you will see that the biggest water consumer in a standard private household is the TOILET.

By placing one or two 1 liter plastic bottles, filled with water, pebbles or sand into the tank you can reduce the amount of water that runs off per flush by up to 20%

By hanging a lead weight (such as the fishermen use) onto the lever that puls up the flushing device, you can achieve even more savings as the toilet flushes only as long as you press the lever down.

Water your plants early or late in the day to reduce evaporation

Use a shut-off nozzle on your hose

Use plants that require less water

Mulch around plants to hold water in the soil

Get Energy Star labeled electric devices

Wash only full loads

Use a low flow shower head or install a flow restrictor

Take shorter showers

Turn off the water while soaping hands or brushing teeth

Turn off sink faucset while washing dishes or pots

Install aeratos on all faucets

Use a broom not a hose to clean driveways or walkways

! Never put water down the drain when there may be another use for it such as watering a plant or garden, or cleaning.

! Verify that your home is leak-free, because many homes have hidden water leaks. Read your water meter before and after a two-hour period when no water is being used. If the meter does not read exactly the same, there is a leak.

! Repair dripping faucets by replacing washers. If your faucet is dripping at the rate of one drop per second, you can expect to waste 2,700 gallons per year which will add to the cost of water and sewer utilities, or strain your septic system.

! Check for toilet tank leaks by adding food coloring to the tank. If the toilet is leaking, color will appear within 30 minutes.

! Avoid flushing the toilet unnecessarily. Dispose of tissues, insects and other such waste in the trash rather than the toilet.

! Store drinking water in the refrigerator rather than letting the tap run every time you want a cool glass of water.

! Create an awareness of the need for water conservation among your children.

! Encourage your school system and local government to help develop and promote a water conservation ethic among children and adults.

! Cover your pool whenever it is not in use

How to include the importance of water and water conservation into school studies or staff training sessions:

Here are a few ideas for educating the next generation about the importance of water in our lives. Remember these are just a start, the more creative you can be the better.

The Arts: paint pictures, view or present performances or sing songs that convey the water conservation message
English: read articles or debate water related issues in your local area, or write stories about the role that water plays in your life
Health & Physical Education (HPE): discuss how water quality and quantity can impact the health of the individual and community relations; investigate the functions of the local water authority
Mathematics: apply mathematical inquiry and techniques to measure rainfall in your local area, carry out a water audit at your school, or understand the amount of water used in your local region; get students to monitor water use at home - read the meter daily, determine how much water is used per person in the household and set percentages for improvement - most improved could win a prize at the end of a month / term / year

5.3 Natural Cleaning Products

If you are concerned about risks to your health or the environment, you may want to consider using homemade, all-natural cleaning products instead.

White Vinegar: The queen of getting it clean, white vinegar, is mildly acidic and disinfecting. It's great for removing calcium deposits, such as those in your humidifier. It's also a potent grease and stain remover. You can use it to clean hard surfaces such as countertops and glass.

Pure Soaps don't contain any synthetic colours, scents or additives and are usually available in health and natural product stores. Pure soap is great for basic light cleaning and can be combined with a few drops of an essential oil for an added air-freshener effect.

Lemon Juice: Lemon juice is a great grease-cutter. When washing your dishes, add it to your water along with a pure soap. Lemon juice is also great for cutting through grease on porcelain and aluminum.

Salt is a great basic scrub that will give you extra cleaning power. Great for smaller jobs like removing tea stains from the inside of cups or cleaning out the coffee pot. Just fill pot with ice-cubes, pour in some salt and swirl.

Baking Soda: is another effective scrub and a gentler alternative to salt. You can also place an open box in your fridge and freezer to help eliminate odors.

All-Purpose Cleanser: Combine ½ cup of pure soap, such as Castile, with one gallon of hot water and 1/4 cup of lemon juice.

Bathroom Tub and Tile Cleaner: Soak a firm bristle brush in a good all-purpose cleaner. Then add baking soda for extra cleaning power. You can also clean grout by combining one part water and three parts baking soda to make a scrub.

Dusting Spray: Combine 1 tsp olive oil and ½ cup of vinegar. Store in a squirt bottle or keep in a jar. Apply small amount of mixture to a soft cloth for use on your wooden furniture.

Fabric Softener: Add 1/4 cup white vinegar to your washer's final rinse cycle.

Glass/Hard Surface Cleaner: Combine ½ cup white vinegar with a gallon of water. Soak cloth, ring it out slightly and use on your surface. Keep a clean chore towel handy for drying.

Sink Scrub: Combine equal amounts of salt and baking soda to make a scrub for your kitchen sink.

Grandma’s Cleaning Tips

! soak ink stains in coca cola overnight, then wash as usual

! to remove old blood stains, soak in a solution of 1 part ammonia to 8 parts water, then wash with a few drops of ammonia added to your usual laundry liquid or powder

! to remove blood stains from carpet, mix starch and water to a thick paste and apply it to the stain - once the powder is dry, brush or vacuum off

! rub chewing gum with ice and then scrape or chip off as much as possible - use methylated spirits or eucalyptus oil to remove any residue

! for crayon marks on walls, spray with a lubricating oil, such as WD40, then wipe - follow with dishwashing liquid diluted in water and wash with a sponge

! to remove the residue left by glue and adhesives, rub with eucalyptus oil on a soft cloth

! remove marks from leather by rubbing gently with eucalyptus oil on a soft cloth

! to remove stains on marble, mix baking soda, water and lemon juice to make a paste. Rub into the stain, rinse and dry

! to remove pencil marks from walls, rub with a clean, white eraser, rub stubborn pencil marks with toothpaste (not a gel)

! if the wax is on material, scrape off as much as possible then put the item in the freezer. When the wax has hardened, it should come away easily

! most stains on wood can be removed by rubbing them with a cork

! to get a glistening, no streak finish for your windows and mirrors, clean them with some methyl spirits diluted in water, then rub dry with screwed up newspaper

! to clean drains that are slightly blocked or gurgling, put half a cup of bi carb soda followed by half a cup of vinegar down the drain. Put the plug in and leave for 10 minutes, then remove plug and pour boiling water down to flush the pipes

! to clean copper, rub with a paste made of equal parts vinegar, salt and flour

! to clean brass, dip a damp cloth in Worcestershire sauce and rub well. Buff the item with a soft cloth

! to clean terracotta tiles, wash with vinegar

! to clean baseball caps, put them through a cycle in the dishwasher - they'll come out clean and won't lose their shape

! to keep wooden floors shiny, wash with half a cup of kerosene added to a bucket of warm water.

! to clean and shine slate floors, use a capful of carwash detergent in a bucket of hot water

! to deodorize carpets, mix two parts of corn flour with one part borax. Sprinkle liberally on carpet, leave one hour, then vacuum

5.4 Waste Management

There are 3 key factors to take into consiederation when thinking about Waste Management:

REDUCE: Waste reduction starts with your shopping habbits. By making slight alterations to your shopping list you can significantly reduce the amount of waste created in and around the home.

REUSE: Many items found around the home can be used for different purposes. So before you throw those items away, think about how they can be reused.

RECYCLE: Many materials can be recycled, such as paper, plastic, metal and glass. Other items such as furniture, electronic equipment, building material and vehicles can also be recycled.

Did you know that:

- 1 recycled tin can would save enough energy to power a television for 3 hours.
- 1 recycled glass bottle would save enough energy to power a computer for 25 minutes.
- 1 recycled plastic bottle would save enough energy to power a 9-watt energy saving light bulb for 20 hours.
- 70% less energy is required to recycle paper compared with making it from raw materials.
- Up to 60% of the rubbish that ends up in the dustbin could be recycled.
- The unreleased energy contained in the average dustbin each year could power a television for 5,000 hours.
- On average, 16% of the money you spend on a product pays for the packaging, which ultimately ends up as rubbish.
- As much as 50% of waste in the average dustbin could be composted.
- Up to 80% of a vehicle can be recycled.
- 9 out of 10 people would recycle more if it were made easier.

5.4.1. Reduce Waste

Buy only what you need
Reduce unnecessary waste by avoiding those pointless purchases. Items that rarely get used can be borrowed or shared with others.

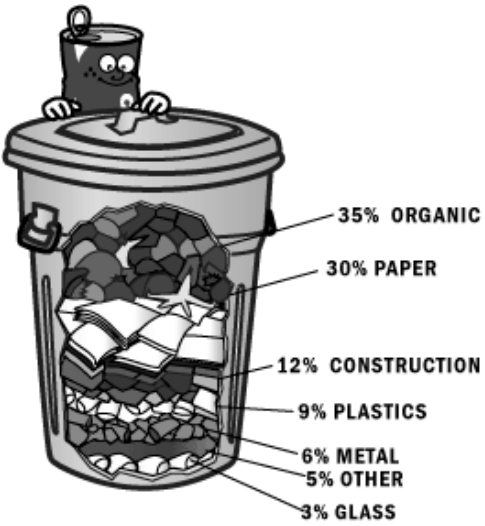
Buy products that can be reused
Buy bottles instead of cans and rechargeable batteries. Items such as this create very little waste, as they don't have to be thrown away after they have been used just once.

Buy all-purpose household cleaner
Instead of buying many different ones for each cleaning role.

Buy products with little packaging
So that less packaging ends up in your rubbish bin. For those items you use regularly, buy them in bulk instead of in smaller amounts.

Sell or give away unwanted items
Reduce waste by donating unwanted items to family, friends or neighbours. Or sell your possessions in a garage sale and earn some extra cash.

Find safer alternatives to hazardous household products.
You can even make your own household cleaners using products such as baking soda and vinegar, olive oil, lemon juice and salt



Most important of All

Think before you throw away!

5.4.2. Reuse Waste

Carrier bags and twist ties.
Carrier bags can be reused in the shops or as bin bags around the house. Paper bags make useful wrapping paper and twist ties can be used to secure loose items together, such as computer wires.

Jars and pots.
By cleaning glass jars and small pots, you can use them as small containers to store odds and ends.

Newspaper, cardboard and bubble wrap
Make useful packing material when moving house or to store items.
Old clothes - can be made into other textile items such as cushion covers or teapot cosies.

Packaging
Such as foil and egg cartons can be donated to schools and nurseries, where they can be use in art and craft projects.

Scrap paper
Can be used to make notes and sketches. Don't forget to recycle it when you no longer need it.

Old Electrical Equipment
Donate old electrical equipment to schools or community centers so that others can reuse them.

Donate Old Clothes and Books
Other people can reuse your unwanted clothes and books when you donate them to charity shops.

Rechargeable Batteries
Rechargeable batteries can be reused many times before they need throwing away, opposed to regular batteries that create unnecessary waste.

Build a Compost Bin
You can reuse many waste items, such as eggshells and old tea bags, using a compost bin. This waste then degrades and turns into compost that can be used to help your garden grow.

Grass Cycling
After mowing your lawn, instead of throwing the grass cuttings away, leave them in your garden. The nutrients from the cuttings go back into the soil and act as a fertiliser.

5.4.2. Recycle Waste

Find ways of recycling different materials
Many materials can be recycled, such as paper, plastic, metal and glass. Other items such as furniture, electronic equipment, building material and vehicles can also be recycled but many people don't often think to do so.

Buy products that can be recycled.
When shopping at the supermarket, buy products that can be recycled easily such as glass jars and tin cans.

Buy products that have been made from recycled material.
You can tell if a product is eco-friendly by looking at the label on the packaging.

Avoiding buying hazardous material.
It is difficult to recycle products that contain hazardous waste. Try to find safer alternatives to household cleaners and buy non-toxic products whenever possible.

Recycle bins.
Make sure you have a range of recycle bins in your home that can be used for materials such as glass, paper, aluminium and plastic. Keep it in an obvious place so you won't forget to use it. .

Cash for cans
This project gives money to people who recycle their aluminium cans. Collect-A-Can is represented in several municipalites, so get involved and earn a bit of extra cash in the process.

You can recycle all your glass, tins, paper, cardboard and plastics ...
in Windhoek with:

- MOVE A MESS. 26-30 Copper St., Prosperita

In Walvis Bay with:

- WESTCOAST RECYCLERS, at the dumping site

You can deliver all your hazardous waste in Windhoek to the Kupferberg Dump Site.

Many municipalities have sites for building rubble and garden refuse

Standard Symbols

Mobius Loop—This indicates whether the product can be recycled.

Mobius Loop with Percentage—This indicates how much of the product is made from recycled materials.

Tidyman Symbol—Implies that you should dispose of the product carefully, do not litter.

Green Dot—Indicating that the recovery of packaging material in some European countries has been paid for.

European Ecolabel—A European symbol that shows the product has been produced in an environmentally friendly manner.

Green Seal—A symbol used by the USA to show that a product has been produced in an environmentally friendly manor.

Glass—This symbol indicates to recycle glass in bottle banks.

Aluminium—This symbol indicates that the product is made from recyclable aluminium.

Steel—This symbol indicates that the product is made from recyclable steel.

These symbols indicate what type of plastic the product is made from:

Polyethylene Terepthalate

High Density Polyethylene

PVC

Low Density Polyethylene

Polypropylene

Polystyrene

All other resins and multi-materials

"Only when the last tree has been cut down,
Only when the last river has been poisoned,
Only when the last fish has been caught,
Only THEN will you find that money cannot be eaten."

(Prophecy, alleged to originate from the Cree people of North America)

6. Ten Steps to Good Environmental Practices

1. **Generate staff support and implement training**
2. **Undertake environmental audits, evaluating water, energy & waste consumption and costs in all key areas of the entire establishment and familiarise yourself with relevant legislation.**
3. **Compare your totals against accepted standards**
4. **Determine excess consumption and calculate costs.**
5. **Establish an action plan to reach goals that includes capital and non-capital, maintnance and operational costs.**
6. **Implement action plan.**
7. **Calculate payback periods.**
8. **Establish a monitoring programme.**
9. **Monitor progress.**
10. **Continuously train staff, support and update staff on environmental objectives.**

eco awards Namibia

The world's natural resources are being consumed faster than nature can replace them and faster than man can try to replace them with artificial means.

Therefore the question is how to ensure that environment-friendly companies are re-warded within the economic system.

An answer is the **eco awards Namibia** programme introduced in Namibia at the end of 2004.

The **eco awards Namibia** will be a mark of distinction for accommodation establishments which are planned and managed according to eco-friendly principles.

The criteria for the **eco awards Namibia** which form the basis of assessment are subdivided into seven categories:

- Conservation
- Waste & sewage disposal
- Social responsibility
- Water
- Energy
- Staff welfare & development
- Sustainable & appropriate construction & landscaping.

The **eco awards Namibia** are intention-ally modelled on the well-known quality grading system of stars: up to five (desert) flowers may be awarded. An assessor visits applicants for assessment and on the basis of his/her report an independent jury determines the number of flowers due.

Similar to the badge with the stars, establishments can display the flower emblem at their entrance, in their brochures and on their website.

For more information go to our web site
www.ecoawards-namibia.org
or contact us under
info@ecoawards-namibia.org

7. Usefull Contacts

A list of usefull web sties we found whilst working on this booklet, without any value or sorting nor grading in regards to their contetnts.

The Local:
www.ecoawards-Namibia.org >> eco awards Namibia Alliance
www.HANnamibia.com >> Hospitality Association of Namibia
The Easy:
www.water-guide.org.uk/ >> The Guides Network
www.electricity-guide.org.uk/ >> The Guides Network
www.recycling-guide.org.uk/ >> The Guides Network
www.biggreenswitch.co.uk/ >> The Big Green Switch
www.almanac.com/ >> The Old Farmers Almanac
http://cleanup.org.au/au/ >> Clean up the World
The Detailed:
www.linux-host.org/energy/ssavelc.htm >> 65 WAYS TO SAVE ELECTRICITY
www.americanwater.com/49ways_savintips.htm >> American Water & Energy Savers
www.energysavingsecrets.co.uk/ >> EnergySavingSecrets 2006
http://home.howstuffworks.com/ >> HowStuffWorks, Inc.
www.enn.com/ >> Environmental News Network
http://energysavingnow.com/tips/ >> energy saving now
www.sustainable.org.za/greenbuilding/ >> Sustainalbe Energy Africa
www.savewaterus.com/ >> Utility Savers®
www.sydneywater.com.au/SavingWater/WaterSavingTips/ >> Sydney Water
www.sydneywater.com.au/SavingWater/InYourHome/GreyWater/ >> Sydney Water
www.michaelbluejay.com/ >> Michael Bluejay
www.wateruseitwisely.com/ >> Water Use It Wisely
www.h2ouse.org/index.cfm >> California Urban Water Conservation Council
www.treehugger.com/ >> TreeHugger
http://hometown.aol.com/erikschiff/ >> Erik's Wastewater Homepage
www.environment-agency.gov.uk/ >> The Environment Agency 2007
http://housekeeping.about.com/cs/environment/a/alternateclean.htm
>> About, Inc., A part of The New York Times Company
www.thisland.uiuc.edu/57ways/57ways_1.html >> 57 Ways - University of Illinois
The Scientific:
www.sustainabilityinstitute.net >> The Sustainability Institute of South Africa
www.leonardodicaprio.org >> Leonardo Dicaprio Eco Site
www.ecotourismcesd.org >> Centre on Ecotourism & Sustainable Development

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